An approach for identifying conflicts in technology adoption at the informal, formal and technical level

An Approach for Identifying Conflicts in Technology Adoption at the Informal, Formal and Technical Level

HENLEY BUSINESS SCHOOL
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A thesis submitted to the University of Reading in fulfilment of the requirements for the degree of Doctor of Philosophy in Business Informatics, Systems and Accounting

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Declaration

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Dedication

This PhD thesis is dedicated to my parents and my sister for their endless love, support and encouragement.

Abstract

Innovation and technology adoption is crucial to the effective enhancement and/or improvement of an organisation's performance. Existing technology adoption models fail to facilitate consideration of all aspects (i.e. individual, organisational, technology systems), and fail to highlight where conflict between aspects occurs. By considering the interplay of individual, organisational and technological aspects, the aim of this thesis is to investigate innovation patterns within business environments and/or relationship structures that encourage positive individual adoption activity in organisations. Data was captured in Thailand, a country that has recently faced considerable technology and infrastructure adoption. Technology turnover in Thailand is fast, and innovation adoption across Thai society is a key to economic development.

Using a mixed methods approach, with the use of both quantitative and qualitative data capture, this thesis combines three interconnected activities:

Activity 1 relates to identification of a classification scheme to support innovation adoption pattern analysis. The research justifies the need for, and describes the development of, a dual aspect adoption model, which was developed on the theoretical foundation of Ronald Stamper. The dual aspect model was strongly influenced by Stamper's semiotic onion, which divides systems into informal, formal and technical norm layers. Stamper's semiotic onion, which in turn was influenced by Edward T. Hall's 'Crucial Trio Concept'. Two overlapping semiotics onions were used to represented, and highlight, the interaction between two systems; with each system representing either an individual, an organisation, or a technology. Adoption matrices were identified and nine points of potential conflicts were discovered. The adoption matrix was validated using a survey questionnaire, conducted by 217 respondents, who had been or were involved in technology adoption projects. Results showed that the order, definition of, and flow between Stampers norm layers, i.e. as defined in Stamper's organisational semiotics onion, is not evidenced empirically within modern day organisations. Results implied that norm definitions, and norm layer interaction or empirical data aligned with Hall's original Major Triad definition. Moreover, results highlighted a significant relationship between the innovation matrix and individual cognitive dissonance and technology perception states, suggesting the need to consider individual internal beliefs/concepts when considering

innovation adoption. In terms of contributions, the section: provides a quantitative validation of Stamper's semiotic onion; suggests a new onion that should be used when representing individual, technology and/or organisational systems; proposes the reshaped dual aspect model, based on Hall's Major Triad, as a tool to study the interplay between two systems; introduced a reshaped alignment framework, based on Hall's Major Triad, which allows the decomposition of systems conflict, and implies that full informal and formal alignment between the two systems is not essential, as implied by Stamper, in order for a business to achieve technical level innovation. The contributions allow combined consideration of individual, organisational and technology aspects, and supports, decomposes, and guides management of the innovation process.

Activity 2 relates to the expansion of our understanding of the technology adoption conflicts by development of a framework to identify, in context of business, potential aspect conflict impacting technology adoption; i.e. to support problem identification, communicate and support resolution of aspect conflict, and affiliate management of change. This research investigated relevant norm structures from the literature, i.e. to capture the activities related to individual, organisational and technology aspects. By facilitating common business methods, i.e. BPMN / UML components and norm analysis, a framework was proposed to identify relevant structures, using the classification scheme. The research subsequently, using case example, qualitatively investigated how problem identification, communication, conflict resolution, and management of change can be contextually handled in a range of business contexts. The framework was validated via the use of relevant case studies. From the framework, we were able to answer to the research question in terms of contributions, practitioners can apply the developed framework to guide their gap analysis process, and apply the bundled framework as a guidance towards detailed analysis, towards detecting possible conflicts arising from technology adoption. Moreover, this framework can be considered as a method for capturing and highlighting conflict in the innovation adoption process.

Activity 3 investigated the relationship between adoptions and individual factors, i.e. to support enhancement of the conceptual innovation model. The research investigated the impact of individuals by applying the CVScale, which captures Hofstede's five cultural dimensions enhanced for measurement at the individual level. Moreover, by employing use of 3D-RAB and Kano model, i.e. to investigate the relationship between innovation, technology and the

individual dimension, we show the importance of the individual's concept layer on user behavioural activity.

The result from SEM analysis shows that long-term orientation (LTO) dimension, influences the attitude towards targeted behaviour (ATTB) and the attitude towards changing non-target and/or maintaining current target behaviour (ATCMB); sub factors of individual cognitive dissonance. SEM confirmed that individual dimensions influence the individual's cognitive dissonance state; i.e. the individual's attitude towards target behaviour and the individual's attitude towards changing / maintaining behaviour. Moreover, it was shown that gender and technology types have moderating effects on the relationship between LTO and ATTB. In terms of contributions, this section provides insightful understanding of the relationship between individual dimensions, individual attitude according to the innovation adoption process.

This thesis, as a whole, provides a significant contribution as combination of the activities allows us to investigate adoption patterns and/or relationship structures that encourage positive individual adoption activities in organisations. The practical contribution, from this thesis, is that business users can fundamentally apply the dual aspect model, the dual innovation path incorporating with the framework for analysis of interacting systems. These models help identifying of, and support management of, potential conflicts and changes that must be implemented to support innovation adoption in business.

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Chapter 1

1.1 Introduction

An innovation is defined as a combination of ideas, processes, and technologies that is adopted to solve specific problems (Gallivan, 2001). An adoption pattern is defined in this thesis as the structure of the relationship between organisations, individuals (members of the organisation), and technology, which defines the context of a specific adoption. This PhD thesis sets out to discover the structured patterns of innovation, focusing on actions, which are presented within the business environment.

To gain acceptance in business, technology has to be adopted by individuals (Gallivan, 2001). Accordingly, it is important for organisations to understand the reaction of individuals, when adopting technology as part of their work practice and responsibility within the business organisation. The benefits of this research will improve the understanding of the role that individual play, as an organisational member, in the acceptance and use of technology when implemented.

1.2 Research Background

Innovation can be subdivided into two areas (Crossan & Apaydin, 2010): innovation as a new outcome - such as a new product or service; and innovation as a new approach - such as a new method to solve a problem. When considering innovation as a new outcome, individuals and/or groups require activities to promote new idea generation. Some leading IT companies, for example, provide 'play areas' where employees can relax. Such companies hope that creative 'play' will result in higher productivity, development of new products, and/or promote employee society and satisfaction (Singh, 2006). When considering innovation as a new approach, organisations may need to change existing processes and/or structures in order to incorporate new technologies and management innovations.

Organisations make process and structural changes with the objective of strengthening organisational competitiveness (Cevahir et al., 2013) and/or maintaining or improving business market position (Joshi et al., 2010). Business operations within an organisation consist of

multiple members/stakeholders, such as individual employees, business units, partners, external organisations, etc. Changes to organisational processes/structures may be viewed by different stakeholders with a different interpretation and framing. One stakeholder might perceive the change as an improvement, or an enhancement, whilst another might view it as unnecessary, a threat to their job, or a wasteful use of resources (Crossan & Apaydin, 2010; Roberts et al., 2012).

Individuals often possess preconceived negative ideas about new technologies; since implementation of new technologies may risk significantly impacting both organisational structures and individual roles (Liang et al., 2007). Since introduction of new technology risks the changing of routine work, processes, individual performance, and self-worth (Goodhue & Thompson, 1995), system implementers are obliged to emphasise and introduce plausible factors; i.e. to show the positive contribution that can be made by successful adoption of new technologies. Accordingly, this research considers the impact of the individual on innovation adoption, and places greater emphasis on i.e. user perception and social norms (Davis et al., 1989; Venkatesh et al., 2003).

Existing innovation adoption theories, such as Social Cognitive Theory (SCT) (Compeau & Higgins, 1995); Technology Acceptance Model (TAM) (Davis et al., 1989) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003), largely focus only on the individual aspects of technology adoption. This thesis discusses the importance of the organisation by considering organisational semiotics (Stamper, 1993), and emphasises the importance of presenting the information with existing organisational systems in a simple and structured form (Stamper, 1973). The semiotics onion, however, does not support the individual aspect as it was designed for use by the organisation to support technical development – as an outcome within the business system (Stamper et al., 1994). Therefore, this thesis emphasises the need for the development of a model that combines both the organisational and individual aspects, and the interaction of these, to facilitate an improved understanding of individual activity, technology innovation, and adoption patterns in organisations.

From a theoretical viewpoint, the research conducted within this thesis is relevant, and has adopted methods and theories from existing models and theories, such as: Diffusion Of Innovation (DOI) (Rogers, 2003); Technology Acceptance Model (TAM) (Davis et al., 1989);

Organisational Assimilation (Gallivan, 2001); and Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003).

1.3 Research Motivation

The research motivation for this study is to develop an innovation adoption model to consider individual, organisational, and technology aspects by determining the behavioural pattern of individuals in organisations, i.e. investigating and analysing adoption patterns presented within organisations concerning individual activity. Three aspects are involved in the innovation process (Gallivan, 2001; Rogers, 2003), which will therefore be investigated, are: Individual, organisation and technology (Gallivan, 2001; Rogers, 2003).

These three aspects play an important role within the adoption process: The organisation represents a business system, which exists to achieve the key business goal of creating profit. Individuals perform the activity, or activities, within the organisation within defined and/or structured roles. Technology facilitates the individual in achieving the business activities, and helps both organisation and individuals to maximise efficiency. We need to understand / model interaction of these three aspects as the interaction of organisation, individual and technology impacts success. We need to be able to contextualise where interaction occurs to support identification, communication of, and management of change in business. Accordingly, to prevent failure in the adoption of innovation we need to increasingly consider and integrate consideration of the individual factors when discussing IS implementation and process-based organisational change.

1.4 Research Questions

The research questions considered in the thesis are:

RQ1: What models identify new technology adoption misalignment?

RQ2: What model and relationships will help to align?

RQ3: How can we validate the model?

RQ4: What framework would help to identify misalignment?

RQ5: What factors would help to identify better technology adoption alignment?

1.5 Research Aim and Activities

This research aims to investigate adoption patterns and/or relationship structures that encourage positive individual adoption activities in organisations.

Activity 1: To identify a classification scheme to support adoption pattern analysis.

Activity 1.1: To design the classification scheme, the individual and organisation dimensions will be investigated within existing literature.

Activity 1.2: To investigate and evaluate the classification scheme to show whether individual cognitive dissonance and technology perception are effectively defined, captured, and analysed.

Activity 1.3: To understand the interplay of organisational, individual and technology aspects, to ensure appropriate application of the classification scheme to support technology adoption.

Activity 2: To develop a framework, to identify in context of business, potential aspect conflict impacting technology adoption; i.e. to support problem identification, communicate and support resolution of aspect conflict, and affiliate management of change.

Activity 2.1: To investigate the relevant structures from the literature, to capture aspect conflicts that arise from technology adoption.

Activity 2.2: To develop a framework to identify relevant structures, using the classification scheme, and capture the aspect conflicts that arise as a result of from technology adoption.

Activity 2.3: To evaluate the framework via use of relevant case studies.

Activity 3: To investigate the relationship between innovations and adoption factors, i.e. to support enhancement of the conceptual adoption model.

Activity 3.1: To investigate the relationship between innovation, technology and the individual with further exploration.

Activity 3.2: To investigate how individual dimensions influence the individual in cognitive dissonance state; such as the attitude towards target behaviour and attitude towards changing / maintaining behaviour.

Activity 3.3: To investigate how technology type affects the relationship between individual dimensions and individual cognitive dissonance state.

1.6 Research Significance and Contributions

Expected contributions will be academic, practical and methodological in nature. In terms of an academic contribution, the research will provide a debate concerning the existing innovation literature; combing consideration of individual, organisational and technology aspects to support explanation and prediction within the adoption process. The research will focus consideration of the interplay of organisational, individual and technological aspects, in order to design a model of, and a framework to support, the identifying conflict by utilising knowledge from literature. In terms of practical contribution, practitioners can apply the developed framework to guide their gap analysis process, and apply the bundled framework as a guidance towards detailed analysis, towards detecting possible conflicts arising from technology adoption. This framework can be considered as a method for capturing and highlighting conflict in the adoption process.

1.7 Thesis Structure

The structure of the thesis is:

Chapter 2 – Literature Review: This chapter reviews the relevant literature concerning innovation use, adoption and diffusion. In addition, we highlight consideration of the attitudes and perceptions behind the behaviour, such as consideration of dissonance. In this chapter we present the reader with background concerning related literature in order to justify and define the research problem.

Chapter 3 – Methodology: This chapter will explore the relevant contextual use of methodologies within this research. By initially considering the philosophical background, and the research paradigm, we aim to discuss relevant methods for obtaining and analysing data in our research. Methods introduced in chapter 3 will be appropriately implemented in chapters 4-6 in order to answer the specific research questions.

Chapter 4 - Dual Aspect Adoption Model: This chapter will investigate the interaction between individuals and the organisation in context of new technology adoption. By considering concepts, including crucial trio model (Hall, 1959), the semiotic onion (Stamper, 1993), individual cognitive dissonance (Wiafe et al., 2011), and technology perception (Kano et al., 1984), we aim to understand the interplay of organisational, individual and technology aspects; i.e. to ensure appropriate application of the classification scheme to support technology adoption. A quantitative study will be undertaken to identified process-based innovation patterns, i.e. the interplay of organisation, individual and technology aspects. We aim to present

the reader with a description of how adoption patterns can be defined, captured, and analysed. The chapter will introduce research relating to technology, process, people, and behaviour, in order to investigate the relevant structures, to facilitate identification of aspect conflicts that arise when innovation occurs.

Chapter 5 - An Approach for Identifying Conflicts from Technology Adoption: This study expands the classification scheme, defined in chapter 4, and, using case studies, aims to qualitatively investigate how problem identification, communication, conflict resolution, and management of change can be contextually handled in a business context. By using commonly used methods, such as BPMN and norm analysis, we aim to present the reader with a framework that can be used to help capture and manage aspect conflicts; caused as a result of technology innovation.

Chapter 6 - An Assessment of Individual and Technology Type: This chapter considers how individual factors impact technology innovation in business. Consideration of demographic and individual cultural aspects will be considered to highlight, to the reader, whether individual difference impacts the likelihood of aspect conflict and technology innovation problems. In addition, we will evaluate the effect of other relevant factors, such as technology type and gender, to provide additional insight into the influences of individual cognitive dissonance and technology perception.

Chapter 7 – Conclusion, Contributions, and Future Work: This chapter will evaluate and summarise the PhD research as a whole. We aim to present the reader with a clear summary of the work, critical consideration of the research contributions, and consideration of recommended future work.

Table 1.1 shows the thematic mapping between research questions and chapter content presented within this thesis.

Table 1.1: Structure of Thesis

Chapter Outline	Research Questions	Approach
1-Introduction		
2-Literature Review		
3-Methodology		
4-Dual Aspect Innovative Adoption Model	RQ1: What models identify new technology adoption misalignment? RQ2: What model and relationships will help to align? RQ3: How can we validate the model?	Quantitative
5-An Approach for Identifying Conflicts from Technology Adoption	RQ4: What framework would help to identify misalignment?	Qualitative
6-An Assessment of Individual and Technology type	RQ5: What factors would help to identify better technology adoption alignment?	Quantitative
7-Evaluation and Conclusion		

Chapter 2

Literature Review

The aim of this chapter is to review relevant literature concerning innovation use, adoption and diffusion in order to present the reader with a background concerning related literature in order to justify and define the research problem.

2.1 What is an Innovation?

The phrase innovation itself, has the potential to be misinterpreted; since innovation is often linked with words such as invention, new products, technology, new services, original, etc. (Oxford University Press, 2009). In reality, innovation implies success in practice, which is very much in contrast to invention, which means creation of a new thing. Innovation therefore does not only relate to the creation of new products or new services, but also includes new ways of producing existing products or services (Stokes & Wilson, 2010, pp. 106–109). Varying definitions of innovations, from various literature, is provided in table 2.1.

Table 2.1: Innovation Definitions

Authors	Definitions
Oxford University Press (2009)	"Any new approach to designing, producing, or marketing goods or services that creates value and gives the innovating company an advantage over competitor".
Rogers (2003)	"An innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (p.12). "Most of the new ideas whose diffusion has been analysed are technological innovations, and we often use the word "innovation" and "technology" as synonyms" (p.12-13).
Stokes & Wilson (2010)	"The terms innovation and creativity are often used interchangeably. In the context of small business management and entrepreneurship it is helpful to distinguish between them. Creativity is the generation of new ideas. Innovation is the successful exploitation of new ideas." (p.104)
Tidd & Bessant (2009)	"The real challenge in innovation was no invention – coming up with good ideas – but in making those inventions work technically and commercially." (p.15) "Innovation is more than simply coming up with good ideas: it is the process of growing them into practical use." (p.16)

In this thesis, innovation is defined as a combination of ideas, processes, and technologies that are used to solve specific problems (Gallivan, 2001). In literature, innovation is subdivided into two areas (Crossan & Apaydin, 2010): innovation as a new outcome - where individuals and/or

groups require activities to promote new idea generation; and innovation as a new approach – where organisations may be required to change existing processes and/or structures to incorporate new technologies and management innovations.

By considering the varying definitions, it can be concluded that innovation adoption, as a focused business activity, is a relatively new concept, which aims to satisfy adopters' needs (Bysted, 2013). But who are the adopters and what do they gain?

Organisations consider adoption of innovation for a variety of reasons: to remain relevant for their customers; to overcome business competitors (Gallivan, 2001); to seek a competitive advantage by exploiting the benefits from using technology (Fabrizio, 2009). Accordingly, organisations adopt innovative solutions to respond to their contextual needs (Cevahir et al., 2013), in order to change the business and integrate new ideas, new processes, or a new technology. Mustonen-Ollila & Lyytinen (2003) conducted a longitudinal study to investigate the adoption of information system process innovation and proposed four categories of process-based innovation: Project management and control procedures (M), Description method (D), development tools (TO), and baseline technology innovation (T). Changes to control procedures (M), have the potential to strengthen process quality and reduce any major project risks that may present themselves (Maruping et al., 2009). Changes to the description method (D), when placed within context of innovation, help reconciling the understanding of different stakeholders, such as UML and BPMN can be used to support the communication between designers and developers within software development projects (Brambilla et al., 2012; Chaudron et al., 2012). Changes to the Development tool (TO) are the use of software to gain more organisational benefit from tool adoption. Increased use of Baseline technology innovation (T) aims to improve the efficiency of the business via use of new technologies, such as use of a cloud-base programming platform, e.g. Hadoop.

This chapter sets out to explore the rationale behind people's decision to use and/or adopt innovations within organisations, and how doing so could help individuals and organisations to perform better by enhancing performance via technology adoption.

2.2 Innovation Pattern Analysis

Figure 2.1 illustrates a hypothetical case example to highlight the point that individual stakeholders / adopters are dependent on innovation use, however future innovation development is also dependent on adopter participation.

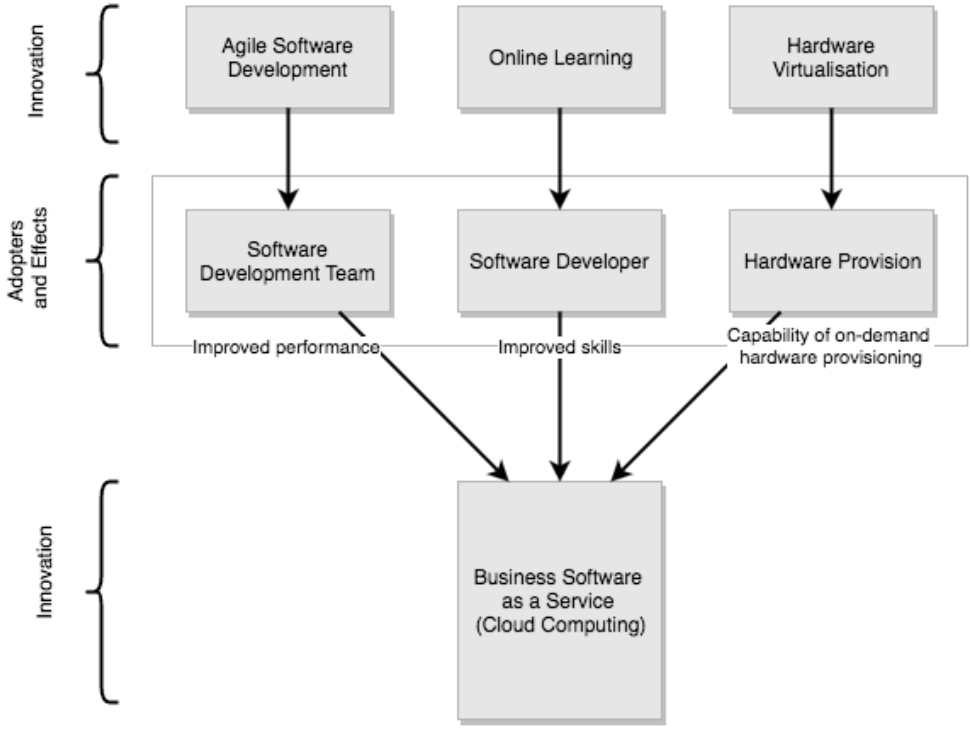

Figure 2.1: Innovation Effects (Gallivan, 2003; Carlo et al., 2011)

In the figure 2.1 case example, three innovations are adopted within the software development domain that positively affects the software developers, the project team, and the available hardware provision (Gallivan, 2003). In this case, the adoption of the agile software development concept is likely to improve team performance (Wang et al., 2012). The adoption of online learning will help support the improvement of an individual software developer's skills (Vidgen & Wang, 2009). The adoption of hardware visualisation changes the hardware provision available within the organisation in terms of speed and flexibility (He, 2015). These improvements, and the combination of these stakeholders, however, is potentially critical to the introduction of an innovation, i.e. in this example 'Business Software as a service'. Both stakeholders and innovations are potentially symbiotically dependent. But how does the relationship between organisations, individual stakeholders (members of the organisation), and technology impact future innovation adoption?

An adoption pattern is defined in this thesis as the structure of the relationship that exists between organisations, individuals (stakeholder mostly within the organisation), and technologies; i.e. what defines the context of a future innovation adoption. Adoption pattern analysis therefore focuses on explaining and breaking down the complexity of adoption process – so that innovation adoption can be understood and encouraged within the organisation. Accordingly, analysis should break down internal characteristics of an innovation (Gallouj & Weinstein, 1997) or external processes interacting when an innovation is adopted.

Literature demonstrates that innovation adoption occurs at multiple levels: business / management level, method / process level, and tool / technical level (McLeod & Macdonell, 2011). Mechanisms for analysing the adoption level of innovation exists, which can provide useful information for decision makers to support the shift of activity towards positive adoption of innovation within an organisation. Examples include: Adomavicius et al. (2008) who conducted a longitudinal study to analyse technology trends and defined how innovation patterns related to either component change, product change and infrastructure change; Baregheh et al., (2009) who conducted a study on cross sectional data, and the analysis defined how innovation can be classified as being of class: Stages (creation, generation, implementation, development, adoption); Social (organisations, firms, customers, social systems, employees, developers); Means (technology, ideas, inventions, creativity, market); Nature (new, improve, change), type (product, service, process, technical) Aim (succeed, differentiate, compete). These six dimensions of innovation provided a conceptual view to understand innovation at a more meaningful and in depth level (Baregheh et al., 2009); Gallouj and Weinstein (1997) proposed fundamental concept of innovation of service and defined modes of innovation as being: radical, improvement, incremental, ad hoc, recombinative, and formalisation.

Although classification approaches exist, they fail to consider the impact of the specific stakeholders and/or organisational systems, when defining the adoption pattern. This research should address this gap in existing literature.

2.3 Innovation Research and Scope

Within innovation research, numerous studies exist that focus on the phenomena of the application of technology in practice (Wang et al., 2012). By examining current literature concerning the types of innovation, this research was able to identify how technology is adopted by organisations, and by the individuals within these organisations. Table 2.2 defines and compared three significant areas of innovation research that currently exist within literature, i.e. Use, Adoption, and Diffusion.

Table 2.2: Innovation Model Comparison

Model	Descriptions	Examples
Use	This type of research focuses on factors that influence usage behaviour. This concerns the question, why people use technology and what drives or promotes the use of technology based on individual profile and preference.	Davis et al. (1989), Compeau and Higgins (1995), Compeau et al. (1999), Venkatesh and Davis (2000), Venkatesh et al. (2003), Venkatesh and Bala (2008), Venkatesh et al. (2012)
Adoption	This type of research is different from "use" research as it is in organisational context. Technology adoption normally begins with an objective to achieve business goals. Adoption research focuses on formalising the process to demonstrate how technology is selected and used in organisation pre and post-adoption i.e. continuation or discontinuation.	Gallivan (2001), Mustonen-Ollila and Lyytinen (2003)
Diffusion	Diffusion research focuses on the social interaction aspect. The underlying assumption is that individuals and organisation play a role and take positions in the diffusion network, and that innovation or technology works as a trigger to initiate change in the network.	Rogers (2003)

Most innovation literature considers adoption at an individual level - focusing on whether and why the individual uses a specific technology. Special note, however, should be placed on consideration of adoption literature, due to the fact that this research links to the research questions of this thesis – i.e. consideration of the link between the individuals, organisations, and technology adoption.

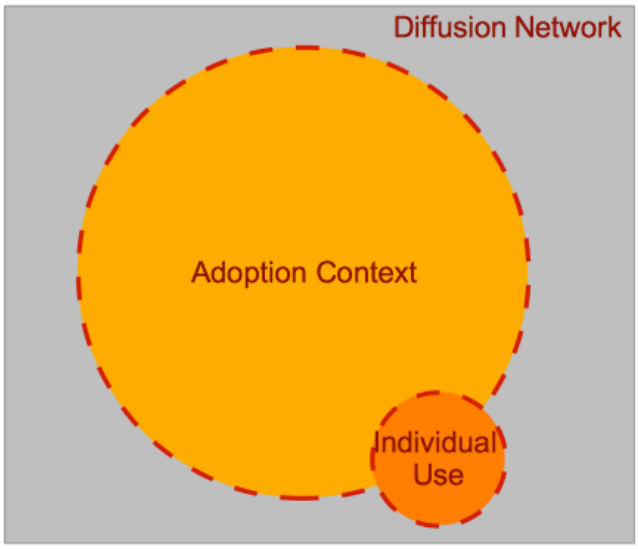

Figure 2.2: Type of Innovation Research based on Scope

Figure 2.2 represents the diffusion network for any innovation, i.e. the possible potential adoption space. For example, the potential diffusion network space for a modern mobile phone relates to all possible business functional capabilities, i.e. the sum of functions provided by the hardware and applications available on the specific device. The adoption context, as shown in figure 2.2, represents the scope of current use within the organisation. Accordingly, much diffusion potential exists (shown in grey), as many phone functionalities exist that are not adopted by the organisation. Individual use relates to the function activity of a specific individual, who is likely to focus on functionality that is specific to the roles that he/she is assigned in the organisation; and/or on functionality that is of personal interest of the individual. Personal activity, i.e. individual use that sits outside the organisational adoption scope, may include informal use of applications and tools that help the individual to perform his/her task, yet are not currently adopted within the organisation as common practice.

The size and overlapping of the three areas are significant, in that they indicate the achievement of the adoption process (Swanson & Wang, 2005), and highlight the potential of the technology, the current acceptance of this potential within the organisation, and the alignment between innovation adoption in organisations and individuals.

2.4 Innovation Process Cycle

Innovation process cycles consists of similar generic steps, which relate to: defining the problem; selecting the innovation; implementing the innovation; and evaluating the innovation success (Rogers, 2003; Crossan & Apaydin, 2010). In Information System (IS) literature there are a number of specific innovation cycles proposed.

Rogers (2003), proposes the innovation process (see figure 2.3), which consists of five steps: agenda-setting, matching, redefining / restructuring, clarifying, and routinising. The agenda-setting stage, focuses on the needs of an organisation for innovation. The matching step identifies which innovation is suitable as a solution regarding organisation needs (Rogers, 2003). After the Agenda Setting and Matching stages, i.e. the initiation phase, the decision for implementation is made (Mustonen-Ollila & Lyytinen, 2003; Rogers, 2003).

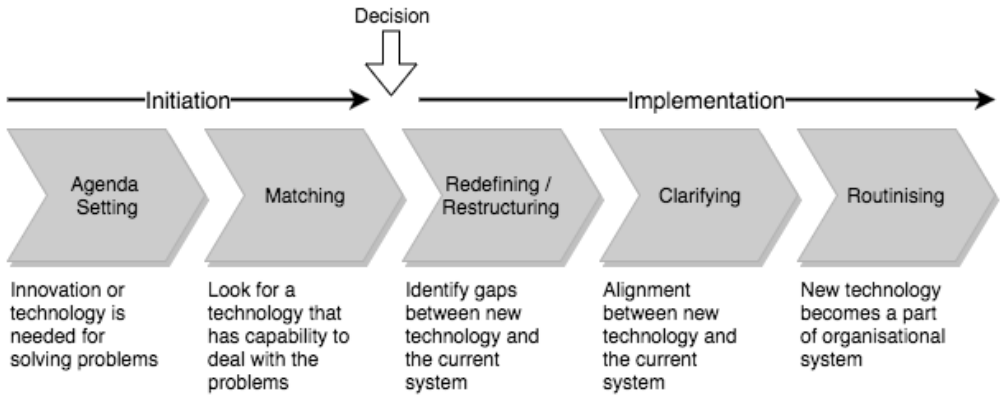

Figure 2.3: The Innovation Process in an Organisation adapted from Rogers (2003)

When the appropriate innovation is chosen (the decision point), customisation is achieved within the redefining / restructuring stage. The redefining / restructuring stage ensures that the innovation implementation fits within the target context requirements. Accordingly, within the redefining / restructuring stage organisational structural change may be considered. Once the innovation has been appropriately customised, the 'Clarifying' stage ensures that the innovation is used by participants in the organisation context to ensure user acceptance. Finally, all participants are required to routinise the solutions, i.e. to incorporate the innovation as part of their regular activities. The final three stages, are considered part of the implementation phase (see figure 2.3).

Gallivan (2001) suggests, for IT innovation adoption to be successful, that an organisation make decisions at a managerial level (either corporate, division or department), which is considered as primary authority adoption selection. At managerial level, the adoption involves decision of management and results in managerial intervention and facilitating conditions to support secondary adoption (organisational assimilation process). Individuals are only considered in the second adoption process with the assumption that all innovation is driven by senior management and/or the organisation. The 'Assimilation Stage' allows management to implement an appropriate vision to support the implementation and usage of IT innovations (see figure 2.4). The assimilation stage is critically significant as it relates to the stage when the user interacts with the innovation, and has been shown to significantly impact success.

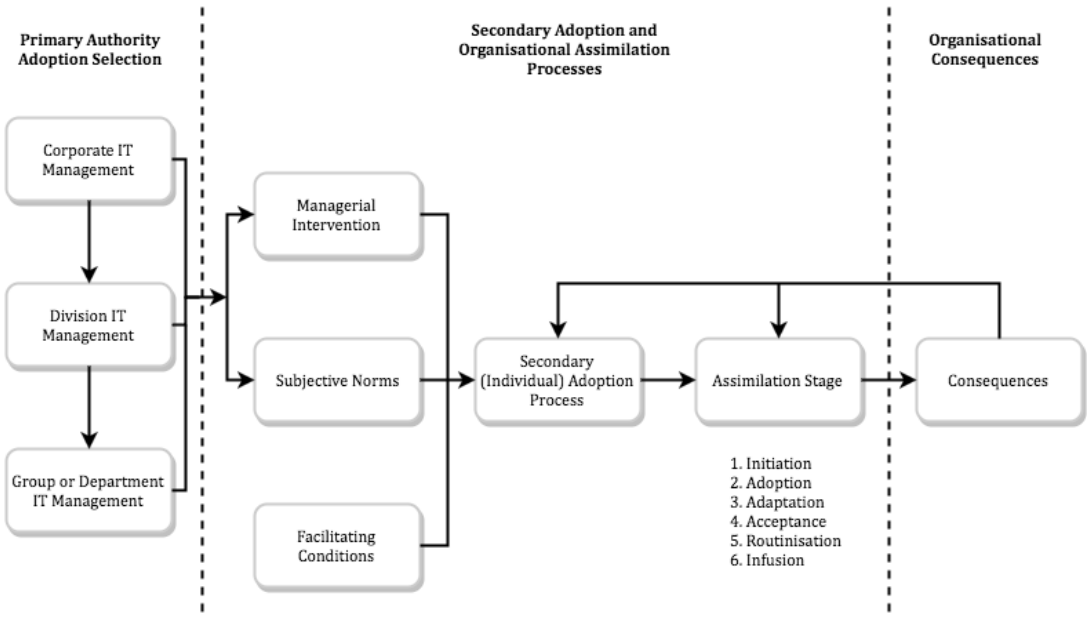

Figure 2.4: Organisational Adoption and Assimilation Process of Complex Technological Innovations adapted from Gallivan (2001, p. 60)

Within this assimilation stage, Gallivan (2001) indicates detailed steps to support positive individual absorption of innovations, which are:

1) Initiation is the step that an innovation is required in an organisation to solve problems;
2) Adoption is the step that an organisation has made the decision to invest resources to adopt an innovation;
3) Adaptation focuses on changes needed to be applied to achieve the assimilation e.g. process changes, individual training;
4) Acceptance focuses on how to obtain commitments from participants;

5) Routinisation determines that the use of an innovation becomes a regular activity;
6) Infusion emphasises the level of use.

These two innovation process cycles share many common features (Cho et al., 2009). Both process cycles agree that an innovation is designed to solve problems and convey relevant information, concerning innovation acceptance needs, to relevant stakeholders; as stated in Gallivan's assimilation-acceptance step and Roger's clarifying step. Furthermore, the use of innovation for business operations, is also stressed in routinisation step in both models. The redefining/restructuring step in Rogers's model emphasises that innovations do not always fit within the intended environment at the beginning of the process.

However, they also have some clear differences such as Rogers's process mainly focuses on individuals, but does not include organisational aspect as proposed in Gallivan's assimilation stage. Both process cycles assume that individual use of technology was initially driven by organisations to solved identified business problems (Gallivan, 2001; Rogers, 2003). Since individuals often bring their own personal devices to use in business activities (Thomson, 2012), something not considered either model, and it seems likely that some of this personal activity introduces innovation within the organisation. The personal activity confirms the individual use that overlaps adoption context in figure 2.2.

After reviewing the innovation process cycles of Rogers and Gallivan assimilation stage (see figure 2.3 and 2.4), three generic steps were defined to simplification of existing innovation literature, i.e.: selection – i.e. defining and initiating the innovation adoption, which relates to Rogers's agenda setting stage and Gallivan's assimilation initiation step; adoption – i.e. relating to the decision process before use, which relates to Rogers's mapping/redefining and structure stages and Gallivan's secondary adoption and assimilation steps; and continuance – relates to facilitating continuing use, which relates to Rogers's Clarifying / Routinising stages and Gallivan's Acceptance / Routinisation / Infusion steps. See table 2.3 to see a critical alignment of Rogers's Stages and Gallivan steps.

Table 2.3: Comparison between the reviewed innovation process cycles and the simplified process

<table>
<tr><th>Rogers's Model</th><th>Gallivan's Model</th><th>Generic Innovation Stages</th></tr>
<tr><td>Agenda setting</td><td rowspan="2">Initiation</td><td rowspan="2">Selection</td></tr>
<tr><td rowspan="2">Matching</td></tr>
<tr><td>Adoption</td><td rowspan="3">Adoption</td></tr>
<tr><td>Redefining/Restructuring
(Both innovation object and organisation structure)</td><td rowspan="3">Adaptation</td></tr>
<tr><td>Clarifying</td></tr>
<tr><td rowspan="3"></td><td>Acceptance</td><td rowspan="3">Continuance</td></tr>
<tr><td>Routinising</td><td>Routinisation</td></tr>
<tr><td></td><td>Infusion</td></tr>
</table>

2.5 Understanding Innovation Literature

In table 2.3. we aligned Rogers's innovation model and Gallivan's assimilation stage steps (which relates to inclusion of the individual), and proposed three generic stages in innovation, i.e. innovation selection, innovation adoption, and innovation continuance.

The first stage is 'Selection'. In this stage, an agreement has to be made, whereby innovation is proposed as a solution that contains a sense of newness and is created to solve problems. To allow innovation, it is critical that the problem is appropriately defined/clarified. The capabilities of available innovations are considered, in order to 'solve' the identified problem, and includes selection between innovation options.

The second stage is 'Adoption'. Within this stage, the drive towards the successful use innovations is supported by the adopters / the stakeholders in organisations. This stage considers internal and external factors that impact attitudes and behaviour, thus support integration of the innovation within the company.

The final stage is related to 'Continuance'. Where the success of innovations in terms of response to the problems and effects to the participants are confirmed through the use of innovation within daily business operations.

The following three sections, 2.5.1 - 2.5.3, discusses focused relevant literature relating to the interaction of organisation, individual adoption, and technology in selection, adopt and continuance stages.

2.5.1 Innovation Selection

The selection stage, focuses on choosing the appropriate innovation in relation to the identified problems within the problem awareness stage. In this section, relevant innovation models, relating to innovation selection stage, are discussed (see table 2.4). This section aims to provide the reader with an understanding of the relationship between business goals / strategy and innovation choice.

Table 2.4: Summaries of Innovation Models

Authors	Topics	Constructs	Stage
Fichman (2004)	New paradigm of IT innovation	Quantity of the right stuff, innovation configurations, contagion effects, management fashion, technology destiny, innovation mindfulness	Selection
Kaganer et al. (2010)	Legitimacy – rationale of innovation adoption	Legitimacy	Selection
Rogers (1995)	Diffusion of innovation	Relative advantage, compatibility, complexity, trialability, and observability.	Selection / Adoption
Lyytinen and Damsgaard (2001)	Complex technology as an innovation	Complexity of technology	Selection / Adoption
Swanson and Ramiller (2004)	Innovation mindfulness	Mindfulness and mindlessness	Selection / Adoption

Dominant Paradigm for IT Innovation - (Fichman, 2004)

In prior innovation models, innovation profile consists of size and structure, knowledge and resources, management support, compatibility, and competitive environment (Fichman, 2004), which are independent variables relating to the innovation context. Fichman (2004) stated that increased levels in these independent variables increases the chance of innovation; i.e. dependently impacting variable such as earliness of adoption, frequency of adoption and extent of implementation (see figure 2.5).

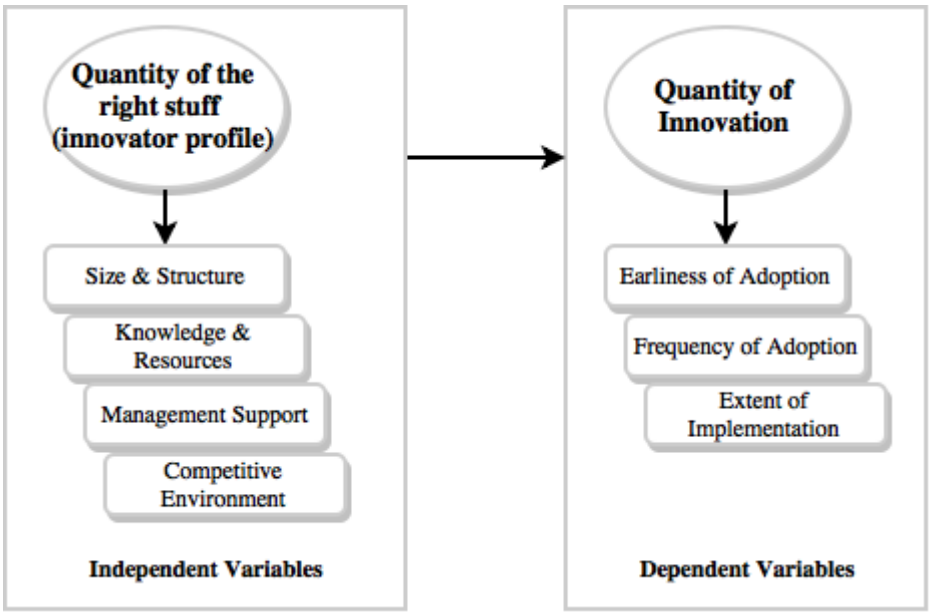

Figure 2.5: The Dominant Paradigm for IT Innovation adapted from Fichman (2004, p. 317)

Fichman (2004) proposed a new dominant paradigm within the IT innovation domain, he enhances the model by adding seven new dimensions. The dominant paradigm concept implies that the right input should result in the optimised output, the new created model largely considers innovation profile; i.e. innovation configurations, contagion effects, and management fashion as an independent variable, that lead to a quantity of innovation (performance impacts and quality of innovation) and allows firms to maximise their resource capabilities (Fichman, 2004). External factors that influence the success of innovation, such as technology destiny and innovation mindfulness have also been included (see figure 2.6).

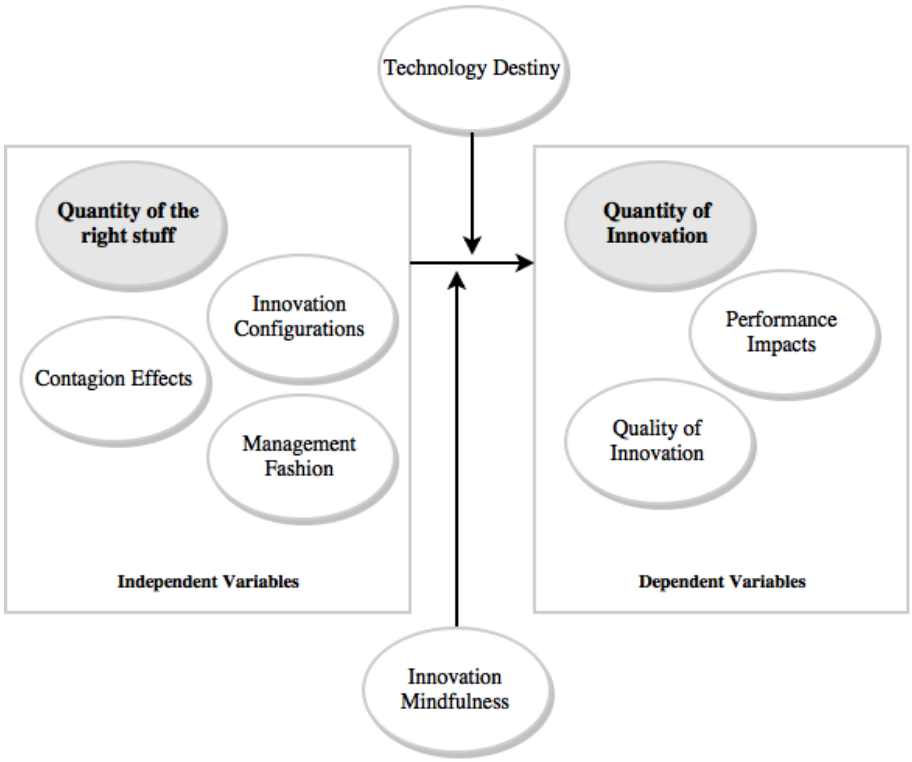

Figure 2.6: Going Beyond the Dominant Paradigm adopted from Fichman (2004, p. 319)

The dominant paradigm in figure 2.6 stressed that relevant factors (innovation configurations, contagion effects, management fashion, technology destiny and innovation mindfulness) should be considered within the innovation selection stage.

Legitimation functions for IT innovations - (Kaganer et al., 2010)

Kaganer et al. (2010) investigated the legitimation functions for IT innovations, at an organisational level. At this level, there are three procedures relating to the diffusion of IT innovations: legitimation, interpretation, and mobilisation' (Kaganer et al., 2010).

Legitimations is considered the motivation behind IT innovation adoption and Interpretation is the way to understand the complexity of IT innovations. Mobilisation is the function that supports adopters regarding technical and knowledge topics (Kaganer et al., 2010). This study proposes four forms of legitimacy, which are: cognitive, pragmatic, normative and regulative. Cognitive can be described as appropriation or fitness of the adoption, such as functions or structures that fit within the organisation and also the benefits from learning new knowledge. Pragmatic refers to as demands for the adoption according to the interests of organisation

(solving problems, improving performance). Normative is where organisation perceives that the adoption aligns with organisational norms and culture. Regulative is defined as compliance with the rules and regulation (Kaganer et al., 2010). The reasons for adopting IT innovation are based on the business needs, i.e. compatibility with organisational systems, and alignment with organisational behaviour and conformance with norm, rules, and regulations.

This section aims to provide the reader with the understanding of the overall context of innovation selection that the selected innovation will need to be evaluated on certain criteria in order to achieve adoption success. Those criteria are: functional alignment, business needs alignment, organisational and social structure alignment and regulatory alignment.

Roger (1995), Lyytinen and Damsgaard (2001), and Swanson and Ramiller (2004) consider both selection and adoption stages. Additional detail concerning these studies will be considered, in context of the adoption stage within section 2.5.2.

Selection Summary

In the selection stage, which relates to activity of the organisation. Related studies have included some theoretical constructs: the characteristics of an innovation; innovation configuration and technology destiny; and the relationship between of innovation adoption and selection criteria (Fichman, 2004; Kaganer et al., 2010). All constructs are identified within table 2.4. The selection stage, therefore focuses on reviewing relevant factors to ensure that an appropriate solution will be chosen to solve the problem.

2.5.2 Innovation Adoption

The innovation adoption stage focuses on factors that affect adoption decision and changes/customisation that need to be made to the innovation or within the organisational structure. The key adoption models (see table 2.5) will be discussed in this section and analysed.

Table 2.5: Summaries of Innovation Models

Authors	Topics	Constructs	Stage
Rogers (1995)	Diffusion of innovation	Relative advantage, compatibility, complexity, trialability, and observability.	Selection / Adoption
Lyytinen and Damsgaard (2001)	Complex technology as an innovation	Complexity of technology	Selection / Adoption
Swanson and Ramiller (2004)	Innovation mindfulness	Mindfulness and mindlessness	Selection / Adoption
Davis et al. (1989)	Technology acceptance model	Perceived usefulness and perceived ease of use	Adoption
Compeau and Higgins (1995) Compeau et al. (1999)	Self-efficacy Individual reaction	Self-efficacy, outcome expectation, encouragement by others, others' use, support, affect, anxiety, and use	Adoption
Mustonen-Ollila and Lyytinen (2003)	Factors affecting IS adoption	Ease of use, standard, user need recognition, own trials, autonomous work, learning by doing, technological; infrastructure, and past technical experience	Adoption
Venkatesh et al. (2003)	Acceptance and use of technology	Performance expectancy, effort expectancy, social influence, facilitating conditions, personality (gender, age, experience, willingness), behavioural intention, use behaviour	Adoption
Wang (2009)	Innovation popularity	Determinant of popularity (business/social problem, related innovation concept)	Adoption

In the following section, we present literature (Roger, 1995; Lyytinen and Damsgaard, 2001; and Swanson and Ramiller, 2004) relating to both selection and adoption stages. We aim to presentation to the reader that much focus is required to understand selection criteria and adoption processes.

Diffusion of Innovation Theory (DOI) - (Rogers, 1995)

Rogers (1995) proposed the diffusion of innovation theory (DOI). In his work Diffusion is defined as 'the process in which an innovation is communicated via certain channels over time amongst members of a social system" (Rogers, 2003; p. 5). He defined four components of DOIs, which are: the innovation, communication, time and the social system. Communication is described by Rogers (2003) as the process of exchanging knowledge, and understanding about an innovation among participants. The time dimension is described as a timeline for considering the innovation processes, and the rate of adoption. Social System is described as a unit of individuals, groups, or organisations, which share the same common objectives regarding innovation. In addition, an innovation has five relevant characteristics (Rogers, 2003), which are: *relative advantage, compatibility, complexity, trial-ability, and observability*. Apart from the main components of DOI theory, which primarily focus on the selection and adoption stages, The DOI model has the potential to explain the potential benefits of innovation.

If, for example, we were to introduce analysis software, use of the innovation (software) is given further credibility when external credible sources, such as research workshops and online learning platforms, talk about the significance/benefits of its use (Zhu et al., 2006). Rogers five characteristics therefore should each be considered when selecting and adopting an innovation.

Critique of Diffusion of Innovation Theory (DOI) - (Lyytinen and Damsgaard, 2001)

Critiques of Roger's Diffusion of Innovation Theory (DOI), include Lyytinen and Damsgaard (2001); who critiqued the DOI theory by using the networked and complex technologies as an innovation. Lyytinen and Damsgaard argued that an innovation should be examined as a system by integrating multiple level or layer of analysis. Gupta et al. (2007) also agree that researchers should consider a multi-level model for the innovation study because the innovation process involves more than one element or level, such as individual and organisation levels (Gupta et al., 2007) or strategic and operational levels (Gallivan, 2001).

Lyytinen and Damsgaard (2001) provided an additional perspective of innovation, i.e that innovation should be perceived as a complex social system rather than a technical object. Lyytinen and Damsgaard also stressed that technology adoption can impact multiple stakeholders when being implemented within organisation, which must be effectively considered.

Mindfulness - (Swanson and Ramiller, 2004)

Swanson and Ramiller (2004) propose the concepts of mindfulness and mindlessness, which can impact innovation adoption within an organisation. Mindfulness is awareness of an organisation to changes happening regarding innovation adoption, whereas mindlessness is resistance or lack of awareness. These concepts influence the innovation in organisations. They proposed that mindful behaviour focuses on the objective of technology adoption whilst mindless behaviour stresses on how to fit the innovation into the organisation. Mindful organisations are aware of changes happening regarding innovation adoption, whereas mindless organisations are likely not to accept the changes from technology adoption. These two concepts were used and aligned with the IT dominant innovation paradigm from Fichman (2004), i.e. that innovation mindfulness moderates the relationship between innovation inputs and innovative outcomes.

Consideration of the work of Swanson and Ramiller (2004) provides the reader with the understanding of the relevance stakeholders' mind-set towards technology adoption. Innovation acceptance is dependent on an adoption plan and strategy that persuaded stakeholders to collaborate with innovation adoption. In innovation pattern analysis, there should be a requirement for an instrument to measure stakeholders' persuasion.

In the following section literature is discussed relating to purely the adoption stage.

Technology Acceptance Model (TAM) – (Davis et al., 1989)

Davis et al. (1989) proposed Technology Acceptance Model (TAM). This model focuses on the use behaviour. The TAM theory considers factors that influence technology usage, such as perceived usefulness (PU) and perceived ease of use (PEU), according to a particular technology. These perceptions toward technology affects individual attitude, which informs behavioural intention (acceptance) and actual use. PU assesses individual perception on benefits of using technology in terms of increasing an individual's performance. PEU assesses individual perception towards the effect from using technology that can take more effort and decrease individual performance. TAM tends to analyse the effect of technology usage perceived by individuals in either a positive and negative way.

Consideration of TAM provides the reader with the understanding that behavioural usage has been studied in different perspectives, such as technology driven-TAM, which stresses the importance of aligning technology adoption with the individual aspect in innovation pattern analysis.

Social Cognitive Theory (SCT) - (Compeau and Higgins, 1995)

Compeau and Higgins (1995) investigated user behaviour of computer technology using the social cognitive theory (SCT). Self-efficacy is the main construct within this study, whereby an individual considers their own capability in order to use a technology. This attitude creates other factors, such as expectation (performance, personal), preferences, and nervousness, which can lead to self-regulated user behaviour. Compeau et al. (1999) investigated the impacts of self-efficacy through innovation usage (computer). They argued that self-efficacy is the "beliefs about one's ability to perform a specific behaviour" (p.146). According to their findings, self-efficacy influences outcome expectations (performance, personal) and leads to innovation

usage. In their study, they evaluate related theories in order to explain the phenomena. Accordingly, pressure can be created through high expectations, that can affect the user's behaviour (Abbasi et al., 2015).

In extension to the work of Compeau and Higgins (1995), research shows that confidence to innovation use increases when new users discover that their colleagues are using the innovation with great success; creating positive feedback and encouragement of use (Baptista & Oliveira, 2015). Social environment can also create expectation pressure on the individual, or on the result outcome (Davis et al., 1992; Wickert et al., 2015).

Consideration of Compeau and Higgins (1995) provides the reader with the understanding that internal individual factors such as self-efficacy play an important role to influence individual use behaviour. In the innovation pattern analysis, specifically in adoption stage, internal individual factors should be focused.

Factors affect IS Adoption - (Mustonen-Ollila and Lyytinen, 2003)

Authors who have extended this work include Mustonen-Ollila and Lyytinen (2003), who conducted a longitudinal study using four generations of information system in order to investigate the factors that affects the decision to adopt innovation. Mustonen-Ollila and Lyytinen showed the factors that influence the decision to adopt innovation, which include: Ease of use; IT standard; user need recognition; user personal experience; level of user autonomy; experience learning by doing; technological level; infrastructure type; and past technical experience (Mustonen-Ollila and Lyytinen, 2003). In addition, Kapoor et al. (2014) conducted a meta-analysis to investigate antecedents and descendants of Rogers' five factors (relative advantage, compatibility, complexity, trialability and observability) and found that there are relationships with some factor, such as ease of use and compatibility, and there are possible relationships that could reconfirm the DOI theory.

Consideration of Mustonen-Ollila and Lyytinen (2003) provides the reader with an understanding that there are various factors related with technology adoption. Those factors were evaluated based on a specific context, which should be taken into consideration when capturing or applying use of innovation pattern analysis.

Unified Theory of Acceptance and Use of Technology (UTAUT) - (Venkatesh et al., 2003)

Venkatesh et al. (2003) proposed the Unified Theory of Acceptance and Use of Technology (UTAUT) model. The UTAUT model focuses on the user behaviour and behavioural intention, in a similar way to the TAM and SCT theories. UTAUT considers factors that influence technology usage, such as: social environment, business expectancy on individuals, management support; and individual characteristics moderators, such as: gender, age, experience, willingness as moderators. UTAUT tends to agree with the SCT theory in terms of the social environment, which influences the user intention and also in terms of the facilitating environment that directly influences use behaviour, in SCT, this factor is seen as indirectly affecting use behaviour.

This section aims to provide the reader with the understanding that behavioural usage has been studied in different perspectives such as technology driven-TAM, individual driven-SCT and organisational driven-UTAUT, which stresses the importance of considering individual and organisational aspects in innovation pattern analysis.

Popularity of Innovations – (Wang, 2009)

Wang (2009) proposed the popularity concept, which supports the adoption of innovation. The model defined drivers of adoption (organisation, technology, and environment) which then leads to adoption of innovations. The adoption of innovations is found, in commercial examples, to influence the popularity of innovation. One example, i.e. extreme programming (XP), is commonly popular and is widely considered the most preferred agile method (Mangalaraj et al., 2009). The popularity of an innovation was also found to influence the adoption of innovations; for example, studies found that most software development firms were, and still are, willing to adopt this popular agile approach (Wang et al., 2012).

Consideration of Wang (2009) provides the reader with the understanding that an innovation will be more likely to be adopted when that innovation's popularity is perceived by adopters. The innovation popularity could be one of classification in conducting innovation pattern analysis.

Summary of Innovation Adoption

Innovation adoption models primarily investigate the characteristics of innovation object and the adopters' behaviour (Scott & Bruce, 1994) to investigate the success indicators of an innovation (Damanpour, 1991). The innovation adoption stage defines and establishes the steps in the decision-making process to adopt an innovation, and the subsequent process steps to customise innovation for the implementation context; the process to investigate organisational changes and the step to obtain commitment from stakeholders.

According to the information collected, and presented in table 2.5, the innovation models that relate to innovation adoption are identified as: Innovation characteristics, e.g. relative advantage (Rogers, 1995); Innovation complexity (Lyytinen & Damsgaard, 2001); self-efficacy Mindfulness (Swanson & Ramiller, 2004); Self-efficacy (Compeau & Higgins, 1995); Business driven technology usage (Venkatesh et al., 2003); IS adoption factors (Mustonen-Ollila and Lyytinen, 2003); and Innovation popularity (Wang, 2009). The seven studies presented above are significant within the adoption stage. Innovation adoption research considers these determinants, from which this study aims to include as factors for innovation patterns analysis.

Consideration in section 2.5.2 aims to provide the reader with the understanding of the relevance of related innovation studies, which confirms the research focus on individual, organisation and technology perspectives when addressing innovation pattern analysis.

2.5.3 Innovation Continuance

This section focuses on the last generic stages, i.e. innovation continuance. The innovation continuance stage focuses on the effects, behaviours or activities occurring with individuals or organisations after the adoption decision. This section will discuss the key studies of innovation continuance models (see table 2.6).

Table 2.6: Summaries of Innovation Models

Authors	Topics	Constructs	Stage
Bhattacherjee (2001)	Expectation confirmation theory (ECT)	Perceived usefulness, confirmation, satisfaction, IS continuance intention	Continuance
Limayem et al. (2007)	IS continuance usage - Habit	Comprehensiveness of usage, frequency of past behaviour, habit	Continuance

Expectation Confirmation Theory (ECT) – (Bhattacherjee, 2001)

Bhattacherjee (2001) investigated continuance intention of an online banking system. This study applied the Expectation Confirmation Theory (ECT). ECT considers adopter's expectation and adopter's experience. The reconciliation of these two factors will result in confirmation of innovation adoption. Confirmation of innovation adoption satisfies adopters and highlights adopter's intention to continue using the innovation. Bhattacherjee's findings emphasised the belief that online banking system could be perceived as useful as not only affecting the decision to adopt innovation, but could also influence the continuance use after the initial adoption. For example, adopters might stop using the online banking system, if they found out that the online banking system does not provide satisfactory service functionality.

Consideration of Bhattacherjee (2001) provides the reader with the importance of aligning innovation adoption with business requirement that lead to confirmation of innovation adoption. Maintaining adopter's expectation and experience will result in confirmation and satisfaction of adopters. Therefore, innovation pattern analysis should focus on organisational alignment.

Continuance Usage - Habit – Limayem et al. (2007)

Limayem et al. (2007) investigated IS continuance usage, they discovered that *habit* greatly affected IS continuance usage in addition to the IS continuance intention of use. Habit means adopters are able to use the adopted innovation as part of their daily activity. This implies adaptation, assimilation, routinisation and infusion steps of Gallivan's process (Gallivan, 2001). Habit also determines the innovation persistence (Le Bas et al., 2015), which confirm that the adopted innovation is not only confirmed and satisfied by adopters but also routinised into adopters' habit.

Consideration of Limayem et al. (2007) provides the reader with the understanding that aligning innovation adoption with adopter's habit (individual behaviour) will result in the continuance usage of the adopted innovation. Innovation pattern analysis should consider innovation adoption and individual behaviour alignment.

Summary of Continuance

In the continuance stage, which relates to activity of the organisation, related studies have included some theoretical constructs: expectation; adopter's experience; confirmation; satisfaction; and habit (Bhattacherjee, 2001; Limayem et al., 2007). All constructs are identified within table 2.6. The continuance stage, therefore focuses on reviewing relevant factors to measure and predict innovation continuance behaviour of adopters.

2.5.4 Summary of Innovation Literature

In sections 2.51 - 2.5.3, we expanded relevant literature concerning selection, adoption, and continuance generic stages. The literature emphasises the relevance of individual, organisation and technology (innovation) aspects in innovation research. In the selection stage, the innovation is evaluated in relation with individual and organisation alignment such as business requirement, adopter's attitude. In the adoption stage, the innovation adoption is dependent on relevant factors such as stakeholders' persuasion, individual perception, organisational expectation, innovation characteristics. In the continuance stage, satisfaction and habit lead to continuance usage behaviour, which is the consequence from adopter's expectation was met with adopter's experience with innovation. This, therefore, reflects the alignment between innovation adoption and organisational and individual perspectives.

2.6 Organisational Aspect

In the previous section, we considered innovation literature relating to selection, innovation adoption, and innovation continuance stages. The majority of literature studies focused on consideration of innovation within organisations, and organisational systems, however this literature did not explicitly consider how the organisational aspect is represented and/or captured. In this section, we aim to present the reader with an understanding of how the organisation can be considered 'as a system', in order to highlight how innovations are accepted.

Semiotic Ladder / Onion – Stamper (1993)

Semiotics is the study on sign, which considers three different perspectives: object, sign and interpretant (Peirce, 1931-35). The interaction between these three elements is called the 'semiosis process' (see figure 2.7). The semiosis process relates to interpretation of signs, which can be words, images, texts; that carry meanings of its representing object. An interpretant is

the inner state of an individual interpreter who understand a sign in a particular context. The semiosis process can be used to analyse a business organisation. For example, a business organisation is considered as an object in the semiosis process. The business objective, processes or rules may be considered as signs, which represents organisational structures and activities; and is contextually interpreted by organisational stakeholders.

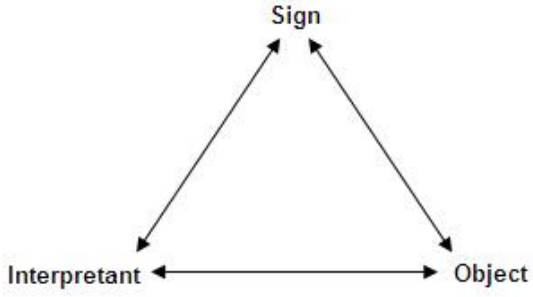

Figure 2.7: Peirce's Triad of Semiosis

Stamper (1993) proposes a way of looking at an organisation's activity through a semiotic lens. He proposed that two worlds exist: the IT world (relating to physical, empiric and syntactic structures of activity); and the social world (relating to semantics, pragmatics and social activity). The physical layer relates to the physical properties of the physical object, i.e. hardware and signals. The empiric layer focuses on patterns of the physical, such as data encoding. The syntactic layer is concerned with the structures, such as languages and databases expressed by the empiric layer. The semantic layer focuses on the meanings of sign (Stamper, 1973). The pragmatic layer, is concerned mainly with intention of sign and conversation. The social layer represents social systems, which consists of beliefs, culture, law, commitments, etc.

Degree of meaning	Social	Informal	Meanings Intentions Beliefs Commitments
	Pragmatic		
	Semantic	Formal	Forms Rules
	Syntactic		
	Empiric	Technical	Mechanism
	Physical		

Figure 2.8: Semiotic Framework aligned with the Semiotic Onion

The idea of the semiotic framework (see figure 2.8) helps us to represent how our social world links to IT and physical solutions. From figure 2.8 we can see that meaning has different focus, and increased significance of importance as communication moves from physical to social layers. For example, a coded message signal at the physical layer has no meaning. Appreciation of the syntactic is critical when understanding the message. The message itself, however, is only contextually relevant when place when we consider social and pragmatic intentions. To support application of semiotics in context of the organisational aspect, Stamper proposed "the organisational onion", which considers three varying layers (see figure 2.9).

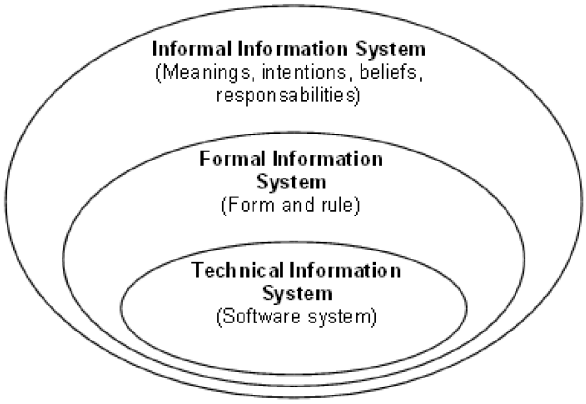

Figure 2.9: Organisational Onion adapted from Stamper (1993)

The 'Organisational Onion', proposed by Stamper (1993), states that the onion's three concentric layers consist of the informal, the formal and the technical (see figure 2.8). Stamper (1993) proposed that an organisation can be seen as an information system, which can also be seen as a social system. He proposed use of a variable focal system object, implying that the onion may represent systems at solution, departmental, and/or organisational levels.

Stamper (1993) claimed that stakeholder communication within informal organisational systems is full of meanings, intentions, beliefs / commitments; the formal system, as defined by Stamper, relates to use instructional rules based; however, those instructions and rules often at this level lack a clear rationale of understanding why they have been applied (Stamper, 1973). The formal system, within the organisation, is value and rule centric. As a result of this formalisation, systems can be easily automated, and efficiency can be improved through the use of computer systems. The introduction of a computer system, is referred to as the 'Technical System'; i.e. where humans are replaced within the organisational system by technical solutions.

Stamper (1993) initially formally proposed the 'organisation onion', which uses the Informal, Formal and Technical layers to consider organisational systems, however the organisational onion has been adopted widely in the semiotic community. Jacobs and Nakata (2012), for example, apply the organisational onion to analyse social media usage within an organisation, their study found that in the informal system, social media was identified as supporting team building and resulted in improved communication, innovation, productivity and knowledge sharing. In the formal system, the study identified that organisations need processes, procedures, and policies to regulate usage of social media. In the technical system, the study identified that the organisation should be concerned with security and privacy of using mobile and Internet technology. Chai-Arayalert and Nakata (2013) adopted the organisational onion in the knowledge management domain, where they used the three layers to classify the context of knowledge transfer between two organisations, the source and the recipient. Li et al. (2014) have also used the organisational onion's three layers, to develop integrated clinical pathways. They proposed a system architecture by classifying individual practical treatments within the informal system; formal pathways in the formal system and healthcare IT applications in the technical system, an approach that facilitates the implementation of the co-design methodology in the healthcare domain. Interestingly, the application of the of the semiotic onion has been successfully applied by researchers and published to support the consideration of individual issues (Wiafe et al., 2011; Jacobs & Nakata, 2012; Chai-Arayalert & Nakata, 2013; Li et al., 2014). Wiafe et al. (2011) for example, has used and adapted the semiotic onion to consider the influencing factors on the selection of persuasive technologies.

Consideration of Stamper's work provides the reader with the understanding of organisational aspect through the semiotics lens. The alignment between the six different levels of meaning (the semiotics framework), and the three levels of organisational systems (the organisational onion), was discussed to emphasise how Stamper structures consideration of the organisation. The semiotic onion (informal, formal and technical systems) will be discussed later as a foundation of interaction between individual and organisation to analyse adoption patterns.

2.7 Individual Aspect

Although we have considered, within the previous section, how the organisation can be considered as a system, it is worth noting that it is the successful interaction of individual, organisation and technology that creates the innovation process (Rogers, 2003). In this section,

we will consider literature relating to the individual aspect, and whether individuals, and whether individual difference (such as education, society and culture) and/or individual roles that they play within the organisation, impact innovation adoption.

If a company aim to enhance their performance by adopting certain technologies, this aim is referred to as "the beginning of the innovation process" (Rogers, 2003). The process of innovation itself, however, has the potential to cause significant disruption and interference to staff roles and work patterns within that organisation (Gallivan, 2001). For example, as a result of change, processes and procedures often become transparent, i.e. openly and clearly defined. By providing information symmetry via transparency, communication and stakeholder collaboration can be increased, thus supporting stakeholders working together on a task (Gallivan, 1995). Full transparency, however, risks removal of control silos; essential to maintain their status.

There are differences between individual and organisational aspects. An individual is a person who can play more than one role. A person may have more than one role in a single organisation and/or the same role in multiple organisations. Alternatively, a single organisation can have multiple individuals playing the same role. Individuals also have the ability to play a family role with a defined status, as well as a membered organisational role. Within this context, an individual is perceived to be serving two roles with purpose simultaneously. From an organisational aspect, the role has certain specific objectives, which would involve individuals contributing to achieve a specific goal.

Hall (1959) was the first person to propose, and use, the "crucial trio" concept, which divides the individual internal process into three different layers: formal, informal and technical. This triune model, aligns with three different physical brains layers — reptilian, limbic and neocortex (Hall, 1959, p. 66; Sorrells, 1998). The reptilian system (formal system), represents self-assertion and preservation concepts / beliefs. The limbic system (informal system) represents emotion and feelings. The neocortex system (technical system) represents functional thinking (Hall, 1998). Hall refers to the formal system as the core system of human aspect, it therefore could be derived from culture, social norms or rituals. The informal system is considered flexible and from these individuals are likely to adapt themselves from the stringency of the formal system. The technical systems are therefore created to support the

current formal systems or through analysis enhance the informal adaptation process, which in turn would then eventually change the outdated belief. This concept emphasises the circle of changes within the individual aspect (see figure 2.10).

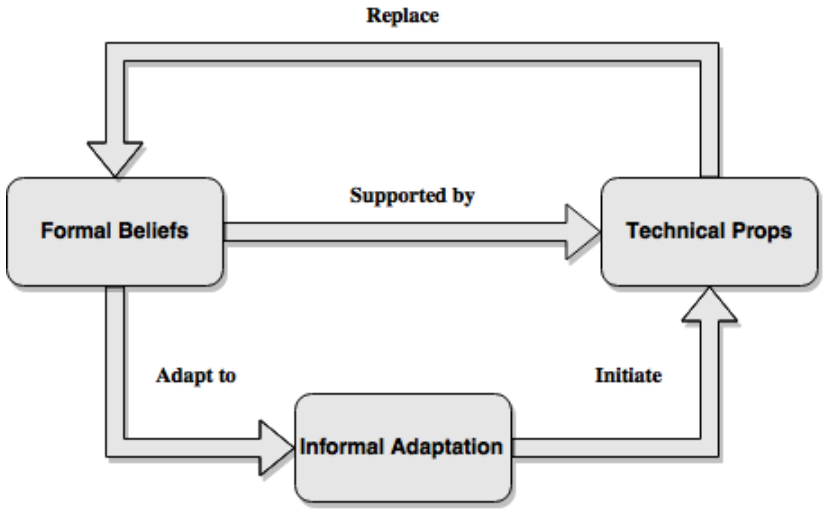

Figure 2.10: The Circle of Change; described by Hall (1959)

2.7.1 Formal System

Hall defines individual belief, as the process of the individual learning from parents and society, the individual is also likely to have their own adaptation (understanding, perception and practice), therefore the individual's beliefs and adaptation can technically be analysed and communicated as being one component. Hall argues that there is a circle of change – see figure 2.10 - that starts from the core belief, this is defined by the formal concepts, i.e. inflexible concepts / beliefs. Hall (1959) states that the individual develops their formal beliefs by absorbing societal contexts, such as the actions of family and social members. The formal system stresses an obligation and permission, rather than the rationale behind actions.

2.7.2 Informal System

The informal adaptation, is therefore developed freely amongst individuals as long as it does not violate the formal system. However, there is a level of flexibility through the deviation of behaviour for the core system as the informal system (Hall, 1959). This flexibility enables people to see the improvements, by undertaking a breakdown and analysis of the reasoning behind the changes taking place. As seen from this perspective, technical innovations are introduced as a functional tool to facilitate user belief and attitudes (Hall, 1959).

2.7.3 Technical System

The technical system is created later – and purposefully - to strengthen the formal system (Hall, 1959). The technical system itself focuses on rationales, which is defined as the causes and effects of actions, in contrast to the formal system, which relate to obligations and permissions. Hall's (1959) crucial trio gives an explanation of the change process that occurs within the individual aspect. The study applies this theory within the adoption process, to gain understanding of how this process will and can affect the individual. Hall argues that there are two intentions driving creation of the technical system, which are: i) intention to build a technical system to support the current formal system; ii) intension to show that the current formal / technical system is out of date and change is needed.

Sections 2.7.1 – 2.7.3 aim to provide the reader with the understanding of individual aspect via consideration of the crucial trio concept of Hall (1959). The formal system is influenced by social norms, family or organisation. The informal system is an individual interpretation of the formal system. The technical system aims to facilitate the formal and informal system. The crucial trio concept emphasises on individual dimensions in connection with a social context, which confirms the need of this research to consider both individual and organisational issues.

2.7.4 Different Aspects of Human Activity

This section presents additional concepts to support the readers understanding of the individual aspect.

Major Triad – (Hall, 1959)

Figure 2.11 shows the major triad adapted from Hall (1959), the model represents the individual dimensions, that involves the crucial trio concept and includes the Primary Message System (PMS). The PMS shows the general dimensions of human activity, and how it consists of three main groups, as well as two independent dimensions the core, the orientation and the expression.

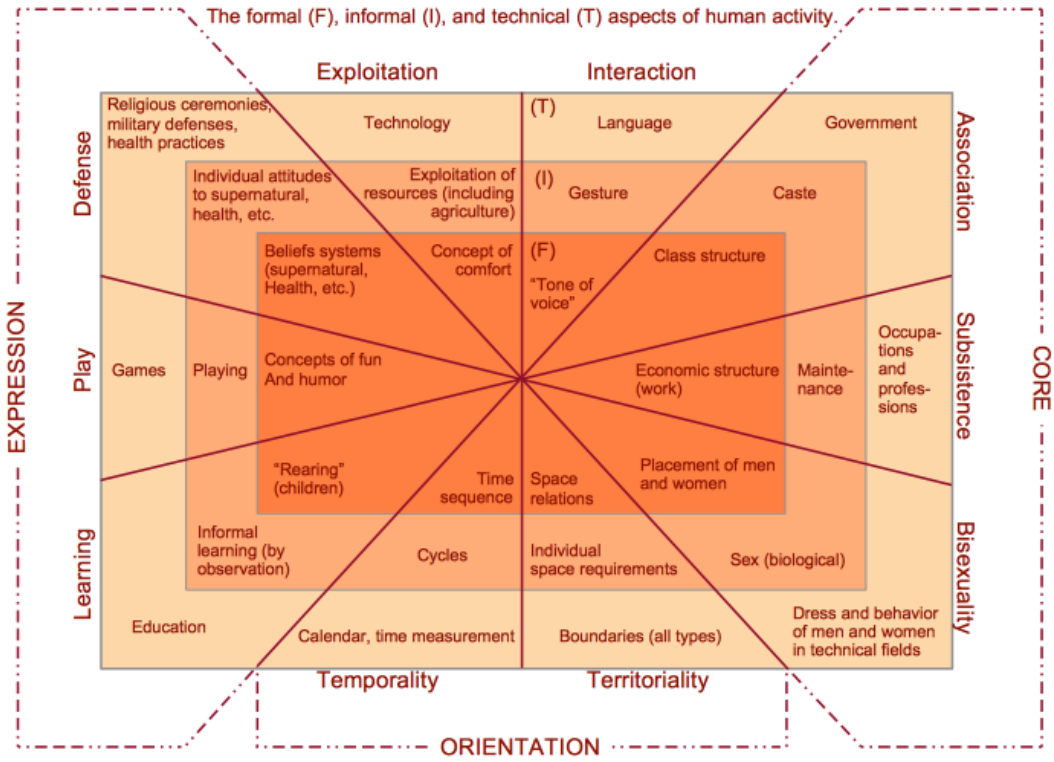

Figure 2.11: Major Triad adapted from Hall (1959)

CORE major triad dimensions (see figure 2.11) include: association, subsistence and bisexuality. These dimensions relate how an individual's see themselves and/or link to a specific society. The **ORIENTATION** dimensions relate to time and space (i.e. temporality and territoriality), which relate to the user's context. For example, the value of punctuation (time) will depend strongly on the cultural/societal view as to whether time is seen as being flexible or fixed/non-negotiable. Individual territory is the context in which humans undertake **EXPRESSION** (learning, playing and/or express belief structures); accordingly, appreciation of territory is crucial to understanding and analysing process change. **Exploitation** focuses on how people fit within the environment, and **Interaction** is concerned with the social status of people in the culture/society.

The PMS ten dimensions explain the crucial trio from different angles, they emphasis the validity of the formal, the informal and the technical system. The formal layer of the **defence** dimension relates to an individual's belief system (i.e. belief in the supernatural). This formal layer, i.e. belief or concept, drives the development and informal structure and/or appropriate formation of technical structures. The technical layer relates to the technical social system, such as ceremonies, that exist to support the informal and formal systems (Hall, 1959). For **play**, an

individual learns how to act from infancy. The infant learns to play from childhood, and develops an 'appropriate' understanding of what play includes, and when it occurs. Technically, games are created with rules that people play singularly or within groups. The contextual understanding of game rules is developed throughout life. For **learning**, individuals initially copy from those around them, i.e. learnt behaviour. Initially learning occurs informally, however upon joining the education system this becomes the purpose of the system, i.e. the technical education system (Hall, 1959). For **temporality**, the individually learns about time sequences, i.e. the concept of minutes, hours, days, weeks, and how these relate to particular events. Technical understanding of how to manage time and schedule, e.g. project management are then established. For **territory**, concepts are learnt concerning space, initially within the home i.e. living room, kitchen, bed room. From this, the idea of why space is needed and what function space has is defined. Technically, the space concept is applied in order to draw physical boundaries for specific functional purposes, e.g. business premises, restricted police area. In reference to the core of human society (Hall, 1959), individuals are born as a specific gender, either male or female – which relates to the definition of **bisexuality**. The concept of male and female placement is a taught concept; with bisexuality roles initially learnt from the original caregiver (Hall, 1959). Perception of gender norms, e.g. clothes, expectations, etc., are therefore shaped via example. For **subsistence**, the infant is taught about occupation, and the varying occupations that are carried out in society. An understanding of currency, money and occupations (i.e. jobs) are also understood based on economic status (Hall, 1959). Career choices, which is considered part of subsistence, are recognised and determined, and skills required to achieve their selected career goals can be determined. For **association**, the individual learns about formal class structures, these are often predetermined within the family structure, i.e. child, father, mother, in addition to grandparents. Informal association are often predetermined by a societal understanding and perception of class value, such as lower, middle and upper class (Hall, 1959), this is also perceived and associated with individual wealth. Technical associations are more concerned with complex organisation structures, such as, government and the substructures within government i.e. governor, citizen and authority (Hall, 1959).

It can therefore be concluded that the formal system is the central human value layer, which people develop and perceive from the society they are in. The informal system is the deviated actions of the individual within that society, and lastly the technical system is referred to as the

logical actions that are developed from the informal system. Integrating PMS with the crucial trio (formal, informal and technical) - see figure 2.11 - assists in measuring the degree of formality in human activity, and therefore, can be better applied with technology or change adoption. Also, there are various applications of PMS, Stamper (1988), for example, applies PMS when analysing cultural impact and development of a valuation framework. Sun et al. (2014) apply the valuation framework in evaluating business value of IT.

In the major triad, the flow of influence is largely from the central layer to the external technical layer. This means that formal beliefs influence informal behaviours and results in technical props i.e. technology development. From the circle of change, we can see that the changes to the formal beliefs occur only if there is a technical approach, which provides a more logical solution. However, logical reasons rely heavily on interpretation as a result of semiosis process, which could lead to conflicts in behaviour as a result of interpretation.

Individual Value – (Hofstede et al., 2010)

Hofstede et al. (2010) proposed another aspect of viewing individual value. He argued that each individual develops his or her own unique personality by partially learning from culture and tradition, i.e. customs, social norms and culturally inherited skills; and also abilities from those around them, such as: eating, craft, walking, trade, speaking. They also proposed different classifications for the individual aspects, they argued that there are three levels of depth: symbols, heroes and rituals.

These levels are different in the degree of abstraction concerning solid matters. In other word, his model determines how individual value is developed from the influence of societal symbols, such as a person as a role model and the activities that are done on a daily basis. These factors have become acceptable practices that form individual values (see figure 2.12).

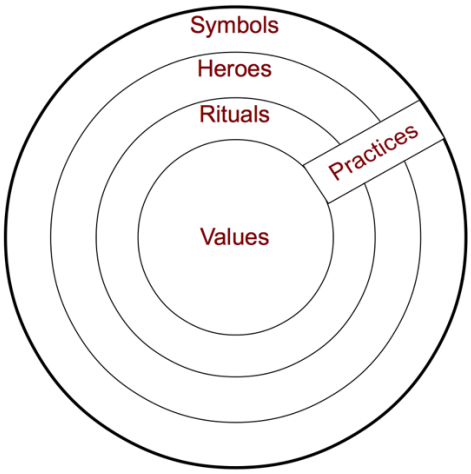

Figure 2.12: The Level of Depth adapted from Hofstede et al. (2010)

However, Hofstede makes a differentiation between values and practices. It can generally be argued that values are more likely to be the formal beliefs and practices, which are more than likely to be places within the context of technical props. Hofstede et al. (2010) proposed a model that demonstrates cultural value, which is in the form of an onion shape and aligns with organisational onion yet considers different perspectives. Figure 2.12 shows the onion as the manifestation of culture (Hofstede et al., 2010). This onion describes how, in 'society', the core of the belief system is considered as the "values". Rituals are referred to as activities that people perform regularly to express what they believe to be important. Heroes are a metaphor for role model, i.e. those successfully undertaking rituals. Symbols relate to the tools that support the role model in undertaking the ritual. Practices are shared standards relating to symbols, heroes and rituals in a particular context or society. For example, baking is core to British culture. The value layer implies that a cake is a core part of most British celebrations. The act of baking relates to the ritual layer, which in the case of baking a Christmas cake involves specific rituals and timing. The Heroes layer, in context of baking, includes individuals such as Mary Berry; who are held up as examples of great bakers. The actions of Heroes are followed by people throughout the society. The Symbols lay, in context of baking, included tools - such as baking recipes – that are the technical expression of Heroes. Practices relate to the accepted societal norms concerning Ritual, Heroes, and Symbols.

The model of Hofstede et al. (2010) aligns with Hall's crucial trio concept, as symbols are technical props, Heroes are formal beliefs, and Rituals are informal behaviour. The flow of dependency, in Hofstede's model, move from the central values to external symbols.

Interestingly, in Hofstede's model, social norms can influence and may conflict with internal values and/or how norms are interpreted and expressed by individuals. In contrast to Hall's model, however, the core value of each individual, in Hofstede's model, can be influenced by the practices of others. If internal expression is restricted by society then this will lead to the formation of cognitive dissonance, which is where current behaviour (to satisfy society) may conflict with the attitudes of a specific individual. A person can, therefore, believe one value but behave in a different way; for example, understand that smoking can cause cancer, yet decided to continue to smoke (An et al., 2013).

Social Distance – (Lewin, 1936)

Lewin (1936) introduces the concept of "social distance", which breaks down personality structure into public and private areas. Lewin looks at a town from different angles: accessibility and personality. He compares the differences and similar association between the US and German people, and their differences in personality. Lewin represents personality with a five-layer circle and within that circle, he establishes that there is a private area as a core surrounded by public area.

US people (U-type) were concluded to have only one private layer, whilst the other four surrounding layers were deemed as public. German people (G-type) were established to be very different, and tended to have larger private areas, consuming the four inner layers, and only allow one outer layer as being public. Lewin also emphasises the boundary of accessibility of the individual. U-type people might be more prone to negotiate than G-type people and they were characterised as being more open (larger public area). In the context of process change, U-type people were determined to be more likely to accept technology adoption.

Trompenaars (1993) proposed the concept of specific and diffuse relationship, concerning interaction of U-type people (specific) and G-type people (diffuse). To make it clear, Trompenaars identifies U-type people interaction as specific relation, and G-type people interaction as diffuse relation. Specific relation in an interaction occurring between people

within a public area and where a long standing established relationship is not needed. In contrast to diffuse relation, it requires people to develop initial relationships before diffuse relation can be established, as individuals must allow others to cross the boundary from public to private. An example of a diffuse relation, is that of a group who are G-type, who will never discuss any personal/private matters concerning themselves with others, unless they have already formed a friendship with that G-type person. The G-type person is more likely through the relationship development, to be more open to discussion and feel at ease to talk about personal topics, e.g. family issues. The concept of personality and accessibility are therefore, important when developing a framework or model when associating dimensions of the individual aspect.

2.8 Assessing Individual and Organisational Models

The 'crucial trio' (Hall, 1959), represents the internal structure/decomposition of an individual's perception, but states that beliefs are derived from what the individual has learned from their family and/or culture. From external influence an individual develops an informal individual adaptation, which proves or disproves formal beliefs. Technical props are subsequently developed to support the formal beliefs, such as governmental laws, which the individual is expected to obey and follow, such as legal requirements. Technical props are often, however, easier for people to accept than formal rules, and become formalised if repeatedly used over time (Hall, 1959).

In 1973, Stamper incorporated Hall's "crucial trio" into his work (Stamper, 1973) – see figure 2.13. Stamper determined that three types of rule exist when considering adjustment of individual rationale, which are: rules that are operationally verifiable but not always formalised (i.e. I - informal rules); rules that are based on belief that must be taken on trust (i.e. II - formal rules); and rules that are formally documented and can repeatedly applied (i.e. III - technical rules). Although Stamper's individual rationalisation model expresses Hall's crucial trio concept, the flow of dependency between layers is very different from Hall's crucial trio concept (Hall, 1959).

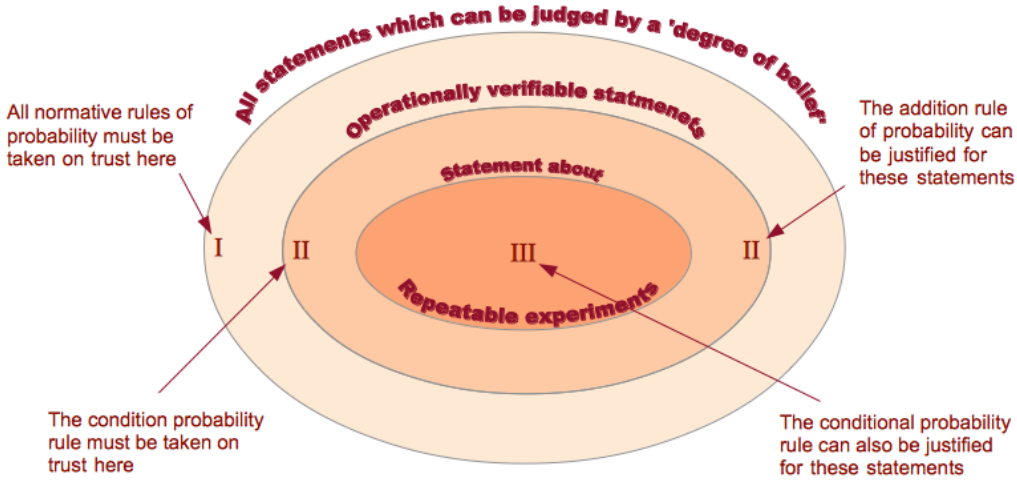

Figure 2.13: Stampers discussion concerning how a rational individual adjusts his opinion - adapted from Stamper (1973)

Later in his career, Stamper (1993) seemingly redeveloped the above model, in context of organisational decomposition, to form the 'organisational onion'. The organisational onion is concerned with the degree of social information that is distorted when the focal system considers the technical system solution. The outer layer of the onion represents the whole social system, called the informal layer; the middle layer relates to rules and instructions that are repeatable, and is called the formal layer; and finally, the central technical core can be automated, by the use computer systems for repetitive tasks that do not require individual or group involvement (Stamper, 1993).

We observe, from the research of Stamper (1993) and Hall (1959), that individual based models assume a high level of interaction; due to Hall's positioning of the technical layer as the interface (outer layer) between the organisation and society (Hall, 1959; Hofstede et al., 2010). In Hall's model, changes in the technical layer, as a result of interaction between individuals, can influence PMS dimensions without a need to change an individual's formal belief. This assumes technology can be used by an individual to help them express general formal rules, which may change over time to better supports the inflexible formal belief of the individuals. In comparison, Stamper's organisational based model is more context orientated, as he proposed that the technical outcome exists within the core layer of the model. The technical outcome in Stamper's model is dependent on the informal and formal layers; with this formal layer sitting on the interface between the organisation and the society. Such a structure implies that the formal structures in the organisation can be influenced by the cultural and societal context of use (Stamper, 1973; Stamper et al., 2000). Accordingly, Stamper assumes a more

rigid formalisation of rules, with change in technology only possible if appropriate changes are managed within formal and informal organisational layers. Table 2.7 shows the alignment of the two models. There are some interesting differences in the dependency flow of each model: in Halls model technology innovation is the (outer) changeable expression of formal and informal layers (with dependency flowing out towards society), whilst Stamper proposed technology innovation as a final (core) outcome of informal and formal structures (with dependency flowing toward core technology development). The formal layer in Hall's model refers to beliefs, which is not the same as the formal layer in Stamper's model which refer to written rules and processes. The technical layer in Hall's model refer to logic, rules and/or processes, whilst Stamper refers to technology or software systems. The informal layer in both models seems to be the same, since it refers to behaviour, action, intention.

Table 2.7: Comparison of Crucial Trio and Organisational Onion

	Hall's crucial trio	**Stamper's onion**
Layer 1 (core)	formal (f) - beliefs	Technical (T)– technology, software systems
Layer 2	informal (i) – behaviour, action	Formal (F) – written rules, processes
Layer 3 (outer)	technical (t) – logics, rules, processes	Informal (I) – meanings, intentions, beliefs

Although Ronald Stamper's organisational "onion" used the terms Informal, Formal and Technical, the semantics and order are significantly different to that defined by Edward Hall. Stamper's use of the term Informal (I), relates to representing the informal behaviour and systems defined in an organisational system. Stamper's use of the term Formal (F) represents formalised rules, processes, and procedures controlled by defined rules - to make it repeatable / consistent. Stamper's use of the term technical (T) relates to use of a computer, i.e. a technical system, which replaces human activity to improve efficiency within the organisational system.

Although 'informal' represents largely the same concepts, the scope of 'technical' is very different, and the use of 'formal' within Stamper's work seemingly changes form and order. Hall's (1959) formal layer (f) represents an individual's concepts and beliefs, where the rules are derived from individual cultural and societal norms. Hall describes a set of concepts, such as the concept of fun, which forms the centre of Hall's model and influences the formation of semi-structured informal rules.

Stamper's Formal (F) layer, facilitates the formalisation of structured rules, processes, and procedures, which are controlled by defined and repeatable rules. In addition to changes in the

use of the meaning of ‘Formal’, Stamper (1993) argued that an organisational system should have the technical layer as a model core, which exists as the central concentric circle because it is an automated organisational system.

In Stamper’s model the technical layer is surrounded by the formal layer, which relates to the formal processes being applied by the technical solution. Stamper (1993) placed the informal layer, which includes informal interactions within an organisation, as the periphery (interface) layer; and defined it as including informal actions or behaviours that are not captured at either formal or technical layers.

A significant conflict with hall's (1959) model, is that the informal activity is regularly formalised, documented, which in turn leads to the development of technical solutions to support activity; implying the influence of dependence moves from the periphery to the core.

Stamper’s (1993) change in layer order and meaning, could be argued to be the result of the change in context; for example, working with organisational systems instead of individuals. This claim can be disputed, as the order and meaning defined in Stamper's paper (“A Semiotic Theory of Information and Information Systems”) concerning the 'Semiotic Onion' (Stamper, 1993) closely reflected the order and meaning of the three types of rule that were first defined in his 1973 book (Stamper, 1973), which relates specifically to individual rationalisation (see figure 2.13).

2.9 Alignment for Technology Adoption

Innovation is defined as a combination of ideas, processes, and technologies that are used to solve specific problems (Gallivan, 2001). Idea innovations include the introduction of people with new skills. Process innovations include changing organisational structures. Technology innovations include implementation of new tools i.e. use of new software systems.

The current organisational system includes implemented technology, formal processes, and stakeholder responsibilities/roles. Organisations need to regularly adopt innovations to progress these aspects, however these innovations need to be aligned within the organisation as a whole; i.e. innovation adoption requires the alignment between innovation and organisational norms.

Figure 2.14 shows an adapted version of Stamper's onion to consider the alignment of the current business system and innovation.

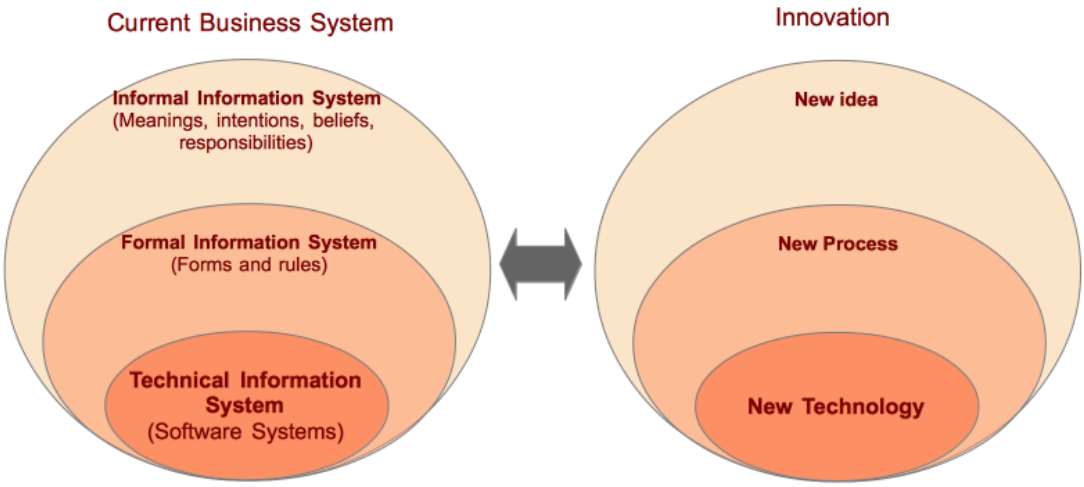

Figure 2.14: Adaptation of Stamper's Onion to consider Innovation Adoption

Every business system includes informal norms/systems; including informal processes that relate to interaction with stakeholders. Many of these informal processes are formalised to support the development of commonly used business processes. To increase the efficiency and/or to optimise the formal processes technical systems (both software and hardware systems) are developed and used within the organisation. If an organisation is to consider adoption of a new technical innovation, Stamper's onion implies that alignment should be obtained within all organisational norm layers (both informal, formal, and technical). Stamper implies that technology development is dependent on agreed (i.e. aligned) formal rules, which themselves is dependent on informal rules. Accordingly, the central layer is dependent on outer layers being in agreement.

Aligning Technology in Business

To align the technology solution with the existing business system (business process, and individual roles/activity), this study initially uses the meanings and order defined within Stamper's semiotic onion to develop our adoption model (Stamper, 1993). To achieve alignment, we ensure mutual alignment between the new technology and existing organisational systems. Both new technology or existing business system, therefore can be adapted to support the aligning process.

To simplify the aligning process, we will initially consider the introduction of a new and/or innovative technology into an existing organisation environment. The organisation has existing informal and formal rules, which (as stated) Stamper implies defines the technical solution used within the organisation (Stamper, 1973). Accordingly, the informal and formal rules applied within the new/innovative technology system need to align with the informal and formal rules of technology used in the organisation. This forms the research questions: **RQ1:** What models identify new technology adoption misalignment? **RQ2:** What model and relationships will help to align? And **RQ3:** How can we validate the model?

2.10 Incorporating the Individual Aspect

The example used to explain the dual-aspect model related to the issue of technology adoption in an organisation. Technology systems are mandated within organisations; however, it is the individuals who ultimately are required to use and/or adopt these systems. If the users do not have a positive attitude towards using the system, then chances are that the system will not ultimately be adopted/used effectively (Gallivan, 2001). The individual perception and/or attitude towards a technology is often ignored in business, since it is organisational strategy, defined by management, that mandates technology change. An individual may choose to use a system, however if the individual's attitude is negative then cognitive dissonance is likely to occur between current behaviour (i.e. using the system) and current attitude (i.e. that the system is of limited value).

Understanding how people are thinking and how they are behaving, helps in the planning of innovation adoption (Wu & Lu, 2013). Individual positive or negative attitude toward the adoption or the technology, is more likely to result in potential success, or continuance adoption of the technology. Measuring people's perception and attitude concerning the adoption of particular innovations will help illustrate how people feel about the changes, i.e. in terms of individual preferences. This understanding supports this research in considering the impact of people's thought's and their actions.

2.10.1 Technology Perception

This section explains how the researchers assess individual perception (satisfaction and fulfilment) when using technology, i.e. whether individuals perceive that the technology will

satisfy and fulfil their needs. Kano et al. (1984) proposed a model to evaluate these two dimension. Kano prioritisation model is an instrument that can be used to assess individual perception. This approach will capture the people perception using positive and negative questions (Xu et al., 2009). The model has five categories, which are: must-be, one-dimensional, attractive, indifferent and reversal (see figure 2.15).

Must-be means that the technology fulfils basic needs. Removing the technology will cause user dissatisfaction, as the technology is critical to basic functional needs. **One-dimensional** means that increased engagement with the technology results in increased satisfaction. Although not essential to basic functional needs, removal of the technology yet will cause dissatisfaction and a lack of fulfilment when it is not there. **Attractive** means that technology will satisfy individuals, although individuals do not actually need it to meet any functional needs. Removal of an attractive technology will not cause dissatisfaction, as use of thic technology was desirable, but not expected. **Indifferent** means that technology that individuals do not respond to the presence of the technology. **Reversal** means that technology fulfils the individual needs, yet will cause dissatisfaction at the same time.

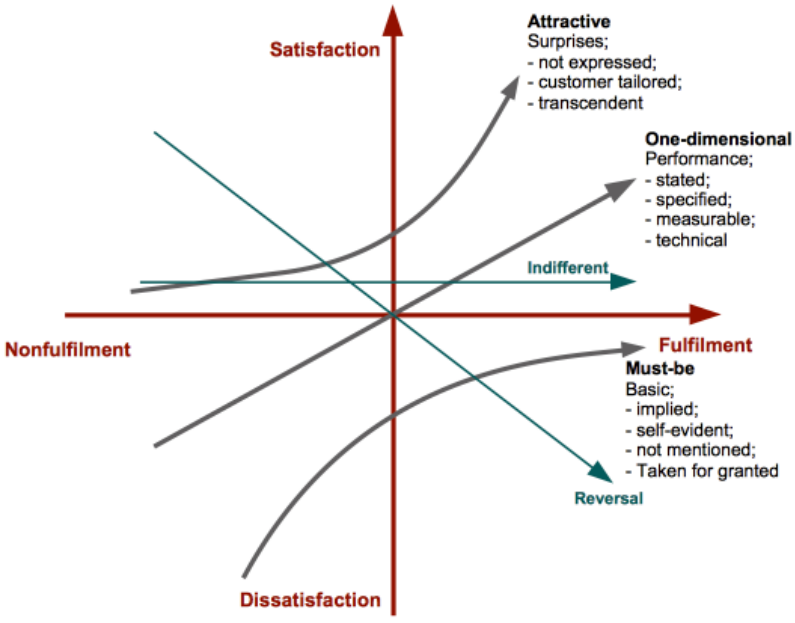

Figure 2.15: Kano Prioritisation

These five dimensions can be applied to assess individual perception concerning use of a particular technology. These factors directly represent the interaction between people and technology. By using Kano prioritisation model, we are able to analyse these constructs and

identify what will influence individual. For an individual, inexperienced in the use of a technology, use of Kano prioritisation model will help him/her form an understanding as to whether individuals have a positive/negative attitude before considering use of a specific technology. A solution will ideally be sought that improves and/or creates a positive process of adoption. The negative implication to this approach, is that people may give their personal opinion concerning their specific role in the organisation, which may in results being impacted the opinion of individuals; since people do not always separate their personal life and their role in organisations (Hofstede et al., 2010). If collected as part of a sample study, however, use of Kano prioritisation model seem appropriate.

2.10.2 Individual Attitude towards Technology Adoption - Cognitive Dissonance

Cognitive dissonance is a mental state of an individual when behaviour and attitude are not aligned (Festinger, 1962). 3D-RAB has been developed by Wiafe et al. (2011), the 3D-RAB represents: "The three dimensional relationships between attitude towards behaviour, attitude towards change or maintaining a change, and current behaviour, and distinguishes variable levels in a user's cognitive state." (Wiafe et al., 2011) – see figure 2.16.

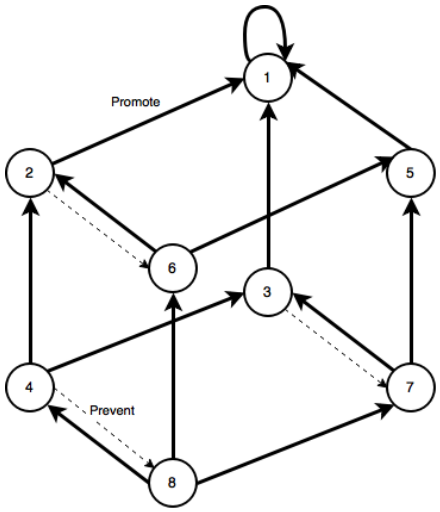

Figure 2.16: 3D-RAB Model adapted from Wiafe et al. (2011)

Wiafe et al. proposed eight states of cognitive dissonance in the 3D-RAB, which consist of three constructs: 'Attitude Toward Target Behaviour (ATTB), Current Behaviour (CB), and Attitude Toward Change/Maintain Behaviour (ATCMB)' (Wiafe et al., 2011).

Current Behaviour (CB)

This is an individual state of behaviour, which acts as a measurement point to identify the individual's cognitive dissonance state (Wiafe et al., 2011). The current behaviour would indicate the state of technology adoption, and whether the technology is being adopted or has been adopted. Therefore, it determines how to evaluate the ATCMB factor in terms of changing or maintaining behaviour.

Attitude towards Target Behaviour (ATTB)

This is where an individual opinion is formed/based — either like or dislike - regarding the target behaviour. For instance, a company may promote bring your own device (BYOD), i.e. where all employees are encouraged to use their own mobile phone to communicate with their colleagues. Each employee will have their own opinion as to the benefit of adopting this innovation. Mr A may be happy using his mobile phone for answering email as he does not need to be at his desk all the time. Ms B may not like using her personal mobile phone for working purposes, as she is afraid that her boss might try to contact her when she is off from work.

Attitude towards Change/Maintaining Behaviour (ATCMB)

This is an individual opinion regarding changing or maintaining a specific behaviour (Wiafe et al., 2011). As technology adoption requires people to adopt use the technology, there is a need for people to change their behaviour to support that very adoption. However, people who have adopted technology need to continue to use the technology, which is often as a result of individual satisfaction or dissatisfaction (Riemer-Reiss & Wacker, 2000). Mr A may have a positive attitude towards the behaviour, i.e. using his own mobile phone, especially if the phone were purchased by work. Mr A, however, may be unwilling to continue the activity if it impacts him financially, i.e work expects staff to upgrade phones using personal funds.

These three factors were used by Wiafe et al. (2011) to construct the 3D-RAB model (see table 2.8); who proposed 8 states of cognitive dissonance:

- **State 1** is non-cognitive dissonance as ATTB and ATCMB which are positive technology is being used. This state indicates the success of technology adoption.
- **State 2** is weak cognitive dissonance as ATCMB is negative. This may be caused by the dissatisfaction of using technology.

- **State 3** is moderate cognitive dissonance as ATTB is negative. People might not like the technology but they do not feel it too difficult when using technology.
- **State 4** is strong cognitive dissonance as the technology is being used but both ATTB and ATCMB are negative. This state can lead to the technology discontinuance.
- **State 5** is strong cognitive dissonance as the technology has yet to be adopted but both ATTB and ATCMB are positive. This state shows that people have expectation and are willing to support technology adoption.
- **State 6** is moderate cognitive dissonance as only ATTB is positive. It is common that people will see the benefit of technology adoption but they will not be eager to change their normal behaviour as they perceive that using technology will put more works to them.
- **State 7** is weak cognitive dissonance as only ATCMB is positive. This state implies the situation that people are obeying the order from top management to adopt technology even though they do not see any profit of the adoption.
- **State 8** is non cognitive dissonance as all three factors are negative. This state represents strong resistance towards technology adoption.

Each group will have 2 sub-groups, which are positive and negative attitudes towards the technology (see table 2.8). By defining these three binary constructs, the 3DRAB model is able to identify the current cognitive dissonance state of an individual. 3D-RAB can be used highlight where users are most likely going to conflict with technology adoption.

Interestingly the resultant state can be either stable, or an unstable state due to dissonance. The individual's state is unstable if there is a conflict occurring between an individual's current behaviour or attitude, or if the individual allows misalignment to occur as a result of change over time. Simply stated - conflicts from an external system, such as an organisation and/or technology can influence the internal state of an individual. At this point, this study argues that conflict between the current and new systems/processes, can lead, as a consequence, to certain unstable cognitive dissonances states.

Table 2.8: Cognitive dissonance state applied in technology adoption adapted from Wiafe et al. (2011)

State	CB	ATTB	ATCMB	Cognitive dissonance	Stability	Expected natural state transition tendency	Targeted state towards persuasion	Adoption circumstances
1	+	+	+	None	Stable (+)	1	1	Successful adoption
2	+	+	-	Weak	Unstable (+)	1	1	Dissatisfaction
3	+	-	+	Moderate	Unstable (-)	7	1	Not too difficult to use
4	+	-	-	Strong	Unstable (-)	8	2 or 3	Discontinuance
5	-	+	+	Strong	Unstable (+)	1	1	Expectation and willing to support
6	-	+	-	Moderate	Unstable (-)	8	2 or 5	Not eager to change
7	-	-	+	Weak	Unstable (-)	8	3 or 5	Obey the order
8	-	-	-	None	Stable (-)	8	4 or 6 or 7	Resistance

These 8 states of 3D-RAB will be used in this research to evaluate the individual attitude towards technology adoption as a measurement of individual aspect. The 3D-RAB model (see figure 2.16) shows the transition between cognitive dissonance states, for example, state 6 (CB-, ATTB+, ATCMB-) is expected to either transition to either state 2 (CB+, ATTB+, ATCMB-) by using the technology, or state 5 (CB-, ATTB+, ATCMB+) by changing the individual's attitude towards changing behaviour.

This research identifies the relationships between individual attitude and perception, since capturing the individual aspect allows us to gain a strong understanding concerning actions that motivate people to change and accept the adoption.

2.11 Norms Concept

Questions often arise as to why people act or behave in a certain way. Norms is one of the concepts that can explain the reason. Wright (1963) introduces the concept of norms, stating: "'Norm' has several synonyms. 'pattern', 'standard', 'type', 'regulation', 'rule', and 'law'. Directions of use and prescriptions are not often called 'norms', but we should not hesitate to call them 'normative'" (Wright, 1963, p. 1).

The norms concept is summarised according to the definitions of Wright (1963), i.e. norms are classified into four main types: law, prescriptions, directives and ideal rules. Norms as a **law** is used in a specific context, i.e. rules of playing football. Norms as **prescriptions / regulations** are a series of actions under a specific boundary, for example people have to pay tax when they earn money in the UK. Norms as **directives** that focus on achieving the result, i.e. students must pass all exams and submit a dissertation to obtain the degree. There is an addition type of norms, i.e. "hypothetical norms". Hypothetical norms are in the form of a conditional statement, i.e. to achieve something, something else has to be done — e.g. "if you want X, you have to do Y". **Ideal rules** are another type of norms that indicates that the properties must be in a preferred state (Wright, 1963). For example, to be defined as a good marathon runner, you must be able to train regularly and finish a marathon race within 4 hours.

See table 2.9 for a detailed break-down concerning the scoping of norms.

Table 2.9: Norms concept adapted from Wright (1963)

Type	Description	Scope
Law	Nature (descriptive) State (prescriptive) Logic (mathematics/thought) Rules (game)	In particular context
Prescriptions/regulations	Law of the state Customs (social habits) Moral norms (principles and rules)	Series of actions in a context i.e. group, organisation, society
Directives/technical norms	Means to an end Anankastic statement or Hypothetical norms	Focusing on the result, what will be the consequences or what is the criteria
Ideal rules	Concept of being	Series of relevant actions to obtain the status

There are a number of different viewpoints concerning the concept of norms, which provide us the patterns that represent the reasons behind actions or activities of individual and/or organisations. Conflict can occur, however, between norms / actions / activities of different

individuals in an organisation. The existence of conflict in norms raises the questions: How can the conflict be captured? Where are conflicts between two different norms? and Can we compare different types of norms?

By using the identified conflict points in the dual aspect model (the technical, formal, informal, and conceptual layers) to facilitate conflict identification process, we need a single consistent way of identifying norms to allow comparison between technical, formal, informal, and conceptual layer conflict points between systems.

2.11.1 Norms relate to Individual in Organisation

In literature concerning the individual aspect, there are five types of norms (Liu & Li, 2015): Perceptual norms: actions as a consequence triggered by environment, i.e. people wake up when the sun rises. Cognitive norms: actions derived from individual beliefs and knowledge, i.e. Evaluative norms: actions to explain the rationale behind other actions. Behavioural norms: regular actions within specific time and location, i.e. having 3 meals a day. Denotative norms: "the choice of signs for signifying" i.e. a luxurious car indicates the wealth of the owner.

In context of business, Liu and Li (2015) applied the concept of norms from Wright (1963), which considers six elements when analysing individual and organisational actions. These 6 elements of norms are: **Character** e.g. mandatory, permissive, prohibitive; **Content** e.g. actions, activities, steps; **Condition** i.e. the entry criteria for the norm; **Authority** i.e. the actor who performs those actions; **Subject** (s) or object (s) of focus; **Occasion**, i.e when / where the norm is applied.

Liu and Li (2015) argue that norms in the business context can be classified as substantive norms, communication norms and control norms. Clear boundaries are stressed through the use of a classification system, where: Substantive norms focus on actions to achieve goals i.e. business goals; Communication norms focus on actions to support interaction between units inside an organisation and also to facilitate actions in substantive norms; Control norms act as a rule keeper to ensure individuals in the organisation perform their role appropriately.

2.11.2 Detailed Norms Specification

The adoption process involves the actions of the individual stakeholder applying concerning relevant rules and processes. In the adoption process an individual, as a stakeholder, is required to follow the rules, pattern and practice in context of their roles within an organisation or their working background knowledge. If those actions are captured and analysed beforehand, it allows for the identification of potential conflicts according to changes that can occur from innovation adoption.

Detailed norms, specification breaks down the structure of norms into five elements: context (situation), condition (state), action, actors (agent), deontic operator (obliged, permitted, prohibited) as shown in figure 2.17.

Whenever <situation>
if <state>
then <agent>
is <deontic operator>; *obliged, permitted, prohibited*
to <action>

Figure 2.17: Detailed norms specification adapted from Liu and Dix (1997) and Stamper et al. (2000)

The definition, in figure 2.17, employs deontic logic, which helps in capturing activities in organisations. Deontic logic implies responsibilities of stakeholders in organisation. Deontic logic is a way to classify nature of rule and norms proposed by Wright (1963) and this concept was later adopted by Liu and Dix (1997) and Stamper et al. (2000) in their "detailed norms specification". Deontic logic consists of three type of norms: obligation, permission and prohibition. Obligation refers to the activity that must be performed by a stakeholder or a business unit in the organisation. Permission refers to the activity that may be performed by a stakeholder. Prohibition refers to the activity that must not be or is not permitted in the organisation.

In table 2.10, this study converted the detailed norms specification into spreadsheet format, this format enabled this study to capture norm patterns from case study text.

Table 2.10: Detailed norms specification in spreadsheet format

Whenever	if	then	is	to
<<Context>>	<<Condition>>	<<Actor>>	<<Deontic operator>>	<<Action>>

In this section, we summarised the key concepts of norms that are related to adoption in the context of technology adoption, as it requires people to change the way they perform their activities after the adoption of the new technology. Furthermore, by analysing impact from technology adoption using norm analysis will allow this study to understand the causes of conflicts that occur. Description of the different definition between impact and conflict are that; Impact is a consequence from new technology adoption causing changes by the new system and conflict refers to the disagreed impact between two systems that require changes to apply on one side. This structure of norms allows us capture and compare technical, formal, informal and conceptual norms that aims to answer the research question **RQ4:** What framework would help to identify misalignment?

2.12 Measuring Individual Culture

Understanding individuals culture, using via measurable dimensions, assists in our predicting individual behaviour. Accordingly, this research has considered relevant and related models that support the capture of individual culture. Most theories have been developed and categorised based on a country (Trompenaars, 1993; Hofstede et al., 2010). Hofstede (2001) conducted a research survey in 50 countries, with over 117,000 participants, with the use of his five cultural dimensions, which were: "Power distance, uncertainty avoidance, collectivism, masculinity and long-term orientation" (Hofstede, 2001).

Another model was also proposed by Trompenaars (1993), consisting of seven cultural dimensions, which were: "Universalism versus particularism, individualism versus communitarianism, neutral versus emotional, diffuse versus specific, achievement versus ascription, time orientation and relation to nature" (Trompenaars, 1993). However, Hofstede et al. (2010) argues that Trompenaars's model cannot be considered a significant or meaningful model, due to its lack of presence in any peer-reviewed publication (Hofstede & Regout, 1996).

Myers and Tan (2003) argue that Hofstede's five dimensions is described as one of the most influential theory in cultural research (Myers & Tan, 2003). This study considered Hofstede's five dimensions as the structure for explaining the "Concept — C" layer.

2.13 Five Hofstede's Cultural Dimensions

Power distance (PO) – It is the acceptable level of power in the society (House et al., 2004). This factor indicates equality among people in the society (Hofstede, 2001), it also shows that social norms can accept different levels of power, especially within the workplace. For example, in high power distance cultures, managers dominate/lead meetings, and lower level employees must negotiate with the manager before the meeting, as lower level staff are not socially permitted to share comments in the meeting.

Uncertainty avoidance (UN) – This factor indicates individual's openness to uncertainty and ambiguity. Hofstede (2001) states that individuals are likely to feel uncomfortable when they cannot foresee the consequences of the actions they are performing (Hofstede, 2001). People are therefore unlikely to take any action that do not follow the norms, processes or procedures (House et al., 2004).

Collectivism (CO) – This factor indicates the degree to which individuals expect to be supported by the societal institution (Hofstede, 2001). Collectivism assumes that individuals share resources and contribute to the society by demonstrating loyalty and relationship within society (House et al., 2004).

Masculinity (MA) – Two points are related to Masculinity (MA), which relates to gender equality and assertiveness (House et al., 2004). Masculinity represents demands for success and assertive behaviour. In contrast, femininity show less preference of confrontation and are modest (Hofstede, 2001). In terms of gender equality, masculinity expects men to undertake heavy working roles in society (Odekerken-Schroder et al., 2002) and femininity expects women to take on non-working caring roles (An & Kim, 2007).

Long-term Orientation (LTO) – This factor focuses on the individual, whereby they are now or later. For now, or short-term focus, individuals will make decisions according to immediate

benefits regardless of the consequences in the long-term. For later or long-term focus, individuals will consider their actions and consequences today and the in the foreseeable future (Hofstede, 2001).

Critics of cultural dimensions such as Myers and Tan (2003), state that the concept of national culture is not appropriate and further question why we should even construct cultural dimensions according to physical boundary. They suggest that culture is more dynamic according to time and society and should be verified within that scope (Myers & Tan, 2003).

Although Myers and Tan (2003) criticised Hofstede's 5-dimensions as not being suitable to determine individual cultural dimensions, Yoo et al. (2011) went on to develop the CVScale, which validated use with individuals. CVScale was validated against consumer ethnocentrism and attitudes towards marketing norms to test reliability. CVScale has been translated and validated in a number of countries, including Thailand, and widely used to study individual culture (Prasongsukarn, 2009).

The research will investigate how individual dimensions influence individual attitudes. Therefore, this study has explored literature, investigating the effect of Hofstede's five dimensions on individual behaviours that will answer the research question **RQ5:** What factors would help to identify better technology adoption alignment?

2.14 Research Gaps

In the context of innovation adoption, individuals or organisational processes will almost always introduce technical innovations into the business system; however only if informal and formal alignment is achieved in an organisation will any new technology be incorporated as an organisationally recognised solution. We intend to explore how these process-based innovation patterns can be defined, captured, and analysed, to understand the interplay of the organisation, individual and technology aspects. There is a need of a combinative model, to assess the differences, which exist at informal, formal and technical layers, which influence the innovation acceptance within either individual, technical, and or organisational / business systems. Such a model would allow us to identify the conflict points between the interplay of individuals, technology systems, and/or the organisation; highlighting to managers where misalignment exists between informal, formal and technical norms. This will explain the adoption patterns in

context of business to support identification, communication of, and management of change. Figure 2.18 is the proposed conceptual model that shows the relationship between aspects from the literature that will be used to answer the research questions.

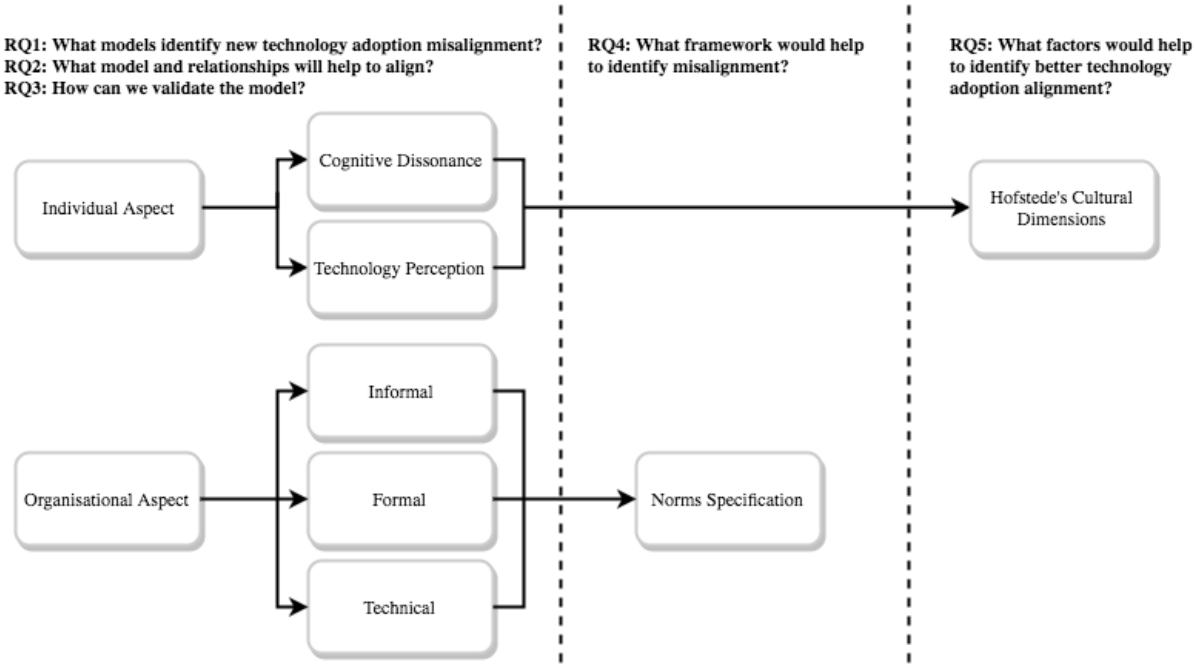

Figure 2.18: Conceptual Model for this PhD thesis

2.15 Summary

This chapter focused on and discussed the relevant theories from literature regarding innovation adoption. Individual and organisational related theories were also researched, selected and included, where deemed appropriate, within the discussion. The research gap on combining individual and organisational aspects with consideration for technology, was emphasised, as there is no existing theory that tends to focus on the interaction between individual and organisation while highlighting innovation within literature.

Chapter 3
Research Design and Methodology

3.1 Chapter Overview

This chapter examines, reviews and evaluates all research methodologies and research design processes used to create, collect and evaluate all relevant data, in context of the problem, which is then used to justify the research development and findings within this thesis.

The research design process, is strengthened by the very fact that it's approach is very much rooted in the integration of varying components and backgrounds, such as philosophies, paradigms, approaches, strategies, methods, techniques and procedures (Saunders et al., 2009). Research design can consist of qualitative, quantitative and even a mixed method approach (Creswell, 2009). Choosing between these methods involves a combination of related factors such as techniques and procedures. A philosophical standpoint takes both the research method and the research question into consideration.

Within this chapter, assisted by the research onion (see figure 3.1), the researcher will provide information concerning relevant research elements, in context of the problem. The research onion, combines the elements of research design, such as: Research philosophies, approaches, strategies, choices, time horizons, techniques and procedures (Saunders et al., 2009).

The elements of the research design, were careful selected in order to obtain and acquire the most relevant data for analysis. The elements found in bold font in figure 3.1, were chosen as the most appropriate methods to be applied within this thesis the reasoning for the selection, have been described in detail within this chapter.

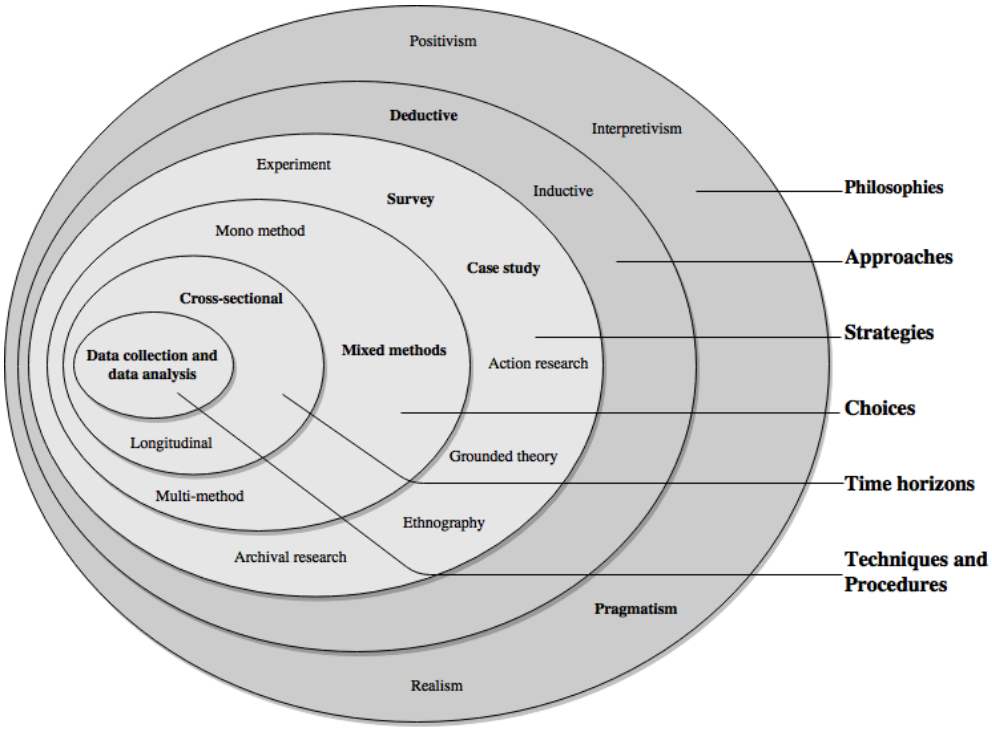

Figure 3.1: Research Onion adapted from Saunders et al. (2009, p. 108)

3.2 Research Philosophies and Paradigms

Research philosophies and paradigms play an important role in bridging the gap between data and theory, these elements play an important part in the way they influence how the research is conducted. The research philosophies, consist of two elements: ontology and epistemology.

Ontology is concerned with the reality or nature of the research; whereas epistemology focuses on the appropriate way to understand or construct knowledge from nature (Easterby-Smith et al., 2012). Figure 3.2 shows the relationship between ontology, epistemology, methodology and methods and techniques, which ground the philosophical foundation of research. Ontology is defined as the core nature, whilst epistemology acts as the lens to understand the core. Methodology combines methods and techniques that are then used to collect the data (Easterby-Smith et al., 2012).

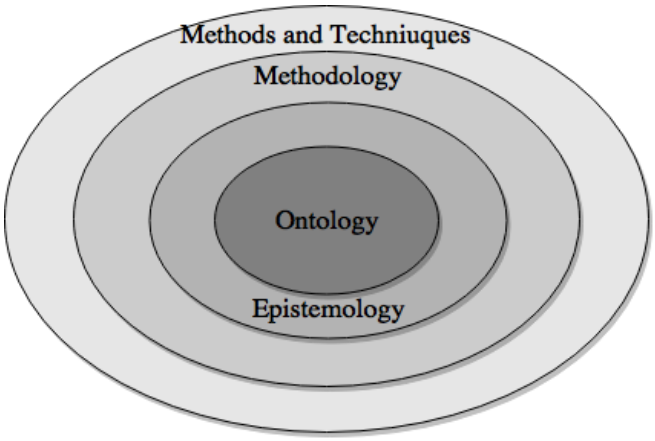

Figure 3.2: Research Tree adapted from Easterby-Smith et al. (2012)

Research paradigm is a combination of research practices, which include rules, applications and instruments, which is widely accepted within the scientific research community (Kuhn, 1996). In other words, paradigm is an approach to develop better understanding and knowledge about the social phenomena (Saunders et al., 2009). The three main research paradigms are positivism, interpretivism and pragmatism (see table 3.1). Currently these paradigms are the most influential, recognised and most recorded within literature (Creswell, 2009; Saunders et al., 2009; Cohen et al., 2011; Easterby-Smith et al., 2012).

Table 3.1: Four Worldviews adapted from Creswell (2009, p. 6)

Positivism	Interpretivism/Constructivism	Pragmatism
• Determination • Reductionism • Empirical observation and measurement • Theory verification	• Understanding • Multiple participant meanings • Social and historical construction • Theory generation	• Consequences of actions • Problem-centred • Pluralistic • Real-world practice oriented

3.2.1 Positivism Paradigm

Positivism paradigm, involves the deductive approach, where focus is placed on testing the theory and quantitative methods. Positivism aims to break down the existing complex problem into simple manageable problems, then sets out to solve those problems using the empirical data and quantitative approach based on existing theory (Creswell, 2009). Positivists focus on analysing the cause and effect factors and then generalising the findings for theory

development. Quantitative methods use is preferable to positivist researchers (Saunders et al., 2009).

Various quantitative studies that have been conducted, have mostly been based on a positivist standpoint (Saunders et al., 2009), for example, TAM (Technology Acceptance Model) and UTAUT (Unified Theory of Acceptance and Use of Technology) focused on studying technology usage behaviour; with the effect focusing on multiple dimensions, such as perceived ease of use, perceived usefulness and other factors (Davis et al., 1989; Venkatesh et al., 2003).

Based on positivist research, statistical methods and software tools, such as structural equation modelling and SPSS Amos, were used to confirm the relationship between those causes and effects (Arbuckle, 2012). Moreover, sufficient sample size is considered crucial to ascertain the reliability of the research (Hair et al., 2009). Although positivists researchers rely mainly on quantitative methods, qualitative methods may be chosen as a possible method (Saunders et al., 2009).

3.2.2 Interpretivism Paradigm

Interpretivism / Constructivism paradigms involve the inductive approach, which aims for the development of theory from the data, the qualitative method is mainly employed. Interpretivists/constructivists aims to gain an understanding through different perspectives and any new theory generated is dependent on the standpoint of the researchers (Creswell, 2009). Interpretivists focus on studying the progression of society, based on the subjective meanings.

More importantly, interpretivist research is interested in gaining a better understanding of the rationales behind the action. As mentioned earlier, qualitative methods are primarily used for conducting in-depth interviews with respondents that are connected to the study in question (Saunders et al., 2009). For example, Sarker et al. (2012) conducted in-depth semi structured interviews, i.e. to evaluate the relationship between ERP (Enterprise Resource Planning) alliances, to gain an insightful understanding of how these companies co-operate and develop the value co-creation process.

3.2.3 Pragmatism Paradigm

Pragmatism approach, unlike positivism or interpretivism, focuses on the research problem. Research design can therefore employ either quantitative or qualitative methods to collect and analyse data (Creswell, 2009). Pragmatists are based on empiricism, which constructs knowledge from actions, which is concerned with the response to the research questions. Therefore, pragmatists consider the relationship between knowledge and action, which are defined as interchangeable (Goldkuhl, 2004). Consequently, knowledge is therefore developed from observing actions that solve certain problems.

Goldkuhl (2004), stated, that actions are also taken from acceptable knowledge, which is believed to solve a particular problem (Goldkuhl, 2004). In addition, Agerfalk et al. (2008) emphasised that pragmaticism have three perspectives of action, which are: functional, referential and methodological (Agerfalk et al., 2008; Goldkuhl, 2012).

Functional pragmatism, tends to focus on the direct benefits or contributions of actions. Referential pragmatism focuses on developing a theory from the action. Lastly methodological pragmatism considers actions as a new way to solve problems (Agerfalk et al., 2008; Goldkuhl, 2012). For the research methods, pragmatism is not restricted to quantitative or qualitative methods alone, and can adopt an alternative / or further method when answering the research question. Therefore, mixed or multiple method is preferable for pragmatism (Saunders et al., 2009).

Table 3.2, Summarises the characteristics and comparisons of the three paradigms, considering ontology, epistemology, axiology and data collection techniques (Saunders et al., 2009).

Table 3.2: Research Paradigm adapted from Saunders et al. (2009, p. 119)

	Positivism	Interpretivism	Pragmatism
Ontology: the researcher's view of the nature of reality or being	External, objective and independent of social actors	Socially constructed, subjective, may change, multiple	External, multiple, view chosen to best enable answering of research question
Epistemology: the researcher's view regarding what constitutes acceptable knowledge	Only observable phenomena can provide credible data, facts. Focus on causality and law like generalisations, reducing phenomena to simplest elements	Subjective meanings and social phenomena. Focus upon the details of situation, a reality behind these details, subjective meanings motivating actions	Either or both observable phenomena and subjective meanings can provide acceptable knowledge dependent upon the research question. Focus on practical applied research, integrating different perspectives to help interpret the data
Axiology: the researcher's view of the role of values in research	Research is undertaken in a value-free way, the researcher is independent of the data and maintains an objective stance	Research is value bound, and the researcher is part of what is being researched, i.e. s/he cannot be separated and results will be subjective	Values play a large role in interpreting results, the researcher adopting both objective and subjective points of view
Data collection techniques most often used	Highly structured, large sample, measurement, quantitative, but can use qualitative	Small samples, in-depth investigations, qualitative	Mixed or multiple method designs, quantitative and qualitative

3.2.4 Selecting Research Paradigm

Positivism is primarily based on the quantitative approach and tests the existing theories, whilst interpretivism tends to focus on qualitatively investigating of the social phenomena; furthering an understanding and explanation of the rationales behind social actions (Creswell, 2009; Saunders et al., 2009).

By reviewing all three of the major research paradigms stated within the previous section, pragmatism is found to be most appropriate for this research study. Since pragmatism focuses on solving problems, using either quantitative or qualitative methods as deemed appropriate, pragmatism was determined to be most ideal in this research. This research was intending to investigate adoption patterns and/or relationship structures that encourage positive individual adoption activities in organisations (see table 3.3.), which will answer the research questions 1

- 3. This aim was broken into three activities. **Activity** 1 was separated into 3 sub-activities – see table 3.3. Activity one was research by considering individual and organisation dimensions discussed in chapter 2, however design will be undertaken in chapter 4. Activities two and three related to evaluating the classification scheme, and understanding the interplay between organisational, individual and technology aspects; to ensure appropriate application of the classification scheme to support technology adoption (see chapter 4). To achieve this **activity**, a quantitative method was used to collect and analysis data to evaluate the relationship structure. **Activity** 2 then develops a framework, to identify, in context of business, potential aspect conflict impacting technology adoption; i.e. to support problem identification, communicate and support resolution of aspect conflict, and affiliate management of change (chapter 5) that will respond the research question 4. A qualitative method was applied to evaluate the potential framework, and a further case study was developed. **Activity** 3 investigates the relationship between innovations and individual factors, i.e. to support enhancement of the conceptual adoption model (chapter 6) that will fulfil the research question 5. A quantitative method was used to test and ascertain the validity of the relationship between factors focusing on individual dimensions and to explain the reasons behind technology adoption.

Accordingly, a mixed method was seen determined as the appropriate method to achieve all the research objectives. It was therefore determined that, pragmatism is the most appropriate philosophical standpoint for this this research.

Table 3.3: Summary of research questions and activities of this thesis

Activities	Chapter	Methods
RQ1: What models identify new technology adoption misalignment? **RQ2:** What model and relationships will help to align? **RQ3:** How can we validate the model? **Activity 1:** To identify a classification scheme to support adoption pattern analysis. **Activity 1.1:** To design the classification scheme, the individual and organisation dimensions will be investigated within existing literature. **Activity 1.2:** To investigate and evaluate the classification scheme to show whether individual cognitive dissonance and technology perception are effectively defined, captured, and analysed. **Activity 1.3:** To understand the interplay of organisational, individual and technology aspects, to ensure appropriate application of the classification scheme to support technology adoption.	4	Quantitative
RQ4: What framework would help to identify misalignment? **Activity 2:** To develop a framework, to identifying, in context of business, potential aspect conflict impacting technology adoption; i.e. to support problem identification, communicate and support resolution of aspect conflict, and affiliate management of change. **Activity 2.1:** To investigate the relevant structures from the literature, to capture aspect conflicts that arise from technology adoption. **Activity 2.2:** To develop a framework to identify relevant structures, using the classification scheme, and capture the aspect conflicts that arise as a result of from technology adoption. **Activity 2.3:** To evaluate the framework via use of relevant case studies.	5	Qualitative
RQ5: What factors would help to identify better technology adoption alignment? **Activity 3:** To investigate the relationship between innovations and individual factors, i.e. to support enhancement of the conceptual adoption model. **Activity 3.1:** To investigate the relationship between innovation, technology and the individual with further exploration. **Activity 3.2:** To investigate how individual dimensions influence the individual in cognitive dissonance state; such as the attitude towards target behaviour and attitude towards changing / maintaining behaviour. **Activity 3.3:** To investigate how technology type affects the relationship between individual dimensions and individual cognitive dissonance state.	6	Quantitative

3.3 Research Strategies

The purpose of research, specifically associated with business and management studies, focuses on exploratory, descriptive and explanatory studies (Saunders et al., 2009). Theories in Information system research, primarily focuses on analysing, explaining, predicting, explaining and predicting and design and action (Gregor, 2006). The purpose of research is therefore dependent on the research questions and the research aim and objectives.

Research strategies are selected to match the type of research being conducted (Saunders et al., 2009). Research design, research strategies, and research methods are considered to match research needs (Creswell, 2009).

3.3.1 Survey Strategy

Survey strategy is a research strategy that can be applied when the research questions are "who", "what", "where", "how much" and "how many" (Saunders et al., 2009, p. 175). Survey strategy ideally obtains data from a large sample source, which then generalise the findings to represent the whole population (Hair et al., 2009). Survey strategy is closely linked to the deductive approach which is then used for testing an existing theory. The approach consists of five steps, which are (Saunders et al., 2009): Develop hypotheses or propositions; Operationalise hypotheses or propositions; Test the operationalise hypotheses or propositions; Examine the findings; Redefine theory based on the findings.

The above strategy serves to complete activities 1 and 3, with the aim of evaluating the relationship structures derived from the relevant theories. Furthermore, this strategy aligns with the quantitative method and questionnaire techniques.

3.3.2 Case Study Strategy

Case study is a research strategy that can be applied when "how's" and "why's" are presented within the research question. However, "what" questions, can also be answered by using a case study research strategy. Yin (2014), presents five elements of case study research, these are: 1. research questions, 2. research propositions, 3. unit of analysis, 4. linkage between data and proposition, 5. analysis criteria (Yin, 2014). These elements help focus the research, especially when collecting and analysing data. Considering Yin's five elements also help ensure the

research questions and research propositions will be evaluated effectively when using case studies.

Using case studies, data can be obtained through multiple sources, e.g. documentations, archive records, interviews, observations, physical artefacts (Yin, 2014). Case studies tend to share common characteristics with the survey strategy, such as focusing on a specific context, i.e. where the boundary between study context and the social phenomena are not clearly isolated (Saunders et al., 2009). However, survey strategies are limited in the number of variables that can be included within the study (Saunders et al., 2009). Case studies also tend to be case classified, such as: critical case, unique case, representative case, revelatory case, and longitudinal case (Seale, 2011).

To complete activity 2, the case study strategy was chosen to evaluate the framework for identifying potential conflicts from technology adoption. Use of case studies facilitates, supports and produces a strong evaluative outcome to explain all the actions involved in the conflict.

3.4 Research Choices and Time Horizon

The mixed method approach was selected as the process of choice for this research, the mixed method approach was also found to aligns suitably with the pragmatism paradigm. Mixed method approach, utilises both quantitative and qualitative methods, which differs from the multi-method approach, which tend to apply either but not both of the quantitative and qualitative techniques. Furthermore, these two methods can be used either in parallel or sequentially (Saunders et al., 2009).

This thesis aims to investigate the patterns and explain the relationship structure. The mixed method approach, will not only strengthen the validity of this study through method triangulation (Venkatesh et al., 2013). In addition, the mixed method also bridges the gap, and subsequent criticism, of using just either the quantitative or qualitative method, i.e. respectively the lack of explanation and qualitative method, or lack of reliability (Creswell, 2009; Venkatesh et al., 2013).

3.4.1 Quantitative Method and Questionnaire Technique (Activities 1 and 3)

To achieve activities 1 and 3, the quantitative method was applied via use of a questionnaire techniques. The questionnaire design, was created using a storyline to assist in fully understanding and perceiving who the respondents are and their roles (Saunders et al., 2009).

The questionnaire (see appendix A) was developed to include three parts:

Part one contains relevant demographic questions and requested details about the respondent profile, which included the CVScale (Yoo et al., 2011), which was used to achieve activity 3. Part one also contained a set of questions, requiring details about the technology that had recently been adopted or was currently in the process of being adopted, and lastly the activity of the adoption; allowing the respondent to provide information concerning three technology adoption settings, as well as the technology itself.

Part two, referred individually to each technology. Part two set out to elicited the perception of each respondent towards an individual technology using the Kano model (Kano et al., 1984). The Kano model's measurement consists of two items, i.e. positive and negative questions. These two items then require the evaluation metric to calculate the Kano prioritisation, which consists of five levels: must-be, one dimensional, attractive, indifferent and reversal (Xu et al., 2009). This study employed the 3-dimensional relationship, between attitude and behaviour (3D-RAB) to measure individual cognitive dissonance (Wiafe et al., 2011). Wiafe et al. (2011) designed a model explaining the relationship between attitude and behaviour, which is as questionnaire based with 11 operationalised items to measure current behaviour (CB, 1 item); attitude towards target behaviour (ATTB, 3 items); attitude towards changing behaviour (ATCB, 3 items) and the attitude towards maintaining behaviour (ATMB, 4 items) (Wiafe, 2012). Both Kano model and 3D-RAB were used as dependent variables in chapter 4 and chapter 6 to achieve activities 1 and 3.

Part three was specifically designed to validate the proposed model. Part 3 consists of 8 operationalised questions, with the aim of obtaining views/opinions/perceptions of respondents to validate the proposed model; when making a comparison between the current system within an organisation and the new adopting technology.

For this study, the systems were contextualised and placed within the technical, formal and informal layers – as define by Stamper (1993). For this study, three questions were created, representing the current system and another three questions were created to represent the new system, the questions were designed to discover which elements the respondents felt needed changing in connection to technology adoption.

Additional, two further questions were created to represent the possible situation, whereby two systems are fully aligned or totally misaligned. Part two and part three were undertaken for each technology referred to within part one.

In support of scale items within the questionnaire, CVscale and 3D-RAB were developed and tested using the 5-point Likert scale (Yoo et al., 2011; Wiafe, 2012). Furthermore, items in part 3 were newly developed, although the 5-point and 7-point Likert scales are popular and widely used in many studies (Saunders et al., 2009). For this study, the decision was made to use a 10-point Likert scale, for the reason that respondents tend to be familiar with it, and the results obtained are not significantly different when compared with the with 5-point and 7-point scales (Dawes, 2008). For the Kano model, the two items (functional and dysfunctional questions) were developed using the nominal scale 1-5 (Xu et al., 2009).

By combining all three parts, as mentioned above together, the questionnaire for collecting data for activities 1 and 3 was developed (see appendix A).

3.4.2 Qualitative Method and Case Study Technique (Activity 2)

To achieve activity 2, this study utilised the existing knowledge or information system artefacts to capture the norms within the organisation (Hevner et al., 2004). In the case of this study, detail norms specification was applied as a standard language to represent the organisational norms (Stamper et al., 1988), as well as business process model notation (BPMN) to visualise how multiple norms interact (White, 2004). From this, a framework was developed, case studies were chosen as a technique to evaluate this framework.

When conducting case studies, Yin (2014) states that there are 6 types source of evidence, these sources are: Documentation; Archival records; Interviews; Direct observations; Participant observation; and Physical artefacts (Yin, 2014).

In this research, use of participant observation case studies was selected, which is based on participant observation. Sufficient participant observation cases were researched in order to identify appropriate conflict situations; facilitating development of the new framework.

3.4.3 Time Horizon—Cross Sectional Analysis vs. Longitudinal Analysis

The time horizon, in research, is concerned with the purpose of capturing a phenomenon, either in one snapshot or in multiple snapshots (Saunders et al., 2009).

Longitudinal study requires the collection of data to be conducted over an extended and lengthy period of time, and it also requires the researcher and his/her intended audience to be able to visualise the trend of a particular phenomenon (Saunders et al., 2009). For example, Adomavicius et al. (2008) proposed mechanisms to represent IT development trends, in order to facilitate IT decision making. They conduct analysis of IT development trends, over an extended time period, to understand trend development. Adomavicius et al. (2008) collected both qualitative and quantitative data over an extended period of time. Adomavicius et al. used a qualitative approach to analyse news content, and a quantitative approach to analyse number of issued Wi-Fi certificates. These two approaches provide data, which facilities development of long-term IT trend models.

Cross-sectional analysis is a suitable method for capturing one snapshot of data, while having the ability to focus on varying perspectives (Saunders et al., 2009). For example, Baregheh et al. (2009) propose the definition of innovation by conducting content analysis across multi-disciplines, the analysis included business and management, economics, organisation studies, innovation and entrepreneurship, technology, science and engineering, knowledge management, and marketing.

For this study, the cross-sectional analysis approach was selected with the intention of analysing technology adoption, the collected data from the respondents provided feedback concerning the

technology type, which then meant that varying technologies were to be included in the analysis.

3.4.4 Analysis Method - Structural Equation Modelling

Structural equation modelling (SEM) is a tool widely used in quantitative IS research to analyse data and confirm theoretical propositions (Gefen et al., 2000). Software, such as LISREL, Stata (StataCorp, 2015), and SPSS Amos (Arbuckle, 2012), provides functions to support SEM analysis. In addition to evaluating hypothesis, and confirming theoretical models, SEM also guides researchers towards detecting hidden relationships (Bagozzi & Yi, 2012). SEM also provides greater advantages when compared to other statistical methods, such as ANOVA or multiple regression. If the analysis needs to identify causal relations, SEM can be used to identify complex structures i.e. more than two layers of mediation (Hoyle, 1995).

Hair et al. (2009) proposes the process for structural equation modelling, consisting of six steps. These steps are explained in detail below.

Step 1 - Define Individual Constructs

This step involves the approach of defining the theoretical constructs that will be used in the study. Theoretical constructs can be adapted from seminal research and / or developed from literature in cases where there is no prior work. The defined constructs will then be operationalised into measurable items through the use of the Likert scale.

Step 2 - Specify Measurement Model

SEM measurement model is based on the factor analysis approach. Three factor models (principal components analysis, exploratory factor analysis and confirmatory factor analysis) are often used to develop SEM measurement models (Blunch, 2013). The Factor analysis groups, operationalises items into specific constructs derived from theory, this analysis confirms the reliability of each constructs and helps researchers to decide, which variables should be included for further analysis (Blunch, 2013).

This section applied the steps for the development of a path diagram, that represented the context of the research. The diagram consisted of relevant elements drawn in the form of SEM notation. The SEM notation consists of indicator, relationship and error terms, there are two

types of SEM indicator: Exogenous (X – influencing variable); Endogenous (Y – influenced factor) (Hair et al., 2009).

The SEM relationship, also consists of measurement, structural and correlational. The measurement (loading) relationship represents the relations between the operationalised items and the latent variables. The structural relationship represents the direction of path diagram. The correlational relationship, is expressed using a two-way arrow, which shows that the two constructs are correlated.

There are error terms representing residual error value of each SEM indicator, figure 3.3 shows how SEM notation simply fit in SEM path diagram. Figure 3.3 presents three operationalised variables – i.e. x1, x2, x. X is an unobserved variable representing x1, x2, x3, and X has measurement relationships with x1, x2, x3. X is an exogenous variable influencing dependent variable y – i.e. endogenous.

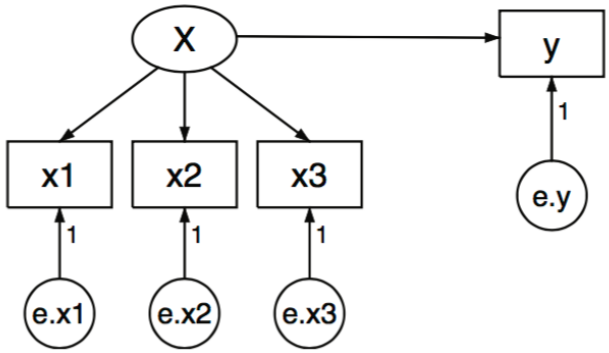

Figure 3.3: SEM Notation adapted from StataCorp (2015, p. 9)

Step 3 - Design a Study to Produce Empirical Results

This step involved procedures to handle empirical data, such as missing data handling, sample size and model complexity, normality and estimation technique. Missing data handling is one of the key tasks when dealing with empirical data. Two approaches are considered at this point: complete case approach (delete record if any missing value) and imputation techniques (replacing missing value with mean). Sample size and model complexity (number of constructs), are key factors towards indicating the reliability and validity of the study. Table 3.4, relating to sample size and model complexity, shows the recommended minimum sample size comparing with the number of constructs. For example, if the defined theoretical constructs

were less than or equal five, then the recommended sample size will be greater than 100 to make the analysis represent the population, and the item communalities (factor loading) for each measurable item (each question in the questionnaire) should be more than 0.6. Although there is a recommendation on sample size, impact by the number of constructs and item communalities, sample size larger than 200 is deemed universally acceptable for SEM analysis (Bagozzi & Yi, 2012).

Table 3.4: Sample Size and Model Complexity adapted from Hair et al. (2009)

Minimum sample size	Number of construct	Item communalities
100	<=5	>.6
150	<=7	.5
300	<=7	<.45
500	> 7	-

The Maximum Likelihood Estimation (MLE) method uses the most likely approach to perform estimation of the model; yet also makes the assumption of data normality (Gefen et al., 2000). Generalised Least Square (GLS) is an alternative method of estimation for cases where the empirical data is not in the normal distribution (Hair et al., 2009). Bagozzi and Yi (2012), however, argued that MLE is reliable in the satisfactory level of estimation, independent of the normality of the data.

Step 4 - Assess Measurement Model Validity

This step concerns the validity of the measurement. Different types of validity check are involved at this point. The basic goodness of fit test, using chi-square ($\chi 2$), tests the hypothesis, i.e. that the model fits with the empirical data. There are other indices that can be used to assess the validity, the most common are: root mean square error approximation (RMSEA); standardised root mean square residual (SRMR); comparative fit index (CFI) and the goodness of fit index (GFI). Table 3.5 shows the recommended value of each index.

Table 3.5: SEM FIT Index

Indicators	Hair et al. (2009)	Bagozzi and Yi (2012)
$\chi 2$		
CMIN/DF		
RMSEA	<.08	<=.07
SRMR	<.08	<=.07
CFI	>.95	>=.93
GFI	>.9	

Step 5 - Specify Structural Model

All the confirmed theoretical constructs, from the measurement model defined within section step 2, were included in this step. Moreover, all relationships between constructs are identified when using structural equation modelling (Hair et al., 2009). The structural model should be drawn according to the hypotheses and/or theoretical propositions based on the literature theory (Hair et al., 2009).

Step 6 - Assess Structural Model Validity

This step, assessed the structural model validity according to defined structures presented within the previous step, which concerned the statistical significance and the direction of the relationship; also including model fitness (as defined in step 4). However, there are existing approaches in SEM to improve model validity, using modification indices that specify additional correlational relationships (Arbuckle, 2012). Altering the direction of the relation, and adding new or remove existing structural relationships, can be done to improve the model validity (Hair et al., 2009).

3.5 Ethical Consideration

To ensure ethical compliance and consideration when conducting the research, this study followed Henley Business School (University of Reading) ethical processes. The questionnaire information sheet, provided to all respondents, included a description of the purpose of the research, and information about the researcher; as advised by the University. Respondents were informed of their rights to withdraw from participating in the study at any time, and that their information would not be shared and would be kept securely. Respondents were also required to electronically sign a consent form, before participating.

During the data collection process, the individual researcher, was the only individual who had access to the data. The name of the participant was used only for tracking purposes and was not used during the analysis process.

3.6 Data Collection

To validate the proposed dual aspect adoption model (introduced in section 4.2), whilst incorporating consideration of the individual aspect (discussed section 4.3), this research needed to collect data, concerning innovation adoption, from stakeholders in an environment

where technology innovation is common. To achieve this, the researcher approached the IT community in Thailand. Thailand is an ASEAN country, which has recently faced considerable technology and infrastructure adoption. Technology turnover in Thailand is fast, and innovation adoption across Thai society has been developing at a fast pace, particularly in financial sector. Change, in part, is driven as a result of significant advances in technology infrastructures, mobile technology devices, use of social media as a communication media in organisations, and wide acceptance of mobile financial technologies (Parveen et al., 2015; Chiarakul & Igel, 2016).

3.6.1 Questionnaire Design

For this study, the questionnaire consisted of two parts. Part one asked about the technologies that were currently being adopted by the participant (and/or had recently been adopted). Questions were accordingly asked about the purpose of the adoption. Respondents provided information concerning up to three technologies.

Part one applied the CVScale (Yoo et al., 2011), which utilises 26-items that have been developed and validated based on Hofstede's cultural dimensions (see section 6.3). Each dimension indicates that people might behave differently, as a result of being: low / high power distance (PO), low / high uncertainty avoidance (UN), low / high collectivism (CO), low / high masculinity (MA), or long- / short-term orientation (LTO). With focus on technology perception, this study intended to find the individual relational structures on technology adoption, for example an individual who works in an organisation that uses and adopts technology to enhance business performance. This study considered two instruments, i.e. CVScale and 3D-RAB, to investigate this pattern. CVScale was used to measure individual cultural dimensions (power distance, collectivism, masculinity, uncertainty avoidance and long-term orientation). 3D-RAB was used to measure cognitive dissonance of an individual to obtain attitude and behaviour towards technology usage.

Part two asked respondents in detail about each technology answered on part one. Respondents answered part two between one and three times, depending upon the number of technologies suggested in part one. Part two consists of three sub sections.

The Measurable Items in Questionnaire

Section 1 asks about *technology perception* - (2 items—KN01 and KN02).

The formula will compare two questions to identify how relevant people see a particular technology. Positive question - KN01: How do you describe your perception regarding the implementation of this technology? Negative question - KN02: How do you describe your perception if your company do not implement this technology? The scale for answering these questions were :"1. I like it, 2. I expect it, 3. I'm neutral, 4. I can tolerate it, and 5. I dislike it".

Section 2 asks about cognitive dissonance, which applies measuring the 3D-RAB instruments (Wiafe, 2012), which consists of 11 items / questions (R01 – R11).

Attitude towards Targeted Behaviour

R01: I find using this technology is an interesting activity (ATTB01)

R02: I like the benefits of using this technology (ATTB02)

R03: To me, using this technology is a good way of improving efficiency (ATTB03)

Current Behaviour

R04: I have use this technology before (CB)

Attitude towards Changing/Maintaining Behaviour

When users have experienced using technologies - Maintaining

R05: I would continue using this technology as a regular activity (ATMB01)

R06: I believe that using this technology is now a part of my daily life (ATMB02)

R07: I am not certain that I will continue to use this technology (ATMB03)

R08: I believe I am capable of using this technology (ATMB04)

When users have not experienced using technologies - Changing

R09: I believe it would be difficult for me to use this technology (ATCB01)

R10: For me to use this technology is extremely difficult (ATCB02)

R11: For me I am sure it would be easy to use this technology (ATCB03)

Section 3 asks questions to evaluate dual aspect model. We formulate eight statements (Q01-Q08) to examine individual perception to the impact between the existing system and the new systems. These eight statements measure individual attitude according to the technology

adoption (the current business system and the new technology interactions). In the statement, we choose technology to represent technical layer, process to represent formal layer and behaviour to represent informal layer.

Those statements are:

"Q01 - The new technology can be fully used in the organisation (ALG)"

"Q02 - The new technology is required to be customised as it doesn't fit well at the first place (CNT)"

"Q03 - The existing technology is required to be customised to be compatible with the adopting technology (CCT)"

"Q04 - The new process is required to change to fit with the current business system (CNP)"

"Q05 - The existing process is required to change to support the new adopting process (CCP)", "Q06 - People will need to change their way they work once the technology is adopted in place (CCB)"

"Q07 - Interaction with the adopting technology is required to be customised to minimise impacts to people's behaviour (CNB)"

"Q08 - People won't use the new adopting technology at all (CFT)".

Items in sections 2 and 3 apply a 10-point Likert scale where zero relates to totally disagree and 10 relates to totally agree. The full version of questionnaire can be viewed in Appendix A.

3.6.2 Questionnaire Administration

The questionnaire items were translated into the Thai language and piloted with six respondents. This questionnaire was administered in October 2015 in Thailand. Face to face feedback was captured concerning respondents use of the questionnaire. All respondents were also given the option to respond via email, or write comments on the online survey form. Both email and online questionnaires were identical.

3.7 Research Design

All relevant research methods, design and philosophies presented within chapter three, were carefully researched, defined and selected, for the sole purpose of answering the research questions. Pragmatism was chosen as the research paradigm for this study. Figure 3.4 show how research questions align with the relevant chapters. Survey strategy and questionnaire technique, were selected as the most appropriate and viable form for data collection, towards answering the research questions. SEM is used to analyse and validate, the structural relationships presented within chapters four and chapter six. The qualitative data for this study, consisted of conducted multiple case studies.

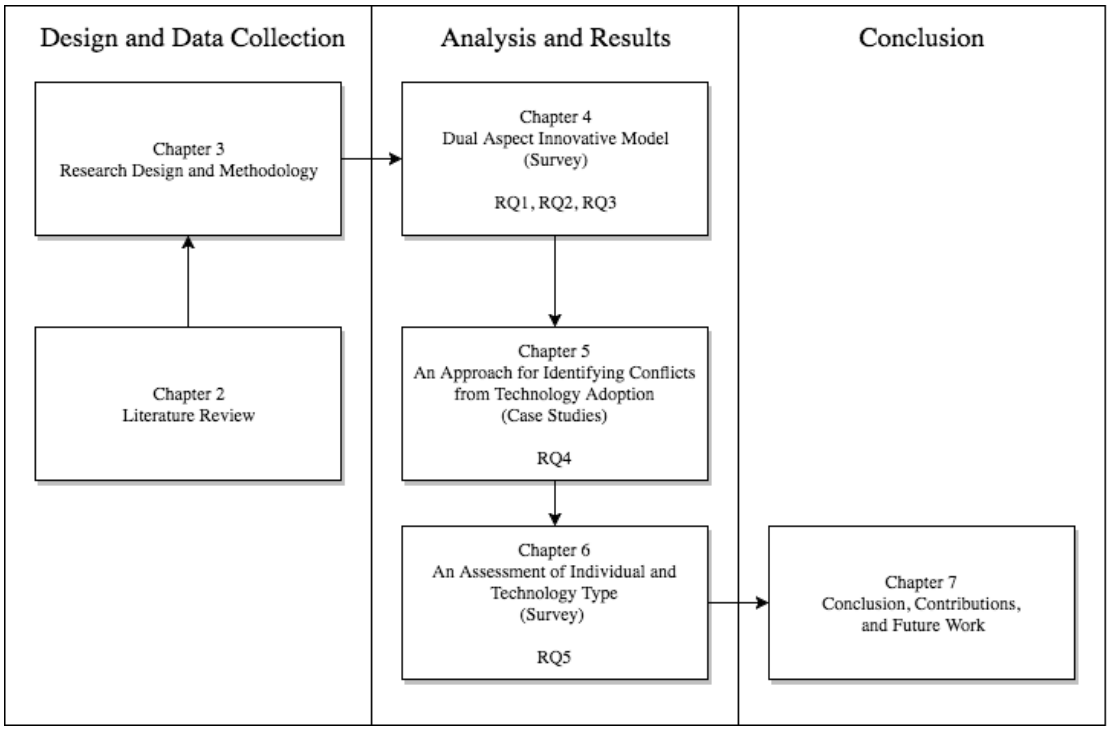

Figure 3.4: Research Design and Methodology

Chapter 4
Dual Aspect Adoption Model

4.1 Chapter Overview

Within this chapter, this research aims to identify a classification scheme to support adoption pattern analysis (Gallivan, 2001; Martin & Fellenz, 2010). The three entities, i.e. individual, organisational and technological (Brooks, 2009; Beynon-Davies, 2013), discussed in chapter 2, are examined and analysed in more detail. Subsequently this chapter proposes a model that is able to identify conflict and align conflict between systems in order to support innovation adoption within business.

The research question processed and answered within this chapter is:
RQ1: What models identify new technology adoption misalignment?
RQ2: What model and relationships will help to align?
RQ3: How can we validate the model?

4.2 Proposed Dual Aspect Model and Dual Alignment Framework

With consideration of aligning technology in business, such as adopting ERP system. The technology system (ERP system) maybe a new system, which needs to be incorporated with the business system. The alignment between two systems is mandatory to ensure the successful implementation of ERP system. Therefore, we propose our alignment framework, which considers innovation adoption based on the aspect of two systems interaction. The model is called the dual aspect model, which is subsequently decomposed to highlight specific dual alignment framework.

4.2.1 Dual Aspect Model

To model innovation adoption, the interaction of multiple onions was considered; as the interaction of layers in multiple systems allows us to consider the interaction of system norms.

The Dual Aspect Model represents, therefore, two overlapping semiotic onions. The two overlapping onions represent the interaction between two systems; where a system represents either an organisation, a technology, or an individual. Each system possesses informal, formal and technical layers. Alignment comes if the norms of A and B are not in conflict. For example,

if a technology is placed in an organisation, but the use of the technology conflicts with the organisational formal processes either the technology should be removed, or the formal (and informal) processes in the organisation need to change. If, an example, an organisation hires a new chief marketing officer (CMO), he/she is likely to introduce new ideas. The organisation will need to change the informal and formal process maximise the benefit of these new ideas. If an individual buys a new technology, such as Netflix (on-demand movies), which is an interaction between an individual and a technology, the individual might change their informal leisure activities as a result, e.g. watching TV programmes on demand providing a more flexible viewing experience. This interaction implies the existence of relationship within the adoption process, and nine interaction points (see figure 4.1).

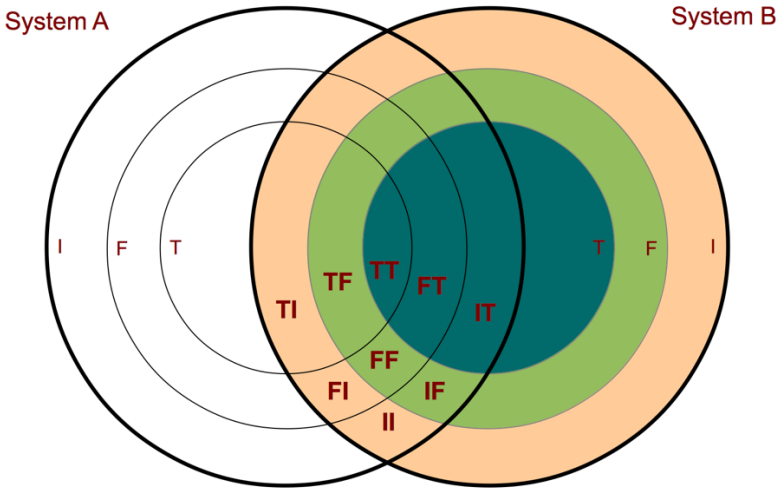

Figure 4.1: Dual Aspects Model modelling the Interaction of Aspects

Business success depends upon the alignment of multiple aspects, either held by individuals and/or implemented within systems. Both individuals and/or organisational systems can be modelled, irrespective of its status as an individual, organisation, and/or technical systems; as we have aligned the same meanings and order of layers - as defined within Stamper's semiotic onion (Stamper, 1993). Accordingly, it is possible to compare systems (including stakeholder) interaction.

This study proposes the use of the Dual Aspect Model, as a viable model to break down the alignment process, and presents researchers with a tool to consider where misalignment occurs

between two different systems. Using the Dual Aspect Model, we are able to identify whether conflict occur between technical, formal, and or informal systems. If we are able to identify the points where informal, formal and technical conflicts occur, then it is possible to determine whether individuals, organisation structure and/or technologies needs to change to find alignment.

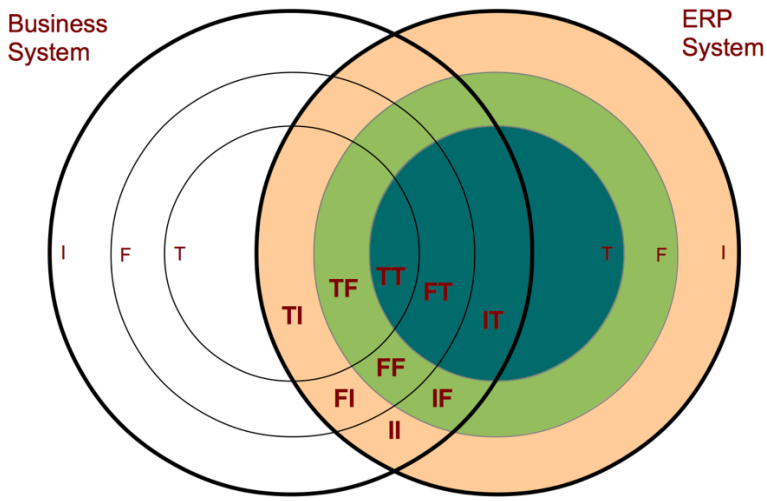

Figure 4.2: Dual Aspects Model – Business System and ERP System Interaction

When considering, for example, the introduction of a new intrusive IT system (see figure 4.2), such as an Enterprise Resource Planning (ERP) system, the business would be seeking to minimise the informal, formal, and technical misalignment between the organisation and the new software (Onita & Dhaliwal, 2011; Fichman & Melville, 2014). Alignment between the organisation and the new system limits the risk and cost faced by the organisation of undertaking either customisation of the ERP software, or reengineering of existing business processes (Wastell et al., 2007). Even instances where technology alignment is possible, failure to achieve alignment between informal and or formal structures is likely to result in the new technology system either acting in conflict to the existing business systems, or being rejected by the end-user such as a customer (Avgerou, 2008).

Figure 4.2 shows two systems interacting; in this case, the current business system is interacting with a new technology. If each system has informal, formal, and technical layers, there are nine possible points of conflict between the two systems. In figure 4.2 'I' represents informal activity i.e. people's behaviour. 'F' represents formal rule-based activity i.e. business processes and

procedures. ‘T’ represents a technical tool or an information system, e.g. smartphone or internet messaging. If IFT of the existing system interacts with TFI of the new systems then nine interaction points are formed; highlighted by an alphabetical code (e.g. TI TF, TT, FT, IT, FI, FF, IF, II). The left alphabetical letter represents the norm layer of the left aspect (System A), and the right alphabetical letter represents the norm layer of the right aspect (System B). TI, for the business example in figure 4.2, represents the point at which possible conflict might exist between the current business technology solutions, and the informal assumptions of the new system. If the new system requires a certain technology, to support cultural and/or informal activity (such as mobile devices), however this technology is not available in the company, then a conflict exists that limits the acceptance of this informal activity into the company.

Use of the dual aspect model hopefully allows identification of conflicts that exist between informal, formal and technical structures of conflicting systems; ideally independent whether of whether the systems relate to organisations, technologies, or individuals. Although the dual-aspect model defines systems interaction points, it in itself fails to support alignment. In order to facilitate this alignment, in the next section, we introduce the concept of alignment framework.

4.2.2 Dual Alignment Framework

The interplay between the two potentially conflicting systems, can be decomposed by defining the alignment framework (see figure 4.3). In the figure 4.2, example we represent interaction of two systems i.e. current business system and the new technological system. If the current business system can change then this can achieve this on the left-hand side of the model, however if not change is permitted within the business these paths cannot be used. If the new system changes then we can achieve this on the right-hand side of model. If the person is unwilling to change then the right had paths cannot be used. If, however, there is mutual change, i.e. both systems are possibly changing in parts to find a mutual alignment, then changes on both sides of the framework are required (at the same time) in order to find mutual alignment (see figure 4.3).

The four possible ‘routes of alignment’ are represented below. The states within each route are stated and the left / right divide is represented by a forward slash. Routes include: Existing alignment (IT-FT-TT-A / TI-TF-TT-A – route 1); Technology misalignment (IT-FT-TT / TI-

TF-TT – route 1); Formal misalignment (IT-FT-FF / TI-TF-FF – route 2); Informal misalignment (IT-IF-II / TI-FI-II route 3) – see figure 4.3. Flow moves towards the central alignment ladder, and reaches full alignment if informal, formal, and technical alignment can be reached.

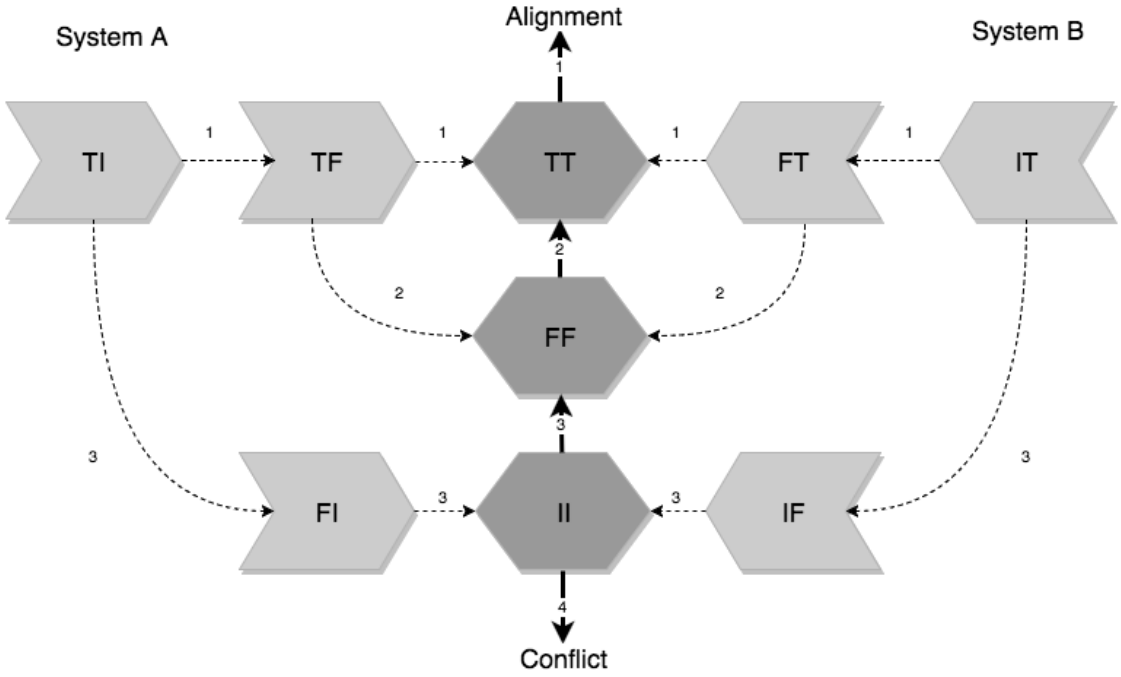

Figure 4.3: Dual Alignment Framework for Identifying Possible Conflicts

Existing Alignment (TI-TF-TT-A and IT-FT-TT-A, route 1)

TI-TF-TT-A and IT-FT-TT-A reflects respectively the left and right aspect routes to perfect alignment. To reach mutual alignment, technology solutions should align, and not conflict with, informal norms (people's behaviour, meaning that the technology should not limit informal interactivity, since technology is dependent on the informal level. If no conflict exists between technology and informal norms, then the technology should be checked to see if it conflicts with formal rules and processes. For example, the technology should not limit formal structures or break organisational rules, since technology should support the activity within, nor impose upon, formal structures. If technology tools align (i.e. no conflict exist between technologies or solutions within state TT), then it can be said that alignment has been achieved (see figure 4.3).

Most organisations prefer to adopt new technologies that minimise the impact to existing technical systems, business processes, and users' behaviour (Duffield & Whitty, 2016). For example, if an Oracle database system requires upgrading, i.e. in order to continue support

service by a software provider, it is most likely that a new/upgraded version of the original Oracle database system will be implemented within the current business system to minimise upset / retraining, etc. Hopefully by minimising change business processes are able to operate without disruption, and other software systems that integrate will continue to function effectively without a need for technical realignment.

Technology Misalignment (TI-TF-TT and IT-FT-TT, route 1)

Technology misalignment occurs when informal and formal structures conflict, and technology solutions conflict with informal and formal structures. Technology solutions have the capacity to conflict with current business systems. For example, the current business systems may not be compatible with the new processes that take place with the new technology solutions. To reach mutual alignment, the technology solutions in opposing aspects should not conflict with informal activities and formal processes. Moreover, the current organisational system should not limit informal and formal activities in the technology. In the model (see figure 4.3), TI-TF-TT and IT-FT-TT reflects respectively the alignment required in left and right aspects of the routes to a point where only technology misalignment occurs (i.e. TT).

Since the technology used within opposing system should support, and not conflict with the informal and formal structures, it is important to align technology norms. If, however, the technical solutions used by opposing aspects do not align, then a process of technical alignment is required. If no changes to formal and/or informal structures is required, technology developers, such as IT developers, can achieve technology alignment without the need for business process reengineering and/or changes to the management mechanisms.

A technology misalignment, as the example, might relate to the data format use to communicate between the current software system and the new technology solution. Technical conflicts would occur if the new system did not offer options to customise this data format. In this circumstance, the modification of the current system is needed, in order to communicate with the new technology solution. No change is required with informal and formal activities / processes, only modification in data format would be required. Once alignment is achieved within the TT state, we can claim to have successfully achieved systems alignment (A).

Formal Misalignment (TI-TF-FF /IT-FT-FF, route 2)

Formal misalignment occurs, when informal structures do not conflict, for example when the two systems (e.g. the current and new systems) are based on the same belief and social structures, and use the same informal behaviours, however formal structures and/or technical solutions have the possibility to be in conflict. To reach mutual alignment, the technical norms in one aspect, should not conflict with the informal norms in the other, i.e. the technology should not limit informal interactivity, since technology is very much dependent on the informal level.

The technical solutions in the opposing aspects however, may conflict with the formal process. For example, the new technology solution may require changes in a process to function successfully, which means the current system cannot serve the current business users. To address this misalignment, formal rules need to be changed / aligned (in state FF) to ensure the technology of one aspect does not break the rules of the other. If formal and technology alignment cannot be achieved (i.e. passing up through states FF and TT), then alignment may not be possible.

For example, the current business system operates on 5-working days. The new technology solution comes with a 7-day operational model, which brings about a conflict between the formal process used in the software and the current business system. To solve this problem, the organisation may decide to customise the new technology or change the business model. If the software is to be change, the technical elements i.e. programming code of the new technology, may require costly customisation to support the agreed formal 5 day working week.

Informal Misalignment (TI-FI-II /IT-IF-II, route 3)

To reach mutual alignment, the informal norms in both aspects should not conflict. Informal misalignment occurs when technical and formal norms of one aspect conflicts with the informal norms of the other aspect. If informal misalignment were to occur, then alignment of informal norms is required in state II (see figure 4.3). Once alignment has been achieved within the II state; the formal and technical alignment, within states FF and TT must be checked before total alignment (i.e. A) can be achieved.

Bank A, for example, might decide to enhance security of all processes. As part of this it decides to adopt multi-factor authentication mechanism, which requires the physical presence of the customer, yet this may conflict with current informal processes. Informal processes within Bank A, would have to be changed to support the use of additional security technologies. Formal processes would have to be changed to manage use of additional authentication factors, and technical systems would also need to be changed, to allow for security devices and additional authentication services. If changes to technical and/or formal norms is not possible, then inclusion of the new technology will not be possible.

4.2.3 Summary Concerning Dual Aspect Model and Dual Alignment Framework

Within this research, we identified the need for an adoption model, that would allow consideration of the two aspects; i.e. to model the interaction between organisation, technology and individual systems. This study proposes a dual aspects innovative model, adapted from Stamper's organisational onion (Stamper, 1993). Since existing literature does not provide a combinative interplay model. We believe the dual-aspect model offers the potential to facilitate our understanding of how innovation can, and is, adopted / diffused throughout organisations.

The developed model classifies the system into three system layers — informal, formal, and technical – and allows the identification of conflicts. The four routes show how conflict states (II, FF, and TT) are reached and practically, allows systems practitioners to identify norm conflicts in advance; allowing businesses to therefore manage the impact of innovation adoption. This research supposes that total alignment will only occur if two systems align in all II, FF, TT states, i.e. II follows by FF, and TT. The dual aspect model provides a very strong structure to allow future consideration of conflict between conflicting systems as a result of the introduction of an innovation.

Although some studies link the individuals and organisation (Gallivan, 2001), they do not, to the best of our knowledge, structure the relationship between individual and organisation factors in a form that allow alignment conflict to be modelled. This study aims to bridge individual, organisational and technology aspects. To investigate the individual aspect in more detail, we consider the individual attitude and perception towards using technology using relevant individual perception models from the literature.

In the following section, we discuss two areas of literature which relate specifically to these individual factors.

Results from data collection subsequent to minor formatting corrections, 217 responses were collected (as shown in table 4.1). All respondents worked for companies in Thailand involving technology adoption. From the data collection, the respondents provided feedback concerning 264 technologies. 251 of the 264 technologies were found to be valid for analysis - records containing incomplete data were removed. Within initial analysis no attempt was made to cluster and/or summarise technologies via thematic groups.

Table 4.1: Data Collection – Sample Size

	Sample Size	Valid Samples	Samples in Analysis
Responses	217	217	196
Technology	264	251	251

For all 251 valid technologies, using the 3D-RAB data, we were able to define participant dissonance states – see Table 4.2. See appendix B for a full list of technologies defined in dissonance states 1-8. Primarily analysis shows two key states, i.e. states 1 and 6. Within state 1 (CB+, ATTB+, ATMCB+) there were 132 technologies; within dissonance state 6 (CB-, ATTB+, ATMCB-) there were 85 technologies.

Table 4.2: Dissonance State vs. Technology Perception

		Technology Perception					Total
		M	O	A	I	R	
Dissonance State	1	7	44	50	29	2	132
	2	1	0	3	3	0	7
	3	0	0	0	4	1	5
	4	0	0	0	3	0	3
	5	0	1	0	1	0	2
	6	8	10	31	36	0	85
	7	0	0	0	3	0	3
	8	1	0	2	10	1	14
Total		17	55	86	89	4	251

A further breakdown of results, using technology perception Kano model, can be seen in table 4.2. The implementation of 17 technologies were considered as mandatory. The benefit of implementing 55 technologies was seen as being one-directional. The implementation of 86 technologies was perceived as attractive. 89 technologies are perceived as indifferent, i.e. the outcome was of limited concern or value to respondents.

From the data collection, the initial result gives us the contextual view of the data based on descriptive statistics. To gain insightful information, inferential statistical analysis i.e. testing hypotheses, will allow us to look into the data in various dimension. The next section will show the analysis process using structural equation modelling (SEM) to investigate the relationship that were identified between dual aspect model, dissonance state and technology perception data.

4.3 Data Analysis Process

In this analysis, this study applied structural equation modelling (SEM), as the analysis method. This study selected SPSS + AMOS 21 as the tool for SEM, the process for structural equation modelling, consisting of 6 steps. These steps will be explained in detail within the following sub-sections.

4.3.1 Define Individual Constructs, Develop and Specify the Measurement Model - Step 1 and Step 2

Step 1 involves the approach of defining the theoretical constructs that are relevant for the study including the operationalisation process to create measurable items for data collection. The development of theoretical constructs was discussed in chapter 3 and earlier this chapter.

Step 2 applied the steps for the development of a SEM measurement model, which confirmed the reliability of the operationalised items within the survey. The measurement model was used to confirm whether or not the collected data had sufficient and reliable data to proceed further for analysis.

4.3.2 Analyse Empirical Results and Validate Measurement Model - Steps 3 and 4

Step 3 involves procedures to handle empirical data – missing data handling, sample size, model complexity, normality and estimation technique. Missing data handling is one of the key tasks when dealing with empirical data. This study applied the complete case approach (Hair et al., 2009).

For sample size and model complexity (number of constructs), this study was able to obtain data about 200+ technologies (from 196 respondents), with data concerning five constructs; i.e.

technology perception, dissonance state, dual aspect factors (which consists of technology misalignment state, process misalignment and people's behaviour misalignment). These numbers were sufficient to confirm the reliability and validity of the study (Bagozzi and Yi, 2012). In the following subsections, we will consider the results of each of these constructs (i.e. Technology Perception, Dissonance State, and Dual Aspect Factors) in turn.

Technology Perception

As shown in table 4.3, this study adopted the Kano evaluation method to measure individual perception towards a particular technology. The items in part 2 of the questionnaire, within section 1 (KN01, KN02) were calculated using the Kano's Evaluation table (see table 4.3). All calculations were undertaken using SPSS syntax. For example, if a respondent choose option 1 for the positive (Functional) question (KN01) and option 5 for the negative (Dysfunctional) question (KN02). This means that the respondent perceives the technology as one-dimensional.

Table 4.3: Kano Evaluation Table adapted from Xu et al. (2009)

Technology Perception		**Dysfunctional (negative) question**				
		1. I like it	2. I expect it	3. I'm neutral	4. I can tolerate it	5. I dislike it
Functional (positive) question	1. I like it	Q	A	A	A	O
	2. I expect it	R	I	I	I	M
	3. I'm neutral	R	I	I	I	M
	4. I can tolerate it	R	I	I	I	M
	5. I dislike it	R	R	R	R	Q
A: Attractive, **O:** One-dimensional, **M:** Must-be, **I:** Indifferent, **R:** Reversal, **Q:** Questionable						

Dissonance State

The 3D-RAB model consists of three constructs: Attitude towards Targeted Behaviour (ATTB) - R01-R03, Current Behaviour (CB) – item R04 and Attitude towards Changing/Maintaining Behaviour (ATCMB) – items R05-R11. ATCMB construct is a combination of two cases, which are attitude towards changing behaviour (ATCB) – items R05-R08 and attitude towards maintaining behaviour (ATMB) – items R09-R11. Respondents were instructed after answering question R04 (CB) either to answer ATCB or ATMB depending on their current behaviour (CB). Item R11 (ATCB03) needs to be reverted score (ATCB03_R) since the question is against other items in the same constructs: R09 (ATCB01) and R10 (ATCB02). See Appendix A for a copy of the complete questionnaire.

From this condition, the responses are assigned into two groups: Experienced group (respondent who answer ATCB and CB-) and inexperienced group (respondents who answer ATMB and CB+). As all 3D-RAB constructs composed of more than one measurable item, we need to perform reliability test for the measurable items using Cronbach's alpha and factor analysis (Hair et al., 2009).

Results in table 4.4 shows the Cronbach's alpha and exploratory factor analysis (EFA from inexperienced group (CB-), whilst table 4.5 shows the result from the experienced group (CB+). Both group showed strong reliability, i.e. with Cronbach's alphas 0.899, 0.788 for ATTB and ATCMB for the inexperienced group Cronbach's alpha 0.917, 0.687 for ATTB and ATCMB for the experienced group.

Table 4.4: Cronbach's Alpha and EFA for 3D-RAB (CB-)

Current Behaviour - Inexperienced	EFA Factor	
	1	2
Cronbach's Alpha	.899	.788
ATTB01 ATTB02 ATTB03	.861 .967 .764	
ATCB01 ATCB02 ATCB03_R		.976 .702 .527

Table 4.5: Cronbach's Alpha and EFA for 3D-RAB (CB+)

Current Behaviour - Unexperienced	EFA Factors	
	1	2
Cronbach's Alpha	.917	.687
ATTB01 ATTB02 ATTB03	.906 .939 .819	
ATMB01 ATMB02 ATMB03 ATMB04		1.020 .787 .263 .441

From the exploratory factor analysis (EFA) results in table 4.5, it was found that factor loading supported the designed constructs; however, there were items highlighted as having a low factor loading (ATMB03, ATMB04).

Step 4 - After the reliability test is done via Cronbach's Alpha and exploratory factor analysis (EFA). The SEM measurement model for 3D-RAB is created. The step confirms the validity of the constructs through confirmatory factor analysis (CFA). The result also confirmed the results from the exploratory factor analysis (EFA) but only ATMB03 (0.26) has factor loading below the recommended value of 0.45 (Hair et al., 2009) – see figure 4.4

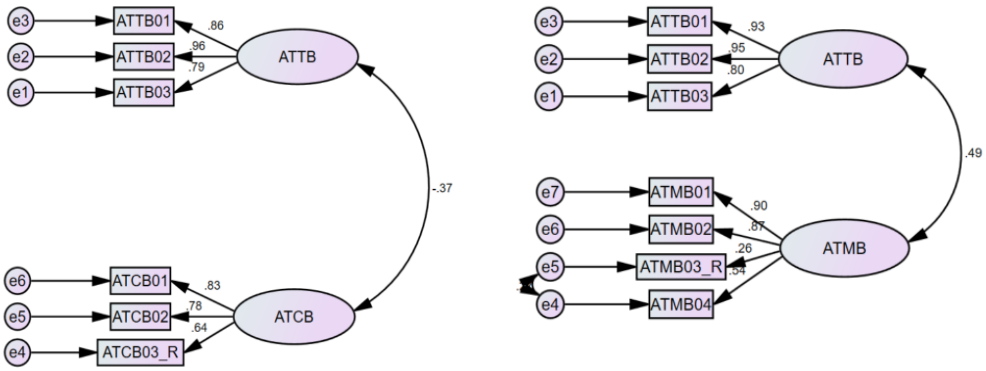

Figure 4.4: SEM Measurement Model
(Confirmatory Factory Analysis - CFA) for 3D-RAB – CB- (left) and CB+ (right)

From the result from confirmatory factor analysis (CFA), this study then further investigated and compared the measurement model fitness using two cases (with and without ATMB03) and confirmed that the CFA fit index was decreased when the variable was removed (CFI from .990 to .985, and GFI from .968 to .967) - see table 4.6. Therefore, the variable was supported and justified as to why it should remain in the model for further analysis although the variable had a low communality but has meanings to the theoretical construct (Hair et al., 2009).

Table 4.6: CFA Model Fit Index - 3D-RAB

Indicators	Hair et al. (2009)	Bagozzi and Yi (2012)	CB-	CB+	CB+ (after remove ATMB03)
$\chi 2$				***	***
CMIN/DF			1.705	1.511	2.052
RMSEA	<.08	<=.07	.083	.059	.085
SRMR	<.08	<=.07	.072	.050	.056
CFI	>.95	>=.93	.982	.990	.985
GFI	>.9		.961	.968	.967

To conduct further analysis, we calculated individual cognitive dissonance states, and included this within the SEM structural model. All calculations were done using SPSS syntax.

Dual Aspect Factors

To analyse part 2 of the questionnaire (SEM's step 3), in section 3, the questions in Q02-Q7 were collected with the scale range from "strongly disagree" to "strongly agree" using a 10-point Liker scale. Q02 (CNT), Q04 (CNP) and Q07 (CNB) represent attitude toward changing the new system (technology, process, people's behaviour), whilst, Q03 (CCT), Q05 (CCP) and Q06 (CCB) represent attitude towards changing the current system). To proceed further analysis, only agree attitudes (> 6 of 10-point Likert scale) will be included in the mapping with the Dual Alignment Framework. The proposed dual alignment framework is applied and mapped with all questionnaire items (see figure 4.5). To undertake dual aspect mapping, we need to create nine dummy variables (TI, TF, TT, FT, IT, FF, FI, II, and IF) with True/False Boolean values. For SEM analysis, 0 is not an allowed state value using in SPSS AMOS, so we apply value 2 for True and value 1 for False.

In this case, the left side represents system A and the right side refers to the system B. For example, TI variable may relate to changing system A (CNT) and/or changing system B behaviour (CCB), (questions Q02 and Q06). Each of the nine dummy variables will be assigned the value 2 (True) if the respondent agrees that there are changes on both sides of the framework, otherwise the dummy variable will be assigned to value 1 (False).

System A			**System B**	
TI = CNT+CCB	TF = CNT+CCP	TT = CNT+CCT	FT = CNP+CCT	IT = CNB+CCT
		FF = CNP+CCP		
	FI = CNP+CCB	II = CNB+CCB	IF = CNB+CCP	

Figure 4.5: Mapping of the questionnaire items with Dual Alignment Framework

After the mapping was done, this study conducted the exploratory factor analysis (EFA) process to analyse whether being in an alignment route state impacted participant perception concerning the technology innovation being discussed. Table 4.7 identifies three factors: technology

misalignment = TT+TI+TF, process misalignment = FT+FF+FI, and people's behaviour misalignment = IT+IF+II.

Table 4.7: EFA for Dual Aspect

	Factor		
	1	2	3
TT	1.078		
TI	.509		
TF	.622		
FT			.572
FF			1.022
FI			.700
IT		.798	
IF		.826	
II		.908	

The EFA result shows reliable factor loading and re-confirmed the SEM measurement model in Figure 4.6 (CFA result, presents the confirmed results from EFA step).

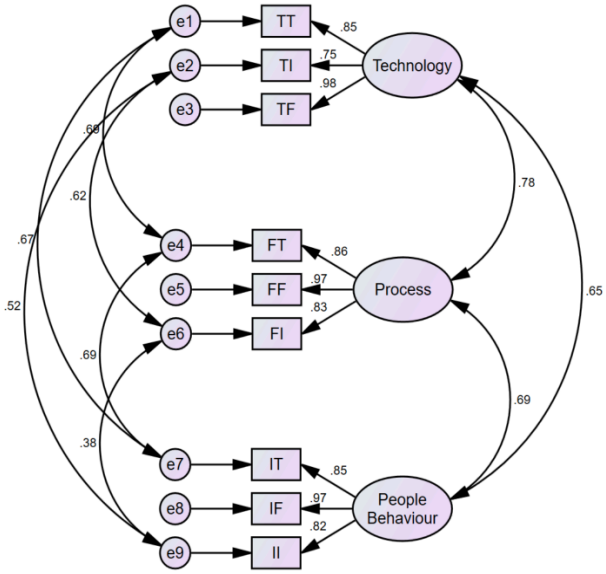

Figure 4.6: SEM Measurement Model
(Confirmatory Factor Analysis - CFA) for Dual Aspects

To assess measurement model validity (SEM's step 4), table 4.8 confirms the validity of the measurement models, which involved different indicators of validity check involved within this step. In this case, root mean square error approximation (RMSEA); standardised root mean square residual (SRMR); comparative fit index (CFI) and goodness of fit index (GFI) were used to confirm whether or not the model would fit with the empirical data.

Table 4.8: CFA Model Fit Index

Indicators	Hair et al. (2009)	Bagozzi and Yi (2012)	Dual Aspect
$\chi 2$			
CMIN/DF			1.705
RMSEA	<.08	<=.07	.063
SRMR	<.08	<=.07	.032
CFI	>.95	>=.93	.992
GFI	>.9		.968

SEM analysis for dual aspect factors identifies three SEM latent variables for further analysis in SEM: technology misalignment (TT, TI, TF), process misalignment (FT, FF, FI) and people / behaviour misalignment (IT, IF, II). This result implies changes happened on the left side of the dual alignment framework (new system).

Summary of Analysing Empirical Results and Validate Measurement Model

From the current findings, this study identified five relevant constructs (technology perception, cognitive dissonance, technology misalignment, process misalignment and people's behaviour misalignment) adapted from three different models. All five constructs were validated and achieved satisfactory level in SEM analysis. In the following section, this study developed and specified the structural model by drawing on the relationship between the five constructs.

4.3.3 Specify and Validate Structural Model - Step 5 and 6

Step 5 identifies the relationship between constructs in the model. In this research, we proposed hypotheses base on the structure of the dual aspect model, which align with Stamper's organisational onion. The structure of changes is that informal system (people's behaviour) is outside, formal system (process) in the middle and technical system (technology) as the core. The changes come from outside towards the core and then lead to individual perception.

Therefore, we create 4 SEM hypotheses:

H1: People's behaviour misalignment influences process misalignment

H2: Process misalignment influences technology misalignment.

H3: Technology misalignment influences individual cognitive dissonance state.

H4: Technology misalignment influence influences individual technology perception.

According to the developed hypotheses, the SEM structural model is developed (see figure 4.7). From the developed SEM structural model, we found that H1 and H2 were supported by SEM analysis, whilst H3 and H4 were rejected by the empirical results.

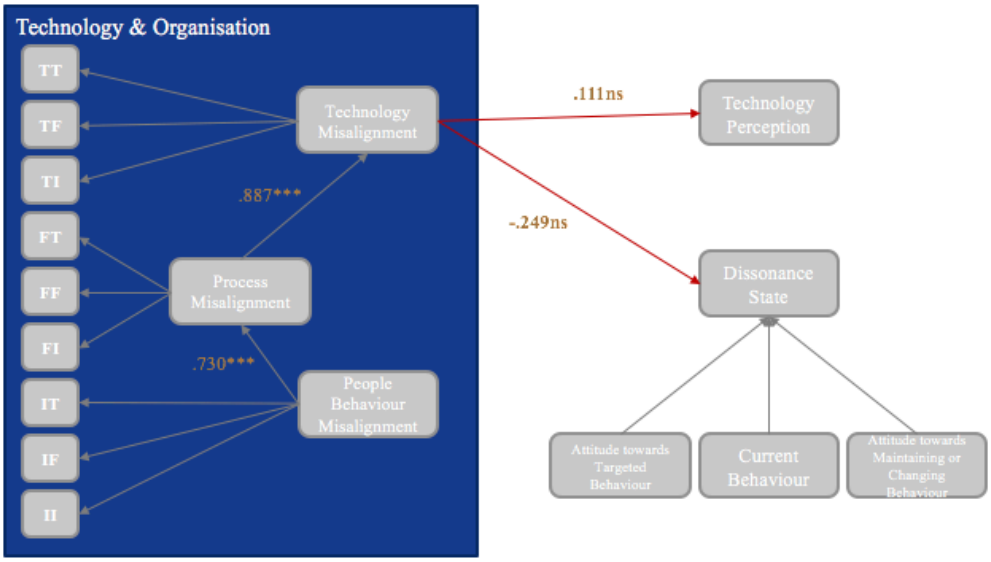

Figure 4.7: 1st SEM Structural Model from the developed hypothesis

Table 4.9 shows the fit index of the 1st SEM structural model, which confirm the validity of the 1st model.

Table 4.9: The 1st SEM Model Fit Index

Indicators	Hair et al. (2009)	Bagozzi and Yi (2012)	1st Model
$\chi 2$			
CMIN/DF			2.469
RMSEA	<.08	<=.07	.077
SRMR	<.08	<=.07	.056
CFI	>.95	>=.93	.978
GFI	>.9		.941

The 1st SEM structural model shows unsatisfactory result as it fails to support the relationship between technology and organisation aspects with individual aspect. However, there is no theory, which has explored these factors and relationship before. Therefore, this study set out to explore all possible relationships as shown in figure 4.8. Technically, this study employed a feature "specification search" in SPSS Amos (Arbuckle, 2012), i.e. to analyse data based on our proposed 2nd structural model (figure 4.8).

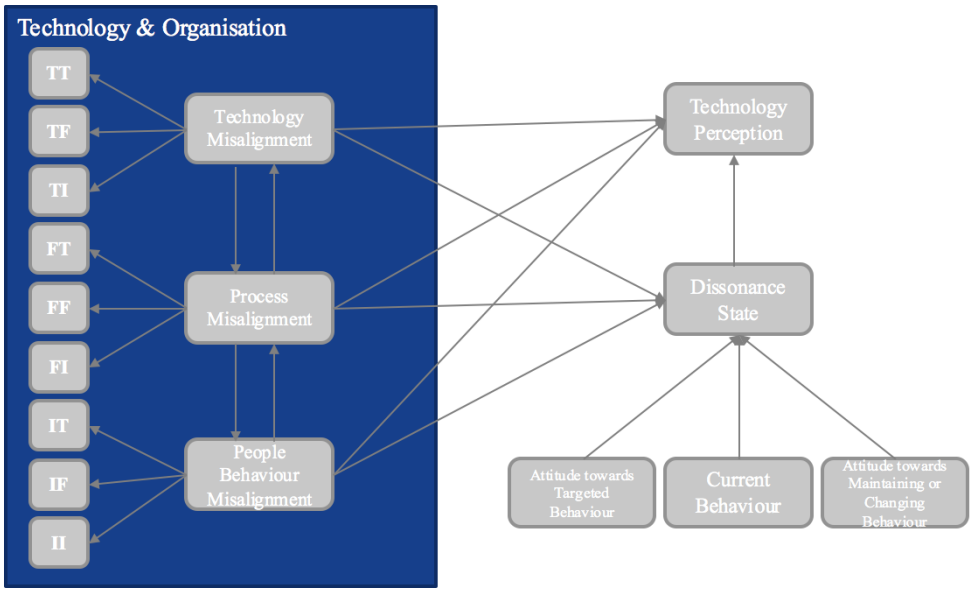

Figure 4.8: Proposed 2nd Structural Model

From the investigation, using a SEM specification search, the results provided the 2nd structural model, which went on to demonstrate the relationship between all five constructs (see figure 4.9).

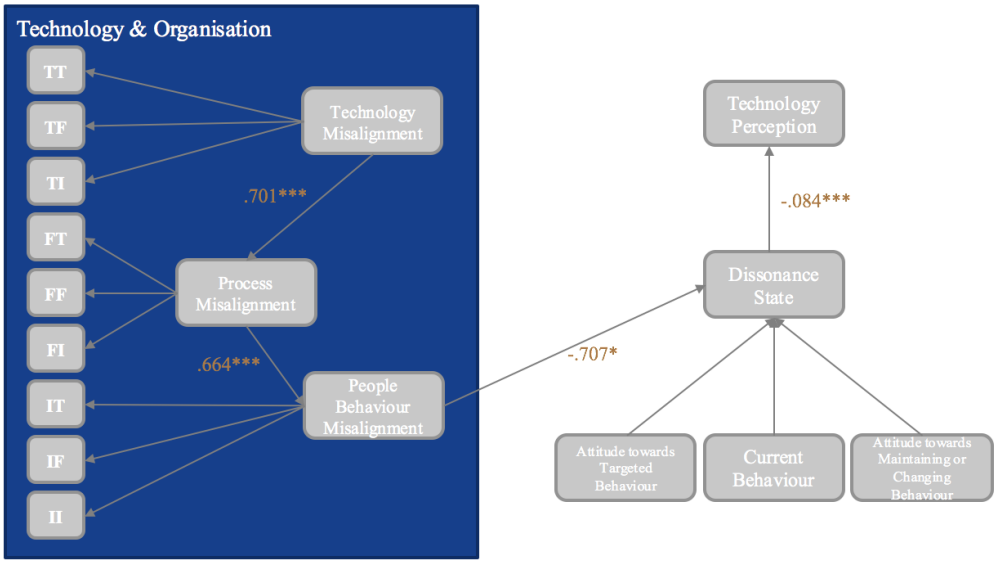

Figure 4.9: 2nd Validated Theoretical Model

Lewin (1936) introduced the social distance concept that shows the diversity of individuals' internal core by comparing American and German cultures. Later on, Trompenaars (1993) adopt this idea and proposed a diffuse and specific relation, which consider the difference

between individual public and private space. This conceptual idea initiates the thinking of diversity of thickness between the layers (technical, formal and informal). This is justifiable in context that technology is often used informally and does not require a formal set of rules. Also technologies used informally by people outside the adoption context with formal rules will apply. Therefore, it is worth to explore and evaluate an additional relationship between technology misalignment and people's behaviour misalignment. The 3rd validated model was proposed as shown in figure 4.10 with the evaluation on the relationship between technology misalignment and people's behaviour misalignment.

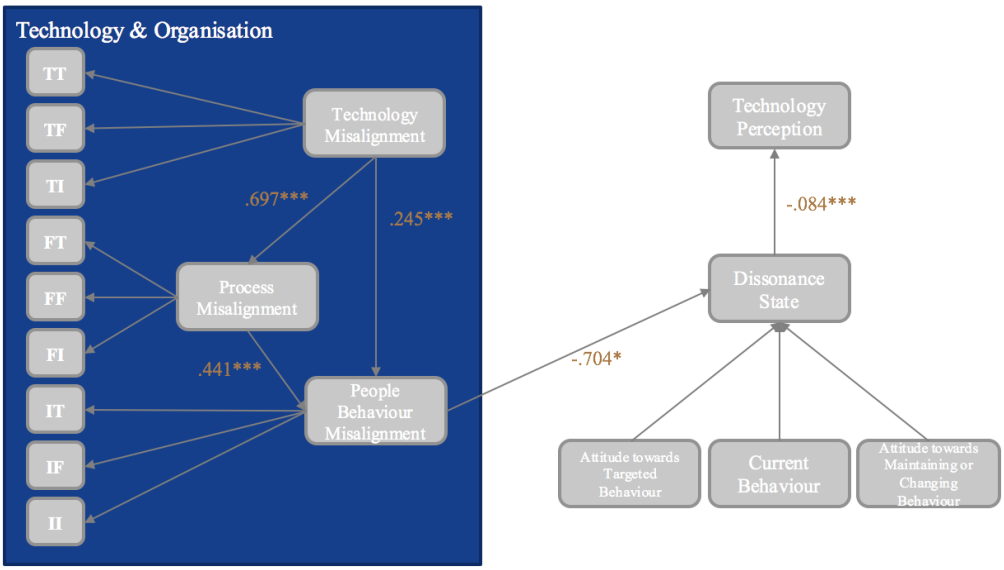

Figure 4.10: 3rd Validated Theoretical Model

Moreover, the 3rd model provided a higher optimised SEM fit index compared to the 2nd model (see Table 4.10).

Table 4.10: SEM Index Comparison

Indicators	Hair et al. (2009)	Bagozzi and Yi (2012)	2nd model	3rd model
$\chi 2$			***	***
CMIN/DF			2.049	1.736
RMSEA	<.08	<=.07	.065	.054
SRMR	<.08	<=.07	.0502	.0451
CFI	>.95	>=.93	.951	.959
GFI	>.9		.984	.989

Apart from the fit index, technology misalignment and process misalignment, together represent 0.686 (at 99% confidence interval). of regression weight with the relationship with

people's behaviour misalignment, whereas in the 2nd model represents 0.664 of regression weight. The 3rd model is more complex but it also considers the issue of a direct relationship between technology and informal behaviour. People's behaviour misalignment strongly shows a relationship with individual cognitive dissonance with regression weight -0.704 (at 90% confidence interval). However, individual cognitive dissonance affects individual technology perception with regression weight -0.084 (at 99% confidence interval).

The exploration process that results in the 3rd SEM structural model is supported by the approach to improve model validity (Arbuckle, 2012), for example: altering the direction of relation, adding new or the removal of existing structural relationships can be done to improve the model validity (Hair et al., 2009). Each of these approaches was applied in turn to in order to improve model validity.

4.3.4 SEM Analysis Summary

From the 3rd (final) SEM structural model, we can highlight the key points that IFT levels exist (as defined by Stamper's model), yet that flow is not as expected. Technology misalignment affects process misalignment, which affects people's behaviour misalignment. Therefore, the flow must be from technology through process and people's behaviour towards individual aspects. We argue that the direction of dependant flow should be move from the formal to the technical - if Stamper's model is correct – yet this is not what empirical results suggest. Our result imply that the dual aspect model needs to be reshaped to match the empirical data. Significantly, the 3rd model seemingly aligns to the dependence flow suggested in Hall's model, however there is a need to reshape the dual aspect model to reflect the direction and findings from the SEM analysis. Within the next section, this study integrated the findings from SEM analysis, to re-validate the proposed dual aspects innovative model and the alignment framework.

4.4 Reshaping the Dual Aspect Model

This chapter aims to identify a classification scheme to support adoption pattern analysis (Rogers, 2003). We proposed the initial dual aspect model (see section 4.2) to fit the flow of dependencies in Stamper's semiotic onion. We validated this empirical data and a SEM model (see section 4.4). We identified, however, influences that are not considered in the original definition of dual aspect model layers. Stampers model fails to consider individual

concept/beliefs, which is measured in our study using dissonance state. The SEM model in figure 4.10, validated by questionnaire data, highlights the importance of the individual's dissonance state, which significantly impacts technology perception.

Stamper's semiotic onion implies that technology is dependent on informal rules, which is dependent on formal structures. This suggests that attitude of an individual influences the formation of technology. From the data, however, we can see that technology use influences business activity, which in turn influences the individual attitudes towards technology.

In this section we reshape and restructure the flow of dependencies in the dual aspect model to fit with SEM model data, i.e. adding consideration of individual beliefs and reversing the alignment routes to align flow to Hall's understanding of the crucial trio concept (Hall, 1959).

4.4.1 Reshape the Aspect of Interaction – Redrawing the onion

From the SEM analysis, see figure 4.10, we see that 'Technology misalignment—T' relates to technology aspects of the new system i.e. TT, TF, and TI conflicts, affecting both process misalignment — F (0.245***) and people behaviour misalignment — I (0.697***). Process misalignment — F, influences people's behaviour misalignment — I (0.441***). People's behaviour misalignment — I, has a relationship with individual cognitive dissonance state (-0.704*). Lastly individual cognitive dissonance state affects individual technology perception (-.084***).

To theoretically understand our empirical results, we returned to the definitions of technical, formal and informal within both Hall's crucial trio (Hall, 1959), and Stamper's organisational onion (Stamper, 1993). Formal (F) and Technical (T) layers from Stamper's onion were seen to be equivalent to respectively Technical (T) from Hall's crucial trio; as they refer to something technical, repeatable and logical (see Table 4.11)

Table 4.11: Mapping of Crucial Trio and Organisational Onion

Hall's crucial trio	Stamper's onion
Formal (F)	
Informal (I)	Informal (I)
Technical (T)	Formal – written rules, processes (F)
Technical (T)	Technical – technology (T)

The T dimension in Halls model includes both written information (i.e. rules, processes) and technology developed to automate the processes. Informal (I) was found to be consistent between the Hall and Stamper; i.e. people's action and behaviour that is not formalised. Interestingly the Formal (F) layer in Hall's model, which relate to the individual's background beliefs, does not have an equivalent layer in Stamper's model; as Stampers model ignores the individual by grouping this as informal activity. Table 4.11 which shows how definition of Stamper's onion and Hall's crucial trio layers align.

This study argues that internal core dimension, i.e. that relate to internal individual beliefs/concepts/processing, should not be seen as informal, yet should instead be allocated a separate definition in the model. In the SEM model, cognitive dissonance state and individual technology perception can be seen as an internal central dimensions of an individual, which we will have termed as the "Concept (C)" layer. Table 4.12 shows the adapted layer

Table 4.12: Mapping of Crucial Trio and Organisational Onion

Hall's crucial trio	Stamper's onion
Formal (F)	**Concept (C)**
Informal (I)	Informal (I)
Technical (T)	Formal – written rules, processes (F)
Technical (T)	Technical – technology (T)

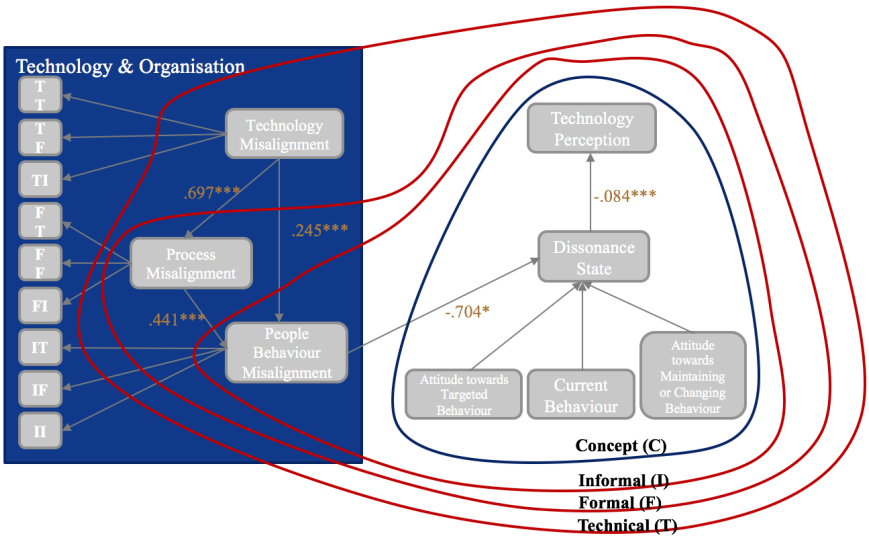

Figure 4.11: Concentric Circle over The validated SEM Theoretical Model

From the figure 4.11, it can be redrawn by using concentric circles (i.e. C, I, F, T). We argue that this relates to an individual, however to get consistency between individual systems and

technology systems, or individual systems and organisational system, the same concept layer should be considered for both organisations and/or technologies. The new concentric onion model is proposed as in figure 4.12. This model reverses Stamper's onion and includes "Concept (C)" as the central layer.

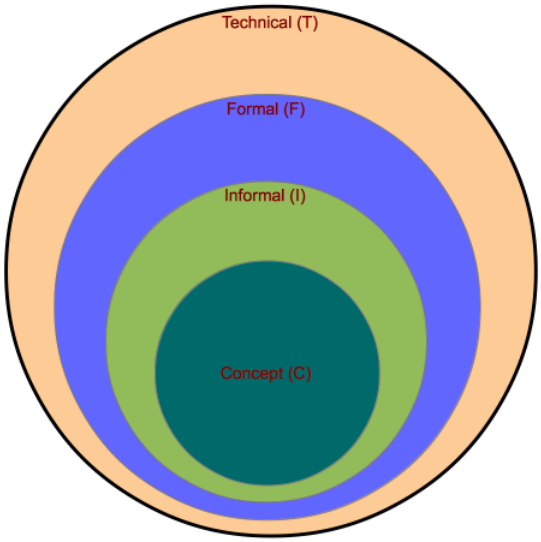

Figure 4.12: New Proposed Onion consider Concept as the Core

4.4.2 Reshaping Interaction – Validating the reshaped dual-aspect model

When considering the interaction between two systems, the new proposed organisational onion reversed the direction of dependencies from informal, formal and technical (IFT) to technical, formal, informal and concept (TFIC). Therefore, the original Dual Aspect Model was required to change to reflect the new dependent flow of the new organisational onion and the validated SEM model. The reshaped dual aspect model is proposed in figure 4.13.

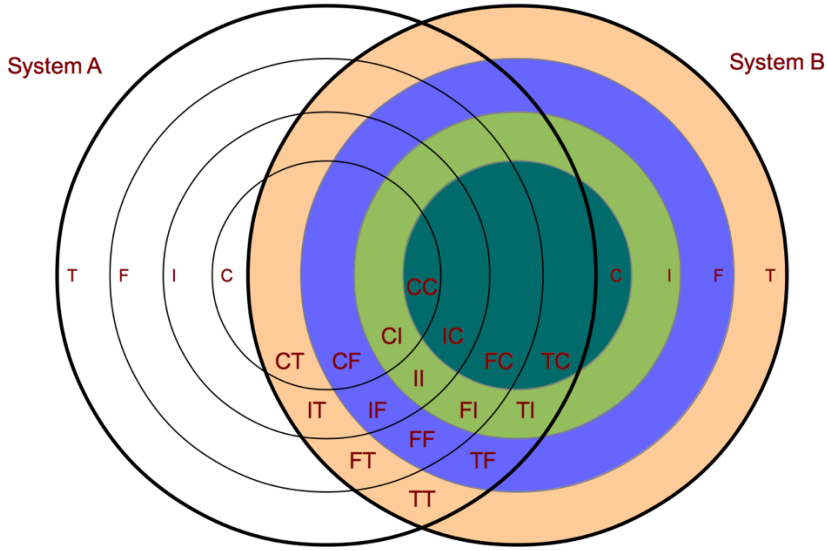

Figure 4.13: Reshaped Dual Aspect Model

As the Dual Aspect Model had been validated and reshaped, the alignment framework also requires reshaping. Within the first version of alignment framework, 9 points of interactions were identified; in the reshaped version (i.e. the reversed alignment framework), 16 points of interactions were identified, which included the new concept (C) layer (see figure 4.14). The reverse alignment framework consists of four routes, which help explain the alignment between two systems.

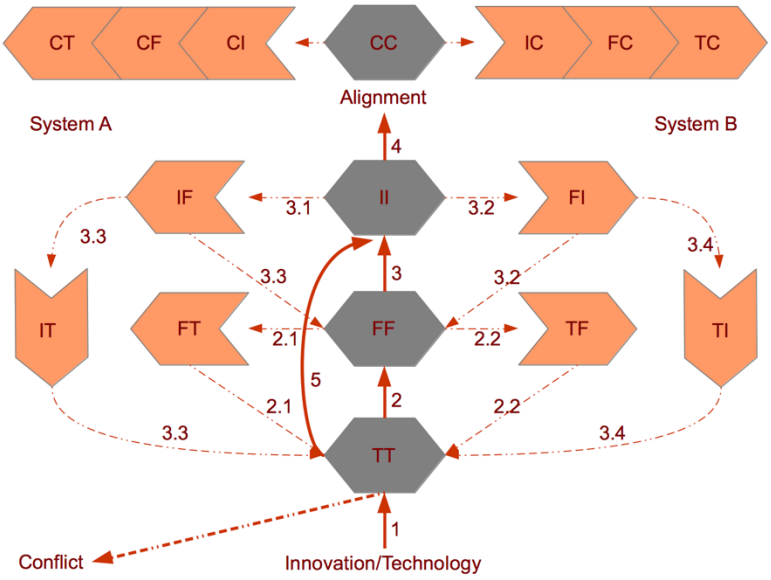

Figure 4.14: Reverse Dual Alignment Framework

The reverse dual alignment framework consists of five routes. Each route has sub-routes, which diverts the flow to consider the subsequent conflict from the misalignment in formal and informal layers. Four route numbers are assigned in the reverse dual alignment framework (see figure 4.14).

Route 1 Technical system misalignment - TT: This stage detects conflicts between two systems If any conflict is found, most likely system A / B will be rejected discontinued. If technical alignment is required, however, the reversed alignment framework implies that technical alignment may be possible without achieving both informal and formal alignment first (as implied in the original framework).

Route 2 Formal system misalignment - FF: This stage detects conflicts between business processes between system A and B. If any conflict is found, two options exist, i.e. either system A or system B need to be changed/customised (route 2.1— system A and 2.2—system B).

Route 2.1 Formal system misalignment / change the technical system of system A (left side) – FF → TF

Route 2.2 Formal system misalignment / change the technical system of system B (right side) – FF → FT

Route 3 Informal system misalignment - II: This stage detects conflicts between people's behaviour aligning with two systems. If any conflict is found, 2 options exist, the formal system of either system A or System B needs to change (route 3.1—system A and 3.2—system B). In some cases, changing only the formal system is not sufficient, as the conflict impacts the technical system as well. This implies that the technology of system A or system B may also need customisation to achieve informal alignment (route 3.3—system A and 3.4—system B).

Route 3.1 Informal system misalignment / change the formal system A (left side) – II → FI → FF

Route 3.2 Informal system misalignment / change the formal system B (right side) – II → IF → FF

Route 3.3 Informal system misalignment / change the technical system of system A (left side) – II → IF → IT → TT

Route 3.4 Informal system misalignment / change the technical system of system B (left side) – II → FI → TI → TT

Route 4 Ideal Alignment – TT, FF, II are achieved. Therefore, the innovation (system A) was fully accepted and aligned within the current business system (system B). From this model, we should note that conceptual alignment is not required to ensure informal alignment. This implies that stakeholders, who believe one thing, may be able to function effectively within the organisation, even if their behaviour is in part in conflict with their internal beliefs.

Route 5 was proposed, after analysing empirical data. The route was developed to represent an additional relationship that seemingly exists between technology misalignment and people's behaviour misalignment. This direct relationship implies that technology is informally used in business, and that a formal structure of use is not always required. This direct relationship also

represents the context of technology adoption outside organisation, i.e. where formal rules are not applied. The route 5 implies the existence of differences, between organisation, in the perceived importance of difference layers, i.e. some organisations rely on informal working (and have a thin formal layer), where other organisations depend on a thick formal lay (where technology use is strongly controlled). Table 4.13 explains the relationship between each state in the reverse dual alignment framework.

Table 4.13: Alignment Matrix

From State	To State	Descriptions
TT	Conflict	Technologies from two systems are not aligned and both cannot be changed to support technical alignment. Therefore, it leads to conflict state, which one technology is rejected (not being adopted). For example, a company is using Apple platform for all workstations. IT project team plans to use MS project for managing and tracking project plan but MS Project software requires running only on MS Windows system. It is seen that these two technologies are not compatible. This company might need to look out for another project management software.
TT	FF	Technologies from two systems are fully aligned and move forward to FF state. For example, a company is using Windows platform for all workstations. IT project team plans to use MS project for managing and tracking project plan. It is obvious that MS Project can be installed on the current workstations. The next step is to consider formal processes of using MS Project.
FF	FT or TF	Formal processes from two systems are not aligned and one system needs to be customised. Accordingly, the technical system might also need to be customised. For example, the formal process for using MS Project requires amending the organisational process as the project team decides to create a new role—project management office (PMO) to track the project. With this new changing formal role, both technical systems require to assess alignment.
FT or TF	TT	Changes in formal systems that impact on technical systems and lead to changes in technical system. After the technical system was amended, both technical systems need to be evaluated at technical levels. For example, as a result from introducing PMO role, IT systems i.e. HR, payroll might need customisations such as modifying parameters to add a new role.
FF	II	Two formal systems are fully aligned and move forward to II state, which will consider informal behaviours. For example, MS Project is successfully installed in company's workstations. The new PMO role is

Table 4.13: Alignment Matrix

From State	To State	Descriptions
		introduced into the formal processes as well as added in all relevant IT systems. The next state is to consider informal behaviour for stakeholder, which might be impacted from MS Project adoption and from new PMO role.
TT	II	Two technologies are fully aligned but skip to FF state to go to II state. This state transition is different when applying outside organisational context. This is applicable when an individual applying technology personally. For example, an employee has MS Project installed on his/her workstation as part of works. He/she may use this tool to personally manage their daily activities outside from works.
II	IF or FI	There is misalignment between informal behaviours between two systems that lead to amendment with formal processes. For example, MS Project adoption and the new PMO team requires all IT staff members to report their progress of their works weekly. This requirement impacts on IT staff behaviour as they report only when they finish their assigned works. This behavioural conflict may need to amend formal processes to force IT staff on regularly reporting progress.
IF or FI	IT or TI	Formal processes are changed to enforce people behaviour. IT systems need to be modified to support the changed processes. For example, the email system may need to configured to send email reminders on the day before progress report submission to ensure IT staff will submit their work progress on time.
IT or TI	TT	After an IT system is amended to support informal and formal changes, it needs to be re-assessed with overall IT systems to ensure the technical alignment. For example, the network system needs to be re-assessed to make sure the email reminder tasks will not interrupt system performance.
II	Alignment	After informal behaviours are aligned with supports from changing or customising formal and technical systems, it leads to the fully alignment state. For example, MS Project adoption is fully adopted when IT staff is enforced by a new process including support from the email system to remind them on the day before submission.

These relationships do not include the new concept layer, which beyond the alignment state of our reverse dual alignment framework.

Chapter 5
An Approach for Identifying Conflicts from Technology Adoption

5.1 Chapter Overview

This chapter aims to answer research question **RQ4**, i.e. What framework would help to identify misalignment?

This chapter aims to develop a framework, to identify in context of business, potential aspect conflict impacting technology adoption; i.e. to support problem identification, communicate and support resolution of aspect conflict, and affiliate management of change. To achieve this aim, we present the application of norm analysis and the business process model to help identify the potential conflicts from technology adoption. In chapter 4, the reshaped Dual Aspect Innovative model was proposed to explain interaction of individual, organisational, and technology aspects. By presenting the activities in more detail, the framework, developed by incorporating the technical, informal, formal and concept conflicts influence behavioural patterns or norms, aims to support identification of the problems, and detect the consequences, that occur as a result of aspect conflict.

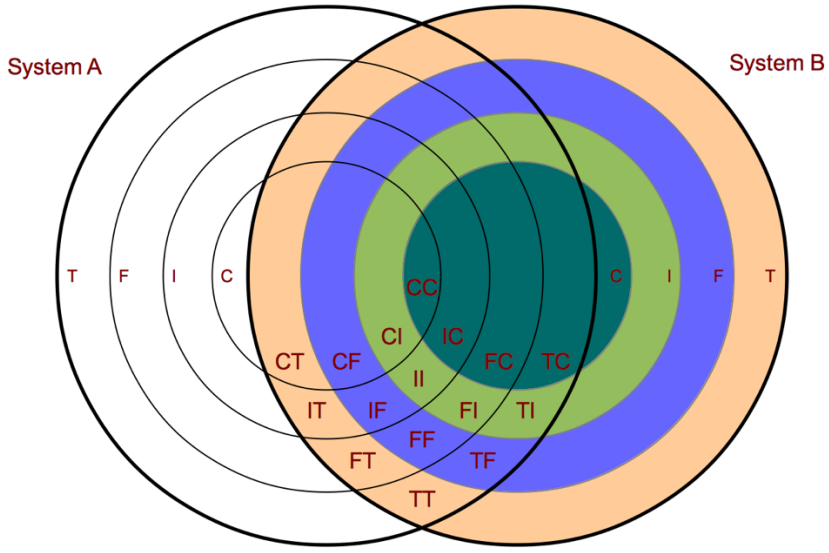

Figure 5.1: Reshaped Dual Aspect Model

Figure 5.1 shows the reshaped dual aspect model, which is quantitatively validated in chapter 4. The model identifies the 16 conflict points, nine different types. To highlight the comparison between technical, formal, informal and conceptual, we stated that conflict exists between technical, formal, informal and concept layers of two interacting systems. To identify common practice, we capture information of activities and compare between the systems. In the following section, we look at ways in which people have catch it behaviour patterns in order to understand how this can be practically implemented as part of the developed framework. To achieve this, we need to have some form of comparison.

The foundation of norm and the concepts of norm relate to behaviour. Considering the dual aspect model, the current classifications for norms do not support the alignment and interplay between individual, organisational and technology aspects. In table 5.2, we define and link the four layers (technical, formal, informal and conceptual) represented in our new proposed onion to classify related norm activity.

Table 5.1: Four Types of Norms

Types of Norms	Examples
Technical Norm	Norms relating to automated systems and physical objects
Formal Norm	Norms relating to business rules and processes
Informal Norm	Norms relating to individual behaviour
Conceptual Norm	Norms relating to individual attitude and perception

Consideration of the four layers incorporating with norms provides the reader with the understanding on how norms can be applied in individual and organisational contexts, which is an approach to capture individual and organisational norms using detailed norms specification. This also provides further explanation for the proposed alignment framework and the alignment matrix (see figure 4.14 and table 4.13).

5.2 Framework Development via Case Studies

This study aims to develop a framework for identifying conflicts, the case study method was used to demonstrate and primarily validate the framework in order to answer the research question RQ4 - What framework would help to identify misalignment? To achieve this, the researcher looked for case examples that focused on conflict between two systems. Pattern matching will be applied to analyse all the cases (as norms) and capture detailed norms

specification in the defined spreadsheet form (Yin, 2014; Liu & Li, 2015). After the norms activities were captured, BPMN (White, 2004) was used to visualise all norms. The analysis criteria can be defined by considering the conflict context, conflict entity and conflict state. **Conflict Context** occurs between two or more different contexts, such as an individual belonging to varying organisations that have different values and focus on different goals. **Conflict Entity** is an object that is the point/reason behind the conflict. Conflict entity can be classified by considering the four layers, as defined in the reshaped dual-aspect model (technical, formal, informal and conceptual). Technical entity can be a physical object, such as furniture or electronic devices. Formal entity can be a business rule or process. Informal entity can be individual or social status. Conceptual entity can refer to an individual's attitude, perception or cultural background. **Conflict State** is the state of the object that can cause or remove conflict as a result of certain actions. One state (window open) might cause satisfaction to one group of employees – due to fresh air, yet at the same time might cause dissatisfaction to the other group – too cold.

The initial case data was collected by undertaking observations in the Informatics Research Centre (IRC) working environment. The rationale behind this approach was that these cases could be simple and matched with the target unit of analysis.

5.3 Artefact 1 - Conflict Identification using Detailed Norms Specification

In this step, the cases are analysed using pattern matching techniques and the results are recorded in DNS format (Yin, 2014; Liu & Li, 2015). Varying actors, who perform actions, and the potential conflict entity are identified. After which, deontic operators concerning individual actions are considered, to recommend relevant solutions to the conflict. In the following subsections, three hypothetical cases were introduced to demonstrate how these cases are analysed and captured within the DNS format.

There are three cases that are discussed to show how conflict can be captured using norm spreadsheets. Case 1 shows a conflict between individuals in an organisation and individuals outside the organisation. Case 2 shows a conflict between two organisations, with an individual taking roles in both organisations. Case 3 shows a conflict between organisation and individual, where the organisational rules are in conflicts with individual ways of working.

5.3.1 Case 1 - Conflict between Individual and Individual

An example - a member of Henley Business School staff works in the office near the kitchen**.** That member of staff is regularly ***inconvenienced by the smell from the joint kitchen***, i.e. where people tend to heat their food for lunch. The smell within the kitchen flows out into other rooms, due to the kitchen and other doors being left open. The school member is then required to regularly enter the kitchen to request that people in the kitchen to keep the door shut to contain the smell. This case is illustrated in figure 5.2.

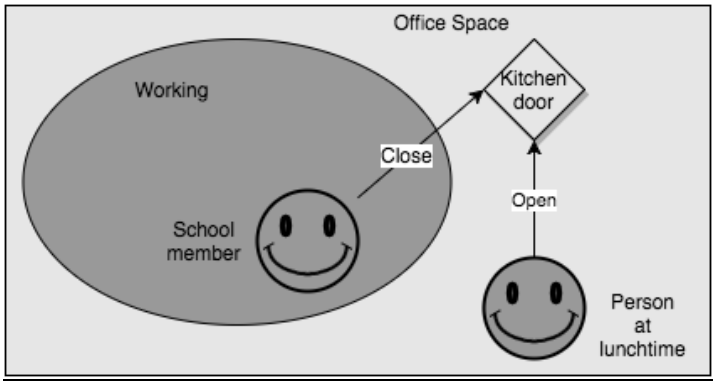

Figure 5.2: Conflict between Individual in Organisation vs Individual outside Organisation

Within this case, this study identified 2 contexts, which were to "work in the office" and to "have lunch in the kitchen", and 2 conditions, which were "on duty" and "on lunch". 'Smell from the kitchen' is highlighted as the result of the conflict between the person who is not using the kitchen and people who are. The conflict entity in this situation is the kitchen door, the conflict indicates that the kitchen door is left open. In table 5.2, all norms actions, which are underlined sentences above are captured in norms specification format. As the text does not provide any deontic operations we assume that all actions are permitted.

Table 5.2: Detailed norms specification – conflict between organisation and individual

Whenever	if	then	is	to
<<Context>>	<<Condition>>	<<Actor>>	<<Deontic operator>>	<<Action>>
A school member who works in the office (Business role)	On duty	School member	Permitted	Work in the office nearby the kitchen
		School member	Permitted	Ask to keep the kitchen door shut
Individuals who have lunch (Private role)	On lunch	Kitchen people	Permitted	Heat food
		Kitchen people	Permitted	Release smell inside the kitchen
		Kitchen people	Permitted	Leave the door open

5.3.2 Case 2 - Conflict between Organisation vs. Organisation

Second conflict example, is where Mr A is an IT specialist who **works for an IT service company** and is responsible for maintaining information systems at many customer sites. Mr A has to keep his mobile phone on 24x7, to be able to receive phone calls from customers. However, there is a conflict as Mr A needs to **spend time with his family** as well as serving his company; as Mr A on a number of occasions, has had to answer phone call from customers, whilst having dinner with his family or playing football with his children. This case is illustrated in figure 5.3.

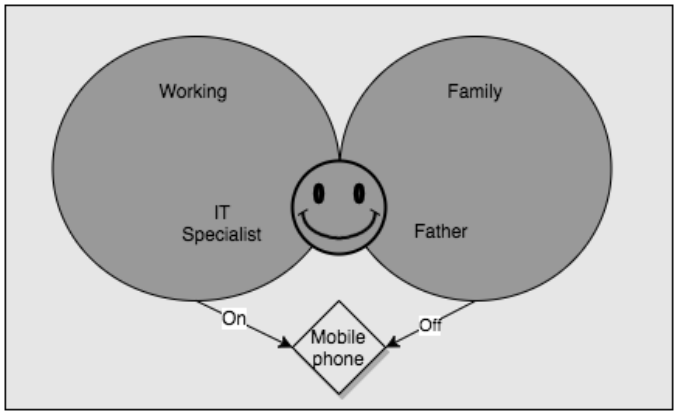

Figure 5.3: Conflict between Organisation and Organisation

In this case, this study identified two contexts, which were "work for a company" and "spend time with family", and two conditions, which were "on duty" and "off duty". Mobile phone status is established as the conflict entity between the two roles: an IT specialist and the role of

a father. The conflict entity is the mobile phone, the conflict state is whether the phone is turned off and/or on. In table 5.3, all norms actions, which are underlined above are captured in norms specification format. The text, does not provide any deontic operations, so the assumption is made within the study that all actions are obliged.

Table 5.3: Detailed norms specification – conflict between two organisations

Whenever	**if**	**then**	**is**	**to**
<<Context>>	<<Condition>>	<<Actor>>	<<Deontic operator>>	<<Action>>
Work for a company (Business organisation)	On duty	IT specialist	Obliged	Maintain information systems
		IT specialist	Obliged	Keep mobile phone on for 24x7
		IT specialist	Obliged	Receive phone calls from customer
Spend time with family (Family organisation)	Off duty	Father	Obliged	Have dinner with family
		Father	Obliged	Play with children

5.3.3 Case 3 - Conflict between Organisation vs. Individual

Mr A has been assigned an urgent task to complete writing a report for customer while ***working on a customer site***. Due to his current workload, he is unable to finish this work during normal working hours. Accordingly, his intention is to work overtime at the customer site to complete his assignment on time. At this customer site, there is a rule stating that there must be at least one employee on site to be able to keep the office open out of working hours. For this case, Mr A has to find a customer employee to remain on site with him, while he is working. Unfortunately, no one offers to stay late. Another constraint, is that Mr A is not allowed to either stay onsite alone or take customer information off site according to the information security policy. This case is illustrated in figure 5.4.

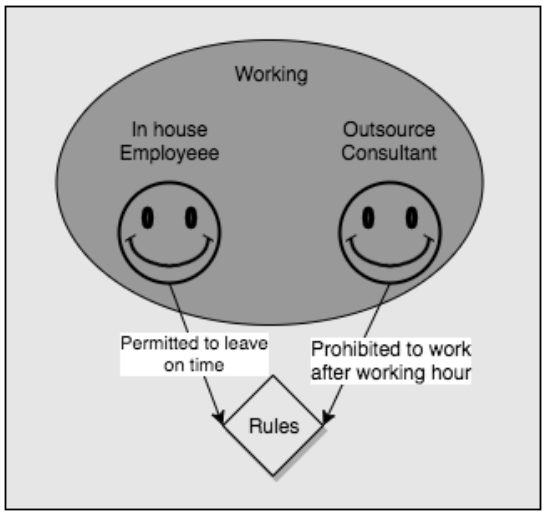

Figure 5.4: Conflict between Organisation and Individual

In this case, this study identified one context, which was "work at customer site" and two conditions, which were "on duty" and "off duty, there are conflicts between norms activities and also between two actors. The conflict entity is the business rule for working out of office hour enforced by customers. In table 5.4, all norms actions, which are underlined above are captured in norms specification format. The text, does not provide any deontic operations, so the assumption is made within the study that all actions are obliged.

Table 5.4: Detailed norms specification – conflict between organisation (business rules) and individual

Whenever	**if**	**then**	**is**	**to**
<<Context>>	<<Condition>>	<<Actor>>	<<Deontic operator>>	<<Action>>
Work out of office hour	On duty	Mr A	Obliged	Complete assignment on time
		Mr A	Obliged	Work overtime on customer site
		Mr A	Obliged	Must have one employee on site to keep the office open
		Mr A	Prohibited	Stay on site alone
		Mr A	Prohibited	Take customer information off site
	Off duty	Customer's employee	Permitted	Not stay on site after hour

By considering the hypothetical cases presented above, this study was able to confirm the conflict elements: conflict context, conflict entity and conflict state. In case 1, we identify kitchen door as the conflict entity between individual in organisation and individual outside organisation, which is a physical object and is considered as technical norm. In case 2, we identify roles in organisation as the conflict entity between organisations, which job role is

classified as formal norm and family role is considered as informal norm. In case 3, we identify the business rules as the conflict entity between individual and organisation, which is considered as formal norm.

Table 5.5 illustrates the classification of the conflict entity in relation with our proposed concept, formal, informal and technical concerning two dimensions: internal – attitudes and external - physical object. The identified conflict entities from the cases 1 - 3 presented within table 5.7.

Table 5.5: Conflict Entity Matrices

4 Layers	Conflict Entities
Conceptual	
Informal	Family role – case 2
Formal	Business rule – case 3 Job role – case 2
Technical	Kitchen door – case 1

Within the first round of the analysis, we found that the current norms specification was able to capture norm activities but was not able to incorporate all four layers of our dual aspect model. The norms specification does not allow to record the sequence of norm activities and the relationship between norm activities.

5.4 Artefact 2 – Customised Norms Specification Format

There is need to adapt the norms specification spreadsheet to align with the functionality of the reshaped dual aspect model, and allow us to capture sequences and relationship between norm activities. In this section, we create additional fields to support the identified needs. Those fields include: Norm ID, Level, Parent norms, Type, and Aspect. Norm ID is a unique ID, which is assigned to each norm activity. Level is a degree of depth that identify the level of norms i.e. norm in level ‘a’ can include norm activities in level ‘b’. Parent norms indicate the norm activity that occur before the current norm activity. Type indicates the type of norm activity, which align with Business Process Model Notation (BPMN). Aspect indicate that the norm activity is considered as being technical, formal, informal and conceptual according to the reshaped dual aspect model. The new version two of the spreadsheet with the additional columns is able to capture the norms that relate to the classification in the reshaped dual aspect model.

In this step, we observe the situation in Informatics Research Centre (IRC) in the university of Reading. IRC is a research centre, which provide office space for PhD students to study and develop PhD research. The centre has school administrators who are in charge of managing office space and handling issues relating to office space.

5.4.1 Case Study – IRC Smart Office System

Situation 1 - Students who study PhD at BISA (Business Informatics, Systems and Accounting), are eligible to use IRC (Information Research Centre) study space. Students can also request for a reserved desk. BISA school admin is responsible for receiving and processing desk requests, the school administration team is also responsible for giving the information about this policy to students. The rules are that only 2nd and 3rd year students can occupy fixed desks, which means the occupiers can leave their belongings overnight. For 1st and 4th year students, a hot desk policy will be used. The students can pick up any free desk and use for the whole day and return them at the end of the day, the 1st and 4th year students must not leave their stuff overnight or occupy desk. At the end of the summer term, the school admin will check the list of all assigned desks and inform 3rd students to clear and return their desks. When students come to use study space. They should follow the rules according to their study year status.

From situation 1, the norm activities were captured according to the underlined sentences into the new norms specification sheet, which included additional fields (norms id, level, parent norms, type) (see table 5.6).

Table 5.6: IRC As-Is

Norms ID	Level	Parent norms	Super Norms	Type	Whenever <<Context>>	if <<Condition>>	then <<Actor>>	is <<Deontic operator>>	Aspect	to <<Action>>
1	a			Event	study PhD with BISA		students	permitted	behaviour	use study space
2	b	1		Activity			students	permitted	process	request for desk
3	b	2		Activity			school admin	obliged	process	receive desk request
4	b	3		Activity			school admin	obliged	process	process desk request
5	b	4		Activity		is 2nd or 3rd year student	school admin	obliged	process	assign desk
6	b	5		Activity			students	permitted	behaviour	accept desk
7	b	6		Activity			students	permitted	behaviour	use assigned desk
8	c	7		Sub condition			students	permitted	behaviour	leave their belongings on desk overnight
9	b	4		Activity		is 1st or and 4th year student	school admin	obliged	process	inform hot desk policy to student
10	b	9		Activity			students	obliged	process	accept hot desk policy
11	c	10		Sub condition			students	prohibited	behaviour	occupy desk
12	a		1	Intermediate event	enter IRC office		students	permitted	behaviour	use study space
13	b	12	7	Activity		is 2nd and 3rd year student	students	permitted	behaviour	use assigned desk
14	b	12		Activity		is 1st year and 4th year student	students	permitted	behaviour	find available hot desk
15	b	14		Activity			students	permitted	behaviour	use hot desk
16	b	15		Sub condition			students	obliged	behaviour	return desk (clean and empty) at the end of the day
17	a			Intermediate event	academic term is ending		school admin	obliged	process	evaluate all assigned desk
18	b	17		Activity			school admin	obliged	process	inform 3rd year student to return desk
19	b	18		Activity		is finishing 3rd year	students	obliged	process	return desk
99	a	7		Event			students		behaviour	Leave office
		10								
		15								
		19								

5.5 Artefact 3 - Enhanced Business Process Model Notation (BPMN) to support Norms Visualisation

According to the objective that emphasises on communication of norm conflicts, which exist between technical, formal, informal, and concept norms. Since norms are presented within a spreadsheet layout, it is difficult for individuals to be able to see the conflicts that exists. If there are many norms within each layer, then potentially there are hundreds of norms the need to be checked. To support business manages in appreciating the interaction of these conflicts we propose using a visual modelling language to represent business activity to support identification and appreciation of conflict points and resultant implications.

When consideration of the visual modelling languages available, Business Process Model Notation (BPMN) is deemed as the most appropriate as it is designed for capturing business processes concerning many stakeholders in an organisation. Other modelling languages were considered, e.g. Unified Modelling Language (UML) and AchiMate. UML consists of series of notation diagrams i.e. class diagram, activity diagram, which aims to support object oriented software development not business process analysis. AchiMate is more to do with enterprise architecture concerning the alignment between technology and business in terms of architecture but not concerning norm activities.

Business Process Model Notation (BPMN) is a modelling tool, which was designed for capturing business processes; capturing data concerning people, business activities and communications (White, 2004). Cruz et al. (2015) proposed an approach to directly create case models from developed business process models, this demonstrates the connection between informal, formal and technical system; with BPMN represents the informal and formal systems and UML model represents the technical system. Kushnareva et al. (2015) adopted BPMN to represent crisis management process concerning relevant norms and regulations and at the same time focusing on the flexibility and adaptability of the modelling process.

Apart from applying BPMN in business environments, there have been studies focusing on enhancing BPMN in particular perspective. Brambilla et al. (2012), for example, enhanced BPMN by adding social aspects, they both defined the additional BPMN notations, i.e. social

actors, social activities and social instructions. These notations support BPMN to represent the social events, i.e. business activity involving social media. Yousfi et al. (2016) extended BPMN to support the ubiquitous business process, this further enhanced BPMN to support the ubiquitous technology adoption within the business environment.

Apart from the aspects related to the adoption of BPMN in the business context, or the enhancement of BPMN extensions for specific purposes, BPMN has the potential to be applied in the area of conflict resolution (Tehrani et al., 2012; Nadhrah & Michell, 2014); e.g. when differentiating before and after process changes, and identifying conflicts from process changes. Tehrani et al. (2012) adopted BPMN to represent the results of semantic and norm analysis, to develop a clinical pathway tool. they aimed to improve healthcare service quality by including various aspects in performance analysis, Tehrani et al. focused mainly on social aspects such as people's behaviour, and the use of BPMN as a representative tool. Nadhrah and Michell (2014) applied BPMN to capture and compare normal work processes and workaround processes within the healthcare context. Nadhrah and Michell showed that BPMN can assist in visualising the different workaround processes and facilitate analysts to see the deviation of workaround process that differ from the normal process.

Within this aspect of the research, this research intends to identify the patterns of behaviour of people. Adapted BPMN has the potential to represent how people perform or behave according to their role assigned within their organisation. This study's intention, was to use BPMN to represent people's daily activity within business organisations, the norm specification is therefore used as the main approach to capture technology adoption events and BPMN will be employed to visualise the norm specification; i.e. by representing norms specification, and the effect of conflict was then accordingly displayed.

5.5.1 Develop Notations

Within this section, this research developed notations that support visualising enhanced detailed norms specifications. As there are many BPMN notations available, this study aimed to develop a simple, minimal and efficient notation model to visualise the detailed norms specification. The notations were mainly derived from BPMN (White, 2004).

One additional notation, i.e. Class Notation, was taken from UML, figure 5.5 displays all notions included and adapted in this framework. The detailed explanation of each notation is as follows:

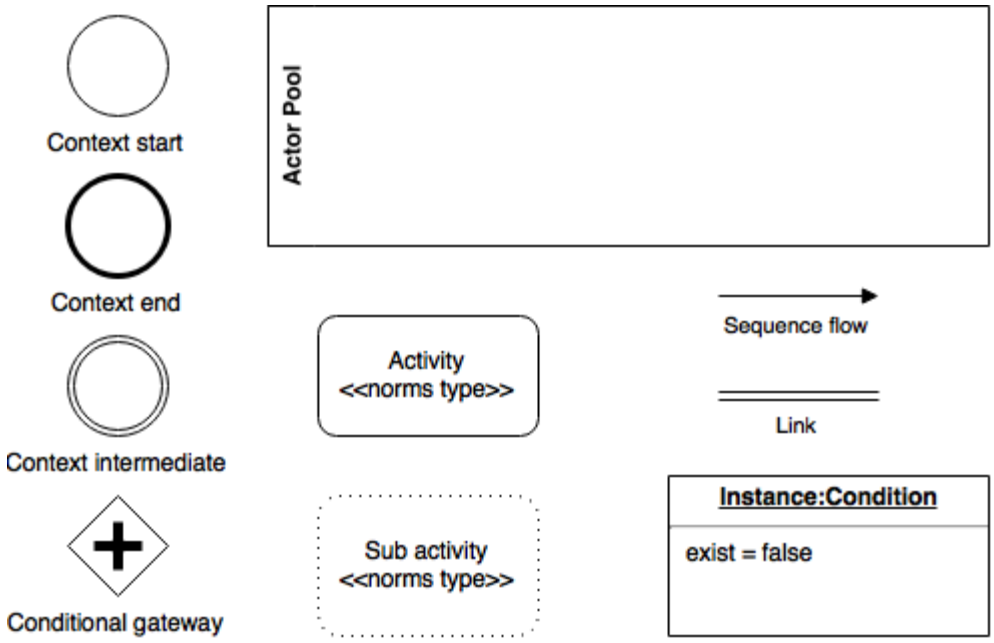

Figure 5.5: Adapted BPMN Notations

Context Start represents the beginning of a context. For example, Mr A starts working for a company. The norm is of type "Event".

Context End represents an end of the context. For example, an employee leaves the office after work. The norms is of type "Event".

Context Intermediate represents an intermediate start of a particular set of activities within a normal norms context. For example, Mr A is currently studying a PhD at Henley Business School. Mr A requests access for a research tool, which only available for BISA students (a sub school inside Henley Business School). This example shows BISA student's norms under Henley student's norms. The norms is of type "Intermediate Event".

Conditional Gateway represents a condition that is an antecedent of each activity. This notation shows the route to the next activity according to the defined condition. For example,

there is a condition specifying the Henley library is only available for Henley student. The activity “use Henley library” must contain a condition, e.g. “is Henley student”.

Activity is a notation representing an individual action within a particular context. For example, an activity can be “use office desk” or “ask for student support”. The norms is of type “Activity”.

Sub Activity is a notation representing a constraint activity included in an activity. It is a sub norms of a norms. For example, student must show their campus card for borrowing books from the library. In this case, the main activity is “borrow books from the library” and the sub activity is “show campus card”. The norms is of type “Sub activity”.

Sequence Flow is a notation representing the connection flow between activities.
Link represents a connection between an activity and sub activity.

Actor Pool represents an actor who performs all activities in the pool. For example, student pool will include certain activities that student must do i.e. “attend class”, “take exams”, “complete assignment”.

Instance of Condition (UML class) is a special object added in our notation list. This notation will represent the conflict object. Stating the object helps in identifying potential conflicts occurring when norms are changed.

In summary, we adapted some notations from BPMN model to visually present norms specification. Context start, context end, context intermediate, conditional gateway, activity, sub activity, sequential flow and actor pool are notions from BPMN. Instance of condition is a notation taken from UML class diagram. All captured norm activities (see individual norm ID i.e. #1) in table 5.6 are visually presented in adapted BPMN notations in figure 5.6.

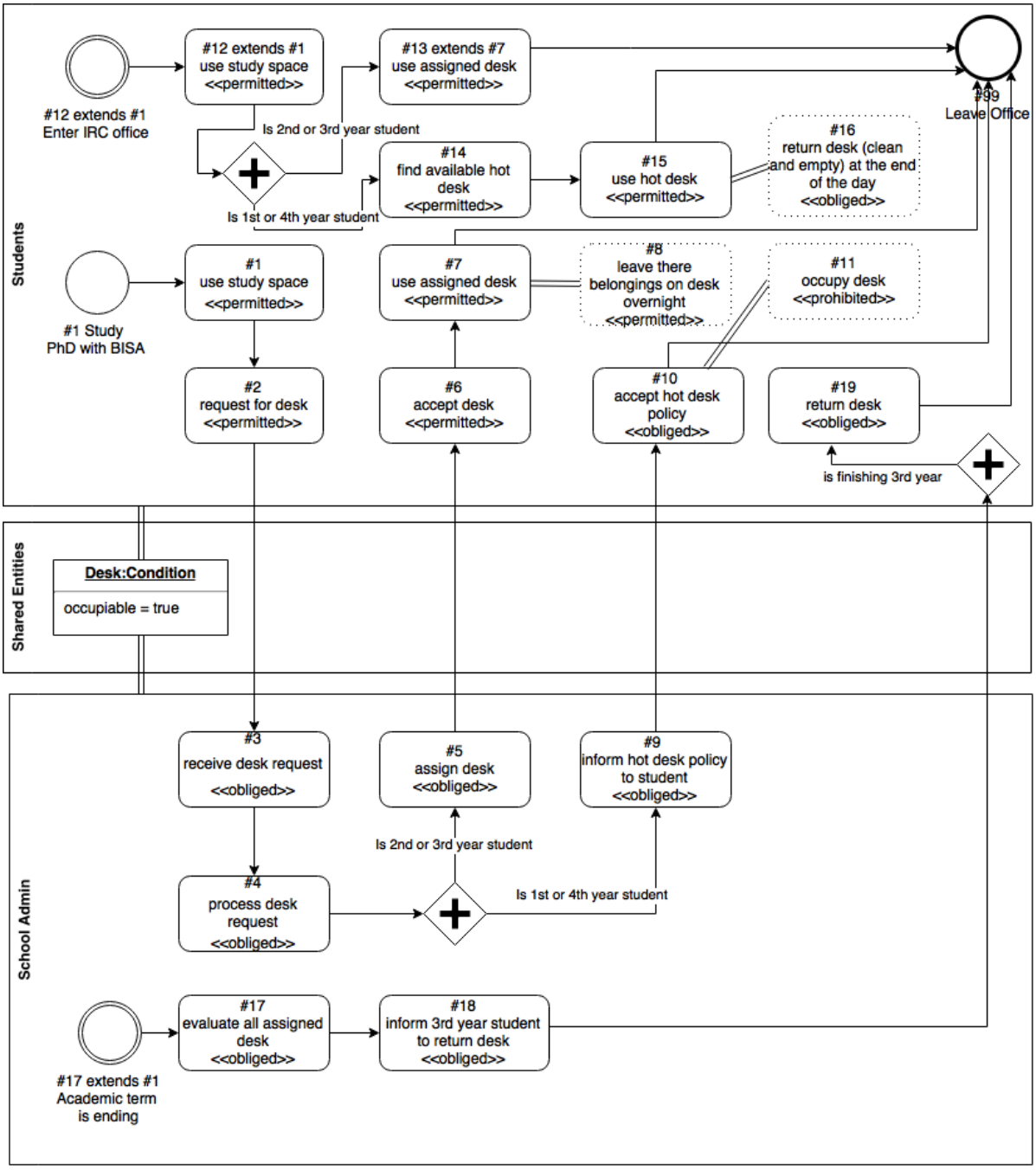

Figure 5.6: IRC As-Is

At this stage, we are able to apply the adopted version of BPMN to visualise norm activities captured in the detailed norm spreadsheet. This highlights that the adaptation of the BPMN is a valid way of representing the business process and linked norms.

5.5.2 Tracking Conflict

Situation 2 - As the IRC office currently does not have sufficient office space to accommodate PhD students, not all PhD students are assigned fixed desks. However, there is a situation where the 1st year students sometimes cannot find a free desk, despite allocated desks being empty; as some 2nd and 3rd students do not come to IRC regularly. To optimise space usage, use of a smart office solution is an option. The idea of a smart office is that all desks will not be permanently assigned to individuals. Everybody who requires a desk has to sign in and reserve a desk space, if any reserved desk is not being used for longer than one hour, the desk will be considered as free for others to use.

Situation 2 introduces some changes to the current office desk policy. All changes were captured and applied in table 5.8. After the current system was captured and identified to decide what was to be kept within the new process; all the rules in the current process could then be identified as being invalid due to the adoption of the new process. If an in depth analysis is conducted, the findings would show, that some student's permission would be revoked (norms #2, #6, #7, #8 and #13) and school admin's responsibilities will be decreased (norms #3, #4, #5, #9, #17 and #18) considerably.

From this simple case, this study adopted detailed norm analysis — DNS (Liu & Li, 2015) to capture existing rules of the current desk allocation process (see table 5.6 and figure 5.6) and the new process itself (see table 5.7 and figure 5.7). This would then assist in performing a comparative analysis, between current and new processes to identify conflict and/or impact from adopting the new process.

Table 5.7: IRC To-Be

Norms ID	Level	Parent norms	Type	Whenever <<Context>>	if <<Condition>>	then <<Actor>>	is <<Deontic operator>>	Aspect	to <<Action>>
1	a		Event	study at UoR		students	permitted	behaviour	use study space
~~2~~	~~b~~	~~1~~	~~Activity~~			~~students~~	~~permitted~~	~~process~~	~~request for desk~~
~~3~~	~~b~~	~~2~~	~~Activity~~			~~school admin~~	~~obliged~~	~~process~~	~~receive desk request~~
~~4~~	~~b~~	~~3~~	~~Activity~~			~~school admin~~	~~obliged~~	~~process~~	~~process desk request~~
~~5~~	~~b~~	~~4~~	~~Activity~~		~~is 2nd and 3rd year student~~	~~school admin~~	~~obliged~~	~~process~~	~~assign desk~~
~~6~~	~~b~~	~~5~~	~~Activity~~			~~students~~	~~permitted~~	~~behaviour~~	~~accept desk~~
~~7~~	~~b~~	~~6~~	~~Activity~~			~~students~~	~~permitted~~	~~behaviour~~	~~use assigned desk~~
~~8~~	~~c~~	~~7~~	~~Sub condition~~			~~students~~	~~permitted~~	~~behaviour~~	~~leave their belongings on desk overnight~~
~~9~~	~~b~~	~~8~~	~~Activity~~		~~is 1st year and 4th year student~~	~~school admin~~	~~obliged~~	~~process~~	~~inform hotdesk policy to student~~
10	b	1	Activity			students	obliged	process	accept hot desk policy
11	c	10	Sub condition			students	prohibited	behaviour	occupy desk
12	a	1	Intermediate event	enter IRC office		students	permitted	behaviour	use study space
~~13~~	~~b~~	~~12~~	~~Activity~~		~~is 2nd and 3rd year student~~	~~students~~	~~permitted~~	~~behaviour~~	~~use assigned desk~~
14	b	12	Activity		~~is 1st year and 4th year student~~	students	permitted	behaviour	find available hot desk
15	b	14	Activity			students	permitted	behaviour	use hot desk
16	b	15	Sub condition			students	obliged	behaviour	return desk (clean and empty) at the end of the day or not use desk for longer than 1 hour
~~17~~	~~a~~	~~1~~	~~Intermediate event~~	~~academic term is ending~~		~~school admin~~	~~obliged~~	~~process~~	~~evaluate all assigned desk~~
~~18~~	~~b~~	~~17~~	~~Activity~~			~~school admin~~	~~obliged~~	~~process~~	~~inform 3rd year student to return desk~~
~~19~~	~~b~~	~~18~~	~~Activity~~		~~is finishing 3rd year~~	~~students~~	~~obliged~~	~~process~~	~~return desk~~
20		1	Intermediate event	every month		school admin	obliged	process	regularly communicate policy to students
~~99~~	a	7	Event					behaviour	Leave office
		10							
		15							
		~~19~~							

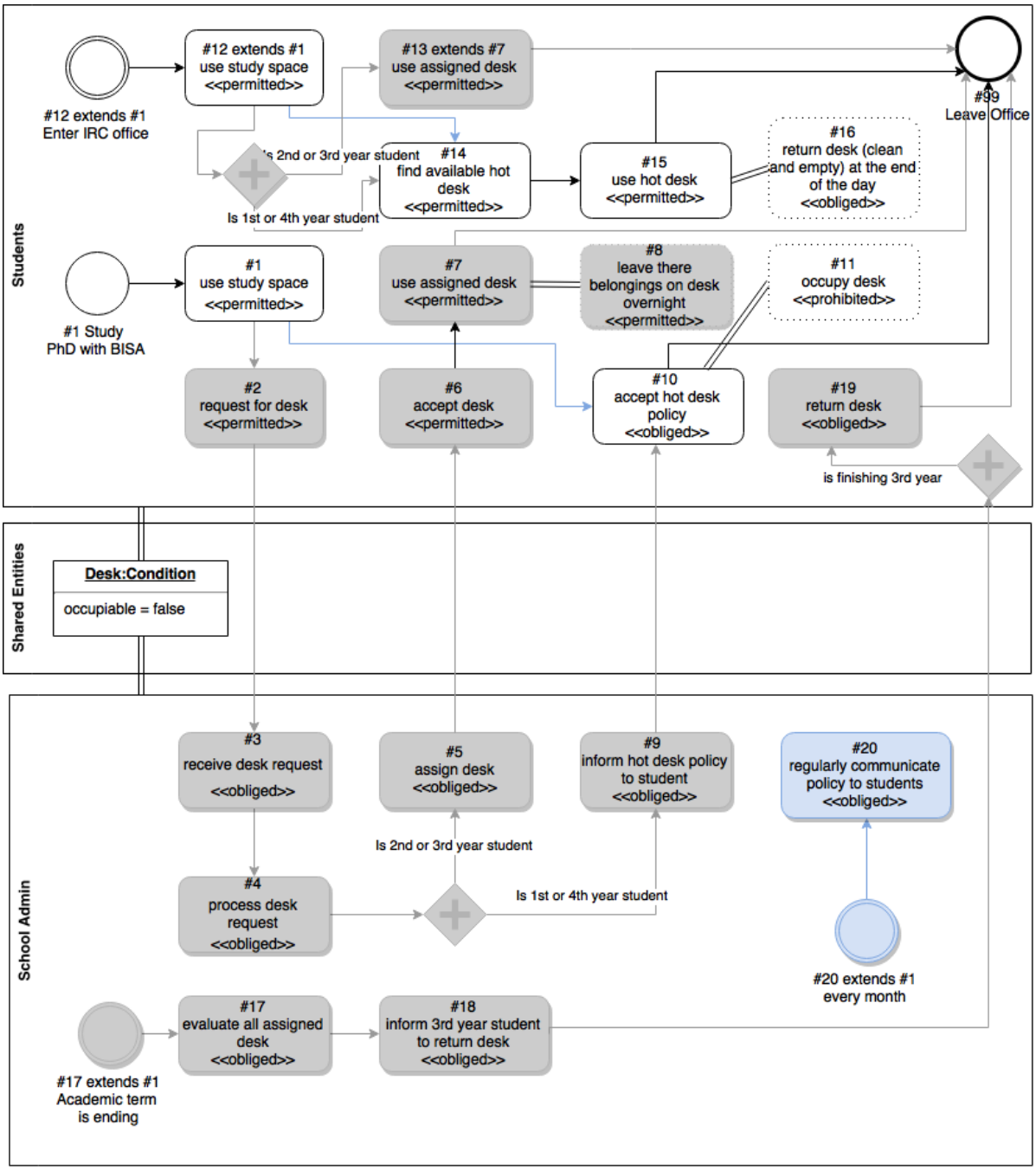

Figure 5.7: IRC To-Be

From the above case, this study summarised the impacts within the table 5.8. The study further analysed and predicted potential conflicts; for example: the desk policy (formal) which originally allowed desk to be allocated as permanently 'occupied', has changed so that all desks, after one hour, are deemed 'un-occupied'. The potential conflicts from this example is the revocation of student's rights and perceived benefits and/or the increased responsibility on school admin to manage desk allocation.

Table 5.8: Summary of Changes

Actors	+/-	Norms Type	Norms Activity	System
Student	-	*Permission*	2, 6, 7, 8, 13	A
	-	Obligation (formal)	19	A
	-	Process (formal)	2, 19	A
	-	Behaviour (informal)	6, 7, 8, 13	A
School admin	-	Obligation (formal)	3, 4, 5, 9, 17, 18	A
	+	*Obligation (formal)*	20	B
	-	Process (formal)	3, 4, 5, 9, 17, 18	A
	+	Process (formal)	20	B

5.6 Linking the Conflict Framework with Routing Transitions

The purpose of the framework development is to incorporate with the reshaped dual aspect and the reverse dual alignment framework. The analysis result from the IRC case study, as summarised in table 5.8, is incorporated in the reshaped dual alignment framework. From the case in section 5.4, the situation 1 is a representation. System A represents the original norms, which the policy allows office desks to be occupied. System B represents the new hot desk system, which is an illustrated representation representing none occupied office space.

This study used the summary of change from table 5.8 to point out at which stage conflict occurs within the routes. PhD students would be required to change their current behaviour (norms #6,# 7, #8, #13) and the current formal processes need to be removed (norms #2, #19). These changes align with route 3.1 if the processes and people's behaviour of system A need to change. Figure 5.8 shows the application of the dual alignment framework, which represents the transition between routing states.

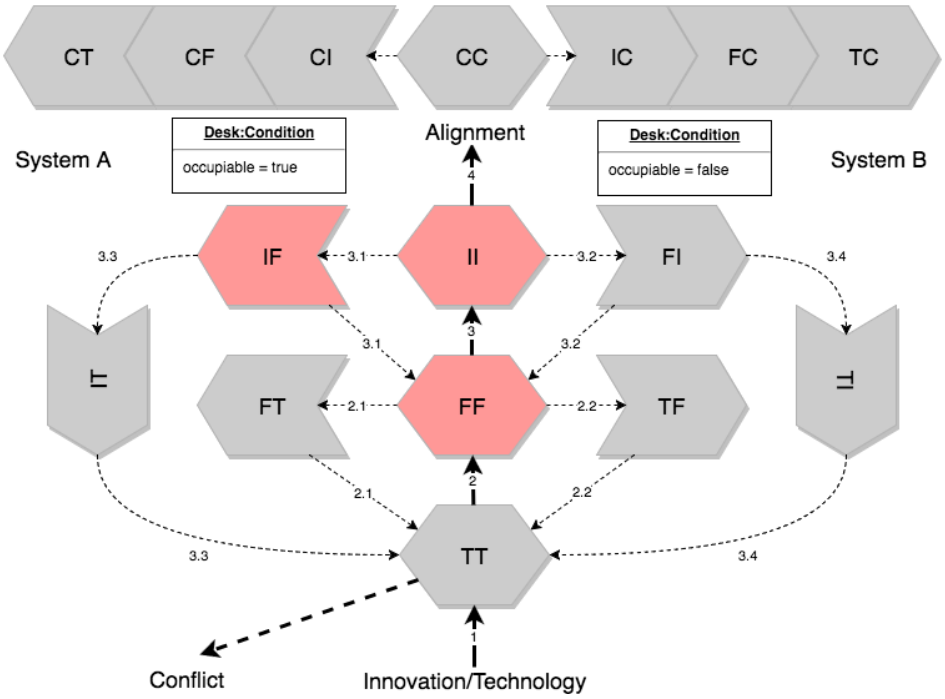

Figure 5.8: Dual Alignment Framework

Route 1 Technical system misalignment - TT: This stage does not find any conflicts because no technology is involved. **Route 2** Formal system misalignment - FF: This stage detects conflicts between business processes between system A (original policy: norms #3, #4, #5, #9, #17, #18) and B (new policy). Therefore, formal processes of system A need to be changed / removed. Since no technology exists in both systems, we move to the next step. **Route 3** Informal system misalignment - II: This stage detects conflict between people's behaviour aligning with two systems (Current norms #6, # 7, #8, #13). Therefore, the formal system of system A needs to change via route 3.1, i.e. Informal system misalignment / change the formal system A (norms #2, #19). **Route 4** Ideal Alignment – TT, FF, II are achieved. Therefore, the innovation (system A) was fully accepted and aligned within the current business system (system B).

5.7 Norms Capturing Framework

All topics proposed within the discussed in this chapter, were concluded as Norms Capturing Framework as shown in figure 5.9. The framework consists of elements: actors or systems, snapshots, analysis process, impacts and changes, handling choices. An individual actor or a system come with varying objectives and values. Changes are found to be required when two or more actors or systems are merged together.

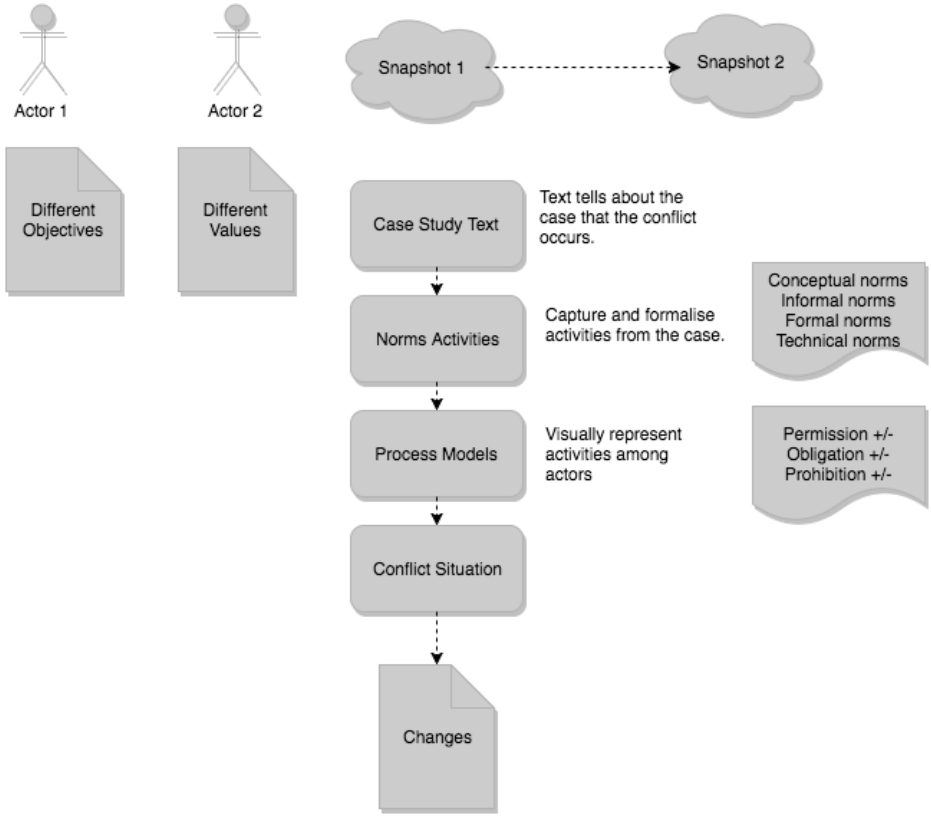

Figure 5.9: Norms Capturing Framework

The framework provides the analysis process (case study text, norms activities, process models, conflict situation), that capture the overview concerning the actors/systems. The results from the analysis process, showed impact concerning right (permission, prohibition) and duty (obligation). These impacts were classified as technical, formal and informal, which would be in consistent with the alignment framework to reconcile what changes are needed to accomplish full alignment. When the conflict situations are identified, changes that needs to applied within the system are listed.

Chapter 6
An Assessment of Individual and Technology Type

6.1 Chapter Overview

Chapter 4 discussed the development of a dual aspect innovative model, and gave the initial justification for an additional layer, termed the "concept (C)" level, which, as claimed in Hall's model (Hall, 1959), refers to internal concepts and beliefs. The concept level is not currently represented in Stamper's model (Stamper, 1993), yet must be included as results (see figure 4.13) that dissonance between current behaviour and beliefs/attitude towards use of current behaviour is significant to technology perception. To investigate the relationship between adoption patterns and individual factors, i.e. to support enhancement of the conceptual adoption model, this chapter investigates the relationship between innovation, technology and the individual difference (i.e. specifically individual culture) by further considering the concept layer.

This chapter aims to answer **RQ5**: What factors would help to identify better technology adoption alignment? By further investigating how individual dimensions influence the individual cognitive dissonance state, we aim to identify whether technology type affects the relationship between individual culture and individual cognitive dissonance state. By focusing on existing literature, related to Hofstede's five dimensions, to understand of the impact and influences on an individual's behaviour. Relevant literature concerning each dimension of Hofstede is reviewed and evaluated in turn. From the review, we aim to develop SEM hypotheses, which will be used to evaluated the factors in relation with individual aspect.

6.2 Understanding Culture

This section focuses on existing literature, related to Hofstede's five dimensions, to understand of the impact and influences on an individual's behaviour. Relevant literature concerning each dimension of Hofstede is reviewed and evaluated in turn. From the review, we aim to develop hypotheses, which will be used to evaluated the factors influence individual adoption patterns

6.2.1 Effects of Power Distance

Begley et al. (2002) conducted research in Beijing, to investigate factors impacting the relationships between power distance and other factors, which were: procedural justice; distributive justice; job satisfaction; affective trust; intention to quit; and organisational citizenship behaviour (Begley et al., 2002). 440 responses and 257 cases were collected and analysed. The results suggested that high power distance and procedural justice are positively associated with job satisfaction, affective trust, intention to quit, and organisational citizenship. Low power distance, and distributive justice, are negatively associated with job satisfaction, affective trust, intention to quit, and organisational citizenship. The implication from this study is that high power distance makes people more concerned with procedures - with people moving towards equality within the organisation. Low power distance creates concern for the individual, in relation to the individual and authority, however of level of trust/value that exists towards authority in often in question (Begley et al., 2002).

Zhang (2005) conducted a study at a large university in China, using a research survey with 176 college students, to investigated the relationship between individual power distance and classroom communication apprehension (fear and anxiety from classroom participation). The findings from the study, established that there is a positive correlation between individual power distance and classroom communication apprehension, the findings showed that students felt more anxious and fearful when they perceived high distance between them and the class instructor. These findings from the study confirmed the implication of the power distance dimension; that it consequently influences individual behaviour to not participate, because of anxiety, when individuals feel the distance between themselves and the other group members (Zhang, 2005).

Purohit and Simmers (2006) assessed the relationship between power distance and conflict management by conducting a survey study on university students as respondents in three countries; with 75 respondents (students) from the U.S.A, 98 respondents from Nigeria, and 99 students from India. They found that power distance had a significant positive relationship with avoidance and compromise conflict handling. This further substantiates that individuals with high power distance will avoid confrontation, and are willing to compromise when they are facing a conflict situation (Purohit & Simmers, 2006).

Power Distance and Conflict

Koslowsky et al. (2011) investigated and studied power distance in connection with influence tactics dealing with conflict in police workforce in Israel. The study gathered data from 191 respondents (40 captains, 151 police officers). The findings from the study showed that power distance is strongly associated with harsh influence tactics (e.g. legitimacy, coercion, reward) (Koslowsky et al., 2011). This would indicate that individuals with high power distance dimension are more likely to apply straightforward tactics to ensure others will obey and follow their demands.

Power Distance and Circulation of Rumours in Organisations

Erden (2013) also investigated the effect of power distance in relationship with circulation of rumours in organisations, which in turn increases an individual's uncertainty avoidance level. Erden (2013) studied 76 workers in Turkey, his findings revealed that power distance positively affects circulation of hearsay in organisations, and perception of uncertainty is a mediator that regulates power distance. This would imply, that the existence of high power distance dimension makes individuals feel uncertain, and results in workers creating and circulating more rumours within the organisation (Erden, 2013).

Power Distance and Transformational Leadership

Liu and Liao (2013) investigated the moderating effect of power distance on the relationship between transformational leadership and willingness to speak up. Through their study conduct using 923 workers who participated in a survey within a multinational telecommunication company in Australia and China. Their results confirmed, that power distance is a strong moderator in relation to transformational leadership and willingness to speak up (Liu & Liao, 2013). This implies that high power distance has the ability to deter workers from effectively communicating with their supervisor, even if the supervisor were to present approachable characteristics.

Power Distance and Collectivism

Yi (2013) investigated power distance with online learning. She conducted an interview with 12 Chinese students from Confucian heritage families in U.S. higher education, Yi (2013) study found that students perceive class instructors as authoritarian, therefore perceived as in high power distance. This perception makes students engage less with the class instructors but more with peers who share a common culture, the findings would imply that Confucian heritage in

relation to collectivism, as well as a high power distance, affects student's behaviour in an online classroom (Yi, 2013).

Power Distance and Silence

Rhee et al. (2014) investigated the relationship of power distance with various type of silences (nonverbal communication), in heavy-industry companies in Korea. They collected data from 628 full-time employees. Their findings found that power distance affects acquiescent silence, and can result in individuals keeping silent to avoid conflict situations (Rhee et al., 2014).

Power Distance and Trust

Ji et al. (2015) researched power distance with employee seeking help and a trusting relationship with their supervisor. Data was collected from 384 respondents in organisations in China. The results showed that power distance is mediated by trust in the supervisor that then influenced employee willingness to seek help. This confirms that communication between employee and supervisor will decrease as employees perceive high power distance, which in turn reduces the trust towards the supervisor (Ji et al., 2015).

In contrast to Ji et al. (2015), Khan et al. (2015) investigated the mediation effect of power distance perception on the relationship between supervisory support and organisational commitment. They conducted a survey in the textile industry in Pakistan and collected 203 responses. The result showed that power distance correlates strongly with supervisory support and organisational commitment, but does not mediate the relationship between supervisory support and/or organisational commitment (Khan et al., 2015).

The effects of power distance dimension (see table 6.1) show that power distance generates effects on uncertainty perception of individuals (Purohit & Simmers, 2006; Erden, 2013) and contributes to certain behaviours in organisations that negatively affects long-term orientation (Begley et al., 2002; Leach-López, 2013; Liu & Liao, 2013; Rhee et al., 2014; Khan et al., 2015).

Literature reviewed in this section is summarised in table 6.1.

Table 6.1: The effects of power distance dimension

Exogenous	Dimension	Endogenous
Supervisory support (Khan et al., 2015)	Power distance	Job satisfaction, affective trust, intention to quit, organisational citizenship behaviour (Begley et al., 2002) Acceptance rate of new products (Yeniyurt & Townsend, 2003) Communication apprehension (Zhang, 2005) Avoidance and compromise in conflict management (Purohit & Simmers, 2006) Consumer innovativeness, propensity to imitate, normative influence, interpersonal communications (Singh, 2006) Life insurance consumption (Chui & Kwok, 2008) Traditional gender role attitudes (Parboteeah et al., 2008) Economics dynamics, institutional stability (Tang & Koveos, 2008) Influence tactics (Koslowsky et al., 2011) Consumer Ethics (questionable activities) (Swaidan, 2012) Foreign direct investment (FDI) (Tang, 2012) Perception of uncertainty, grapevine (rumour) (Erden, 2013) Willingness to speak up (Liu & Liao, 2013) Job performance (Leach-López, 2013) Acquiescent silence (useless) (Rhee et al., 2014) Trust in supervisor, employee help seeking (Ji et al., 2015) Organisational commitment (Khan et al., 2015)

Therefore, two SEM hypotheses can be created for use in our study:

H1a: The power distance dimension positively influences uncertainty avoidance.

H1b: The power distance dimension negatively influences long-term orientation dimension.

6.2.2 Effects of Uncertainty Avoidance

Purohit and Simmers (2006) were able to confirm from their research findings, that uncertainty avoidance, does in fact positively influence avoidance and compromise conflict handling mode. Anuwichanont (2010) studied the moderating effects of uncertainty avoidance in respect to the relational connection between brand affect, brand trust, commitment and loyalty in airline businesses. 474 samples were connected from Thai travellers. They found that uncertainty avoidance does not moderate the relationship between brand, commitment and loyalty.

Uncertainty Avoidance and Behavioural Intention

Lim et al. (2004) investigated the moderating effect of uncertainty avoidance with individualism-collectivism and internet shopping adoption rate. Lim et al. (2004) collected secondary data from 33 countries, using Hofstede's country index, the results showed that individualism-collectivism are strongly associated when moderated by low uncertainty avoidance. Their study suggests that two different approaches should be taken when promoting internet shopping adoption, according to whether the target country is collectivist or individualist. Litvin et al. (2004) examined tourism consumer behaviour in the U.S. according

to certainty avoidance using the country index. Approximately 750 samples were collected, however the sample was reduced to 526 samples, as many participants were in countries outside Hofstede's suggested number of country indexed (Hofstede, 2001). The results of Lim et al. showed that individuals from low uncertainty avoidance countries are more likely to take risks, e.g. travel alone, booking ahead of time, and/or planning longer trips. Hwang (2005) evaluated uncertainty avoidance with the use of the technology acceptance model (perceived ease of use), via the use of online surveys. Hwang (2005) collected 101 responses. The result from the survey shows that uncertainty avoidance has a positive relationship with perceive usefulness. The results implied that that individuals will perceive the technology to be useful when their high uncertainty avoidance level is high.

Albuloushi and Algharaballi (2014) investigated the relationship between uncertainty avoidance; information sharing; trust; and personal interest in supply chain coordination context. They collected data from 138 international supply chain members, from the Middle East (i.e. Kuwait, UAE), and Far Eastern countries (i.e. China, India). The findings demonstrated that low uncertainty avoidance positively affects information sharing and trust. The conclusion from the study confirmed that individuals who have a different level of uncertainty avoidance will have a different view of sharing and trust (Albuloushi & Algharaballi, 2014).

Uncertainty Avoidance and Radical Actions towards Long-term Orientation

Lee et al. (2007) conducted two studies using primary data, which consisted of 224 respondents and secondary data from 13,319 samples. To evaluate uncertainty avoidance in relation to product uncertainty. Both studies conclude that individual from high uncertainty avoidance countries have negative quality judgement and behavioural intention when product uncertainty is high. Wennekers et al. (2007) investigated the relationship between uncertainty avoidance and business ownership rate, using secondary data consisting of non-agricultural business ownership rates from 23 OECD-countries. Eventually only 21 countries were included in the study, as only these countries were present on Hofstede's uncertainty avoidance index. The result showed that uncertainty avoidance has a positive relationship with business ownership rates. Wennekers et al concluded that individuals in the high uncertainty avoidance countries prefer to start their own businesses.

Shah (2012) examined the consumer behaviour within 68 countries in connection with uncertainty avoidance. Data was acquired from multiple sources i.e. UN, World bank, OECD to study investments, free markets, mobility, and job switching in 68 countries. The result showed that uncertainty avoidance had a negative relationship with investment, free market, mobility and job switching behaviour. Results imply that the effect of uncertainty avoidance was closely connected with risk aversion behaviour (Shah, 2012).

Chatterjee et al. (2014) conducted a study, consisting of 405 participants, to investigate the relationship between uncertainty avoidance and prospect theory's reflection effect (i.e. certainty and risk). The results of this study showed that there is no significant difference between gain and loss preference for individuals who have high uncertainty avoidance scores. Interestingly there is significant between gain and loss preference for individuals who have low uncertainty avoidance scores (Chatterjee et al., 2014). The implication of the findings is that low uncertainty avoidance individuals are more likely to accept multiple degrees of risks.

All literature reviewed concerning uncertainty avoidance is summarised in table 6.2.

Table 6.2: The effects of uncertainty avoidance dimension

Exogenous	Dimension	Endogenous
	Uncertainty avoidance	Acceptance rate of new products (Yeniyurt & Townsend, 2003) Internet shopping adoption (Lim et al., 2004) Tourist consumer behaviour (Litvin et al., 2004) ERP systems adoption (Hwang, 2005) Avoidance and compromise in conflict management (Purohit & Simmers, 2006) Consumer innovativeness, propensity to imitate, normative influence, interpersonal communications (Singh, 2006) Product uncertainty, behavioural intention (Lee et al., 2007) Business ownership rate (Wennekers et al., 2007) Life insurance consumption (Chui & Kwok, 2008) Traditional gender role attitudes (Parboteeah et al., 2008) Economics dynamics, institutional stability (Tang & Koveos, 2008) Loyalty (Anuwichanont, 2010) Investment, free market, mobility, job switch, lawyer per thousand (Shah, 2012) Consumer Ethics (questionable activities) (Swaidan, 2012) Foreign direct investment (FDI) (Tang, 2012) Job performance (Leach-López, 2013) Information sharing, personal interest, supply chain coordination (Albuloushi & Algharaballi, 2014) Reflection effect (prospect theory) (Chatterjee et al., 2014)

It can be concluded from the discussion, and summarised literature (see table 6.2), that uncertainty avoidance influences behavioural intention, i.e. acceptance and adoption (Yeniyurt & Townsend, 2003; Lim et al., 2004; Litvin et al., 2004; Hwang, 2005; Lee et al., 2007; Albuloushi & Algharaballi, 2014) and that it doesn't contribute to certain radical actions for long-term orientation (Lee et al., 2007; Wennekers et al., 2007; Shah, 2012).

This study proposes a SEM hypotheses as following:

H2: The uncertainty avoidance influences long-term orientation.

6.2.3 Effects of Collectivism

Lim et al. (2004) argued that the relationship between collectivism dimension and internet shopping adoption, is moderated by uncertainty avoidance. However, Lim et al. (2004) also found that neither collectivism nor uncertainty avoidance is significantly linked with internet shopping. Kim (2011) studied and evaluated the effect of collectivism on green-buying behaviour. Kim (2011) conducted a survey using 261 students from a major mid-western university in South Korea, and argued that self-transcendence, self-enhancement and environmental attitudes, can and will mediate the relationship between collectivism and green-buying behaviour. Kim (2011) also found that perceived consumer effectiveness will be a moderator between environmental attitudes and green-buying behaviour. Evidence from the research indicated that only self-transcendence and environmental attitudes mediate the relationship and that neither self-enhancement, nor perceived consumer significantly affect green-buying behaviour. The study, therefore implies that behavioural chains is influenced by collectivism towards environmentally-related personal value. In other words, individuals are more likely to follow behaviour or practices if those practices are accepted as social norms (Kim, 2011).

Collectivism and Conflicts

Gire (1997) investigated the effect of collectivism procedural preference, when individuals are faced conflict situations. The study collected data from 185 respondents (90 Nigerians and 95 Canadians), the Nigerian respondents represent collectivism and the Canadian respondents represent individualism. The respondents were given five options for solving conflicts: Threats, acceptance of the situation, negotiation, mediation, and arbitration (Gire, 1997).

The result showed that in this study 'threats' is the preferred option for solving conflict. 'Acceptance of the situation' was the second preferred option for solving conflict, and 'arbitration' was the third preferred option (Gire, 1997). Through further analysis, Gire (1997) argued that negotiation was the preferred option by Nigerians (collectivism), whilst arbitration was preferred by the Canadians (individualism). However, Nigerians prefer threat as an option when there is a conflict between groups, i.e. between Nigerians and Canadians; Canadians prefer arbitration option. Canadians were willing to accept the situation as a singular individual (Gire, 1997). This implies that individualism-collectivism influences individual behaviour in different ways, depending on how individuals interpret the situations.

Komarraju et al. (2008) conducted a study using 640 students in the USA. Komarraju et al. investigated the relationship between individualism-collectivism (both vertically and horizontally), and conflict management style (dominating, obliging, avoiding, integrating, compromising). Horizontal individualism-collectivism focuses on equality among people, whilst vertical individualism-collectivism focuses on status and comparison / competition among others. The results found that dominating styles, were mostly preferred by vertical individualism (outstanding); obliging style were mostly preferred by horizontal collectivism (loyalty) and voiding style were preferred by vertical collectivism (relationship) (Komarraju et al., 2008). The results imply that categories of potential actions were influenced and determined by individual cultural background.

Collectivism and Whistleblowing Intentions

Park et al. (2005) investigated the effects of Confucian ethics (long-term orientation) and collectivism on whistleblowing intentions (disclosure of illegitimate actions) using 343 public official respondents in South Korea. They evaluated the whistle blowing intentions, from both an internal and external perspectives, and looked at collectivism from both a horizontal (blending, loyalty) and vertical (distinguishing, outstanding) perspective. The result showed that vertical individualism (outstanding), horizontal collectivism (loyalty) had significant relational linkages with internal whistleblowing intentions. The findings suggest that individuals are more likely to blow the whistle to empower and standout amongst their colleagues, as well as establishing organisational allegiance. Horizontal collectivism (loyalty) has a positive relationship with external whistleblowing intentions. The study proposed that four perspectives of collectivism dimensions exist (collectivism, individualism, horizontal and

vertical) i.e. that influence individual behaviours in different ways dependently impact the individual intentions (Park et al., 2005).

Collectivism and the Organisation

Gundlach et al. (2006) proposed the application of social identity theory when determining the significance between the individualism-collectivism dimension and team performance. They argued that the higher individualism level will result in the lower levels of team identification and that this relationship will be moderated by task interdependence. Their findings suggest that, collectivism promotes team collaboration when the assigned tasks require interactions between individuals (Gundlach et al., 2006).

Finkelstein (2012) investigated the relationship between individualism-collectivism, in the context of organisation citizenship behaviour. The study collected data from 86 undergraduate students in South-Eastern U.S. The study focused on students undertaking working experience for more than 20 hours a week, for more than 12 months, within an organisation.

Organisational citizenship behaviour was broken down into pro-social values, consisting of organisational concern and impress management. The result demonstrated that collectivism was compellingly linked with pro-social value, organisational concern and impress management. The results suggest that, collectivism creates dedication, efficiency and effectiveness within an organisation (Finkelstein, 2012).

Collectivism and Social Status

Kawabata (2013) conducted a qualitative study by interviewing 16 day labourers (people who earn money on daily labour work basis) in Kamagasaki district in Japan; to determine how collectivism influences health promotion practices. The study determined Japan to be a collectivist society, and that day labourers are considered as being of low status, and that day labourers have limited access to public service, i.e. transportation and health benefits. The study suggested that public health practitioners needed to develop a more progressive outlook, and except and promote the notion that health benefits should be for all regardless of social status (Kawabata, 2013).

Collectivism and Knowledge Sharing

Bao et al. (2015) suggests that sharing is a mechanism for promoting innovation and competitive advantages within organisations. They conducted research to investigate the mediation effects of in-group identification, between collectivism and knowledge sharing in China (Shandong and Zhejiang); obtaining 512 valid responses. They applied collective reliance, collective interest, collective goal, collective regulation, and collective care as the five dimensions of collectivism; and added in-group identification mechanisms as a mediator and knowledge sharing as a dependent variable (Bao et al., 2015). Bao et al. analysed the results using 3 methods (i.e. Baron & Kemny test, Sobel test, SEM test) to ensure reliability. From their findings, Bao et al. were able to identify that in-group identification mediates the relationship between collective reliance, collective care and common knowledge sharing. But for key knowledge sharing and in-group identification mediates, they found that relationships for collective reliance, collective goal, collective care; key knowledge sharing and the deviation of behavioural intention were established according to different aspects of collectivism (Bao et al., 2015).

Uncertainty Avoidance Summarised Literature Review in table 6.3.

Table 6.3: The effects of collectivism dimension

Exogenous	Dimension	Endogenous
	Collectivism	Procedural preference (threats, acceptance, negotiation, mediation, arbitration) (Gire, 1997) Acceptance rate of new products (Yeniyurt & Townsend, 2003) Internet shopping adoption (Lim et al., 2004) Whistleblowing intentions (disclosure) (Park et al., 2005) Team performance, team identity, team identification, task interdependence (Gundlach et al., 2006) Consumer innovativeness, propensity to imitate, normative influence, interpersonal communications (Singh, 2006) Conflict management styles (Komarraju et al., 2008) Life insurance consumption (Chui & Kwok, 2008) Economics dynamics, institutional stability (Tang & Koveos, 2008) Green purchase, personal values (self-transcendence, self-enhancement), environmental attitudes (Kim, 2011) Organisation Citizenship Behaviour (OCB), Prosocial value (PV), Organisational concern (OC), Impression management (IM) (Finkelstein, 2012) Consumer Ethics (questionable activities) (Swaidan, 2012) Foreign direct investment (FDI) (Tang, 2012) Health promotion practices (Kawabata, 2013) Job performance (Leach-López, 2013) Sales collaboration, firm sales performance (Magnusson et al., 2014) Knowledge sharing (Bao et al., 2015)

From the findings in this section, it can be concluded that that collectivism influences behavioural intention, such as acceptance and adoption (Lim et al., 2004; Kim, 2011); conflict management approach (Gire, 1997; Komarraju et al., 2008); disclosure intention (Park et al., 2005); organisational behaviour (Gundlach et al., 2006; Finkelstein, 2012; Bao et al., 2015) and social behaviour (Kawabata, 2013).

In summary, collectivism, can and does influence individuals to follow social norms to mitigate risk that might possibly occur from not following social norms. Therefore, it is clear that collectivism influences uncertain avoidance behaviour (Kawabata, 2013).

In this study, the findings suggest a SEM hypotheses as following:

H3: The collectivism dimension positively influences uncertainty avoidance dimension.

6.2.4 Effects of Masculinity

Masculinity has been shown to relate to gender inequality. Odekerken-Schroder et al. (2002) investigated the relationship between gender stereotype and masculinity index (UK—masculinity index = 66 and the Netherlands—masculinity index = 14). They analysed 946 advertisements (600 from the UK, 346 from the Netherlands) to compare data to traditional gender stereotypes, e.g. females are not portrayed in business working roles, females are glamorised as a result of their appearance, and females are sometime sexually or negatively objectified. The result showed significant differences between male and female when adverts relate to working roles, and/or relating to sexual objectification. Results, however, show no differences in non-working contexts. The study of Odekerken-Schroder et al. stressed that the masculinity index therefore does not represent any gender inequality and/or specific gender role (Odekerken-Schroder et al., 2002).

An and Kim (2007) also investigated how masculinity dimension relates to gender portrayals between Korea and the U.S. They conducted content analysis using 400 random web ads (200 from Korean brand and 200 from the U.S. brand) to evaluate masculinity dimension presented on web advertisement in various perspectives. The focus was on the ad's character depiction (in relationship with others/ in production situations, role of woman with neutral products, gender difference in working role, women portrayal working role, and non-working role (An & Kim, 2007). In this study, Korean represents femininity and The U.S. represents masculinity

according to Hofstede's masculinity index. The result confirmed that Korean ads (femininity) significantly showed that ad's character depiction in relationship with others but masculinity (US) did not commonly use gender characters in production related ads. Moreover, women are depicted as main characters in Korean samples as hypothesised. In contrast, men were depicted in working role in Korean samples more than in the U.S, whilst women were depicted in working role more in the U.S. samples. Women also represented high/middle level in the U.S. advertisements more than in the Korean. Interestingly, women were depicted in family and recreational roles in Korean ads, while women were depicted in decorative roles (sex object) in the U.S. ads. This shows considerable implication of the variable of masculinity dimension between countries. Also, the effect of masculinity and femininity that influence the gender difference portrayed in societies (An & Kim, 2007).

Masculinity and Consumption Behaviour

Yeniyurt and Townsend (2003) assessed the effect of cultural dimension on the rate of new product diffusion using secondary data from the world bank. Only 30 countries were included in the analysis to align to Hofstede's country index availability. In this study, they focused on internet, cellular phone and PC usage rate and consider socio economic structures as moderators (i.e. GDP, urbanisation, literacy and openness). Focusing on masculinity index, the results showed that it had a positive relationship with new product adoption rates when literacy rates are high but negative relationship when literacy rates were low. As the moderating effect of literacy rates that go along with masculinity level, this implies masculinity dimension relies on literacy skills or education to drive new production diffusion (Yeniyurt & Townsend, 2003).

Singh (2006) investigated the different influence of cultural dimension on consumer innovativeness, propensity to imitate, normative influence and interpersonal communications to differentiate between innovators and imitators. This study collected data via telephone surveys (152 from France and 151 German respondents). The result showed that masculinity has a positive relationship with consumer innovativeness, while having a negative relationship with normative influences (social influences) (Singh, 2006). This implies that the masculinity dimension does not influence consumer intention to follow other people, but does cause consumer to be more assertive when evaluating product information before purchase.

Chui and Kwok (2008) examined the relationship between Hofstede's dimensions and insurance consumption in 41 countries; with data taken from a secondary data source (a new database on financial development and structure—2003) and Hofstede's country index. Focusing on masculinity, the result showed that masculinity has negative relationship with insurance consumption. Chui and Kwok argued that insurance companies should target their market to feminine countries (Chui & Kwok, 2008).

Masculinity and Consumer Ethics

Swaidan (2012) conducted a survey study to investigate the relationship between culture and consumer ethics (illegal, active, passive and no harm activities). The questionnaires were distributed in a city in the U.S., and 761 responses were collected. The study showed that low masculinity participants avoid illegal, active and passive questionable activities. The results suggest, that feminine individuals will avoid taking risk if their action have ethical implications (Swaidan, 2012).

Masculinity with Collaboration

Magnusson et al. (2014) evaluated, the moderating and direct effect of masculinity dimension in relationship with sale collaboration. They used secondary data from multiple sources, which contained 7,624 responses from 56 countries. Magnusson et al. increased data quality by deleting records with excessive missing values and balance distribution in terms of culture (more than 60% of the responses were from the U.S.). Magnusson et al., therefore, selected 2,847 from 7,624 responses, which are from 26 countries that align to Hofstede's cultural index. Magnusson et al. hypothesised that low masculinity (femininity) has a positive relationship with sales collaboration; as femininity represents modesty and compromise. On the other hand, high masculinity moderates the relationship between rewards alignment and sales collaboration; as masculinity represent assertiveness and ambition. The results from the analysis confirmed these two propositions (Magnusson et al., 2014).

Masculinity and Non-Effect

Parboteeah et al. (2008) investigated the attitude of managers towards gender roles, in relation with Hofstede's cultural dimensions. They conducted the analysis on WVS data (Web Value Survey) but focused on people who were in manager roles, which included 1,584 managers in 14 nations. Results found that manager's gender role attitude did not have relationships with

masculinity dimension (Parboteeah et al., 2008), which implies that Hofstede's cultural dimension does not work at an individual level.

Tang and Koveos (2008) investigated how economic condition, change the effects on Hofstede's cultural dimension value. They analysed Hofstede's country index, comparing GDP per capita information from the world bank's world development indicators for 48 countries. With focus on masculinity, the results showed that changes to economic situation did not affect the masculinity dimension. However, they argued that Hofstede's country index should be periodically updated to reflect economic changes, as they found that this had a causal effect on the other dimensions (Tang & Koveos, 2008). The empirical implication of this research is that economic condition changes do not import on perception of gender equality but relate with the other four dimensions as those four imply the sense of uncertainty perspective.

Masculinity and Investment

Tang (2012) investigated the relationship between cultural distance and foreign direct investment (FDI) in 21 OECD and 14 non-OECD countries between 1980 and 2000 using data from the United Nation's FDP databases. They analysed the FDI data with cultural indexes provided by Hofstede's country index and the Global Leadership and Organizational Behaviour Effectiveness (GLOBE) practices and values based cultural scores (House et al., 2004). The result were able to highlight, the negative relationship masculinity dimensions had with FDI according to Hofstede's index and GLOBE's practices based index, but has no significant relationship with GLOBE's value-based index (Tang, 2012). This stressed the implication of applying cultural index at national level to investigate consumer behaviour. Each cultural dimension is based on varying assumptions.

Literature review concerning masculinity summarised in table 6.4.

Table 6.4: The effects of masculinity dimension

Exogenous	Dimension	Endogenous
	Masculinity	Working role, high- and mid-level business working role, decorative non-working role, being younger, being equal to men, sex objects, seductive type of dress (Odekerken-Schroder et al., 2002) Acceptance rate of new products (Yeniyurt & Townsend, 2003) Consumer innovativeness, propensity to imitate, normative influence, interpersonal communications (Singh, 2006) Relationship with others, production situations as exhibited through employment, feature women as a main character, portrayal of working roles, high- and mid-level business roles, non-working roles (An & Kim, 2007) Life insurance consumption (Chui & Kwok, 2008) Traditional gender role attitudes (Parboteeah et al., 2008) Economics dynamics, institutional stability (Tang & Koveos, 2008) Consumer Ethics (questionable activities) (Swaidan, 2012) Foreign direct investment (FDI) (Tang, 2012) Job performance (Leach-López, 2013) Sales collaboration, firm sales performance (Magnusson et al., 2014)

This study proposes a SEM hypotheses as following:

H4: The masculinity dimension influences Power Distance dimension.

6.2.5 Effects of Long-term Orientation

Zhang et al. (2012) investigated the relationship between the Protestant Work Ethic (PWE) and Hofstede's long-term orientation dimension. They conducted a survey research using questionnaire and were able to collect 1,757 respondents consisting of university members, government's officers and business organisation staff in China. PWE consists of 19 items, which were reduced to four constructs using factor analysis methods. The constructs were hard work, internal motive, admiration of work itself and negative attitude toward leisure. The regression analysis showed that hard work, internal motive and admiration of work itself had a positive relationship with long-term orientation dimension, whilst negative attitude to leisure does not have significant relationship with long-term orientation dimension (Zhang et al., 2012).

Long-term orientation was discovered as the fifth dimension by Hofstede and Bond (1988), Robertson and Hoffman (2000) investigated the relationship of long-term orientation with other four dimensions. They conducted a questionnaire survey with 255 volunteer business students in the south-eastern of the U.S. The results showed that power distance and uncertainty avoidance have a positive relationship with the long-term orientation dimension (i.e. Confucian dynamism) (Robertson & Hoffman, 2000). This implies that individuals who are within the high power distance and high uncertainty avoidance would focus more on sacrificing their

benefit now, to guarantee the long-term outcomes, for example not spending money on holidays but keep it for growing children.

Literature review concerning of long-term orientation summarised in table 6.5.

Table 6.5: The effects of long-term orientation dimension

Exogenous	Dimension	Endogenous
Confucian dynamism (perseverance, thrift) (Hofstede & Bond, 1988) Power distance (negative), uncertainty avoidance (future), masculinity (negative), individualism (negative) (Robertson & Hoffman, 2000) Protestant work ethic, hard work, internal motive, admiration of work itself, negative attitude to leisure (Zhang et al., 2012)	Long-term orientation	

This study proposes two SEM hypotheses as following:

H5a: The long-term Orientation positively affects Attitude towards targeted behaviour (ATTB)

H5b: The long-term Orientation positively affects Attitude towards maintaining or changing behaviour (ATMCB)

6.3 Considering Moderators: Technology Type and Gender

This research investigates the moderating effects on the individual dimensions and attitude towards target behaviour (ATTB) and attitude towards changing and maintaining behaviour (ATCMB). Technology type and gender are potential to moderate the relationship defined by the proposed hypotheses (H1-H5). For example, mobile technology, i.e. Bring Your Own Device (BYOD) will impact individuals' privacy, as the devices that they need to take home, and develop a sense of responsibility towards maintaining the devices in connection with organisational purposes. In contrast to non-mobile technology, i.e. information system or technology at workplace, people can leave the technology, after work finishes and go home (Thomson, 2012). Gender is one of the cruel options to investigate since male and female have different mindset. For example, married women might prioritise family higher than single women. Men could take it serious at work as their careers are so important for their children education (Venkatesh & Morris, 2000; Venkatesh et al., 2012).

Accordingly, this study investigated the moderating effect of technology type and gender, i.e. the relationship between individual dimensions and attitude towards target behaviour (ATTB), and attitude towards changing and maintaining behaviour (ATCMB).

This study proposes two SEM hypotheses as following:

H6a: Technology type has moderating effects on the relationships between five dimensions and ATTB and ATCMB.

H6b: Gender has moderating effects on the relationships between five dimensions and ATTB and ATCMB.

6.4 Investigate Individual Value

Understanding what could be the rationale behind people's behaviour, assists this study to anticipate the potential issues of technology adoption. The strength is that cultural measurement tools, such as the CVScale, have been developed as a result of substantial research and development activity (Yoo et al., 2011), to ensure reliability of the findings. However, the weakness of this approach, in terms of the instrument and dimension that should be selected or included in the measurement, is that many dimensions cannot be assess at the same time.

Measuring the cultural dimensions of individual, CVScale, enables this research to group people into specific categories, for example, adopter categories (Rogers, 2003) classify adopter according to how early they adopt technology. Using the CVScale measurement can aid in the development of a new understanding and will aid in the development of new insights. In sections 6.2 – 6.3, we review literature and develop the 6 SEM hypotheses. H1 – H4 show the relationship between individual dimensions (power distance (PO), uncertainty avoidance (UN), collectivism (CO), masculinity (MA) and long-term orientation (LTO). H5a and H5b represent relationship between long-term orientation (LTO) and attitude towards target behaviour (ATTB), and attitude towards changing and maintaining behaviour (ATCMB). H6a and H6b represent moderating effects of technology type and gender with the relationship of H1-H5. Figure 6.1 shows the theoretical (SEM structural) model aligning with all hypotheses defined earlier in the chapter. The causal relationship between Hofstede's five dimensions will be measured in accordance with the SEM hypotheses developed from literature.

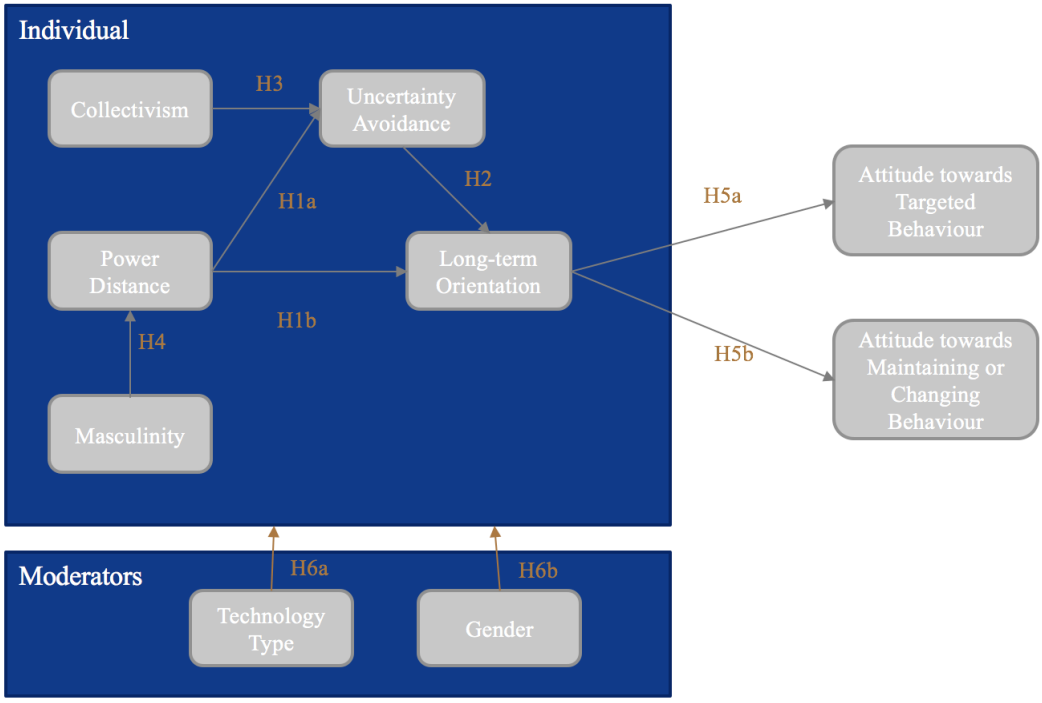

Figure 6.1: Proposed Theoretical Model

6.5 Research Analysis and Results

For the data collection, the questionnaire consisted of 2 parts. For part 1, specific demographic information, of each individual, was captured. For part 2, we asked respondents to specify up to 3 technologies that they have recently adopted and/or were currently adopting. The CVScale was included as part one of our study.

In contrast to other studies, which ask respondents questions regarding a specific technology such as mobile internet computing (Venkatesh et al., 2012). This study used a selected approach, which means participants are able to express opinion about a relevant technology innovation. By not pre-selecting technologies we are limiting data collection, as individuals who come from different organisations, are most likely using and/or adopting different technologies. As it is not possible to make the assumption that all participants are using the same technology, respondents provided feedback concerning the adoption process, in relating to at least one technology that they were currently using and/or about to adopt.

6.5.1 Preliminary Analysis and Results

As this study applies the same data set, which exists within chapter 4, focus was primarily placed on analysing 217 individual CVScale profiles and 251 technologies. The technologies provided by the respondents require the use of the deduction process, to enable further in depth analysis. The thematic analysis (six phases) was employed for classifying technology categories (Braun and Clarke, 2006). In phase one, we got familiar with the data by going through all the technology names. In phase two, we generated initial categories i.e. information system, mobile. After that (phases 3-4), we searched and review for themes (assign technologies in the category). Then in phase five, we defined seven categories. Those categories are: 'information system', 'mobile device', 'mobile application', 'cloud technology', 'hardware and infrastructure', 'process and practice' and 'software tool'. All of these technologies are information technology applications and hardware. Lastly, in phase 6, we summarised and report all 251 technologies that were classified into seven categories via thematic analysis using NVivo software (see figure 6.2).

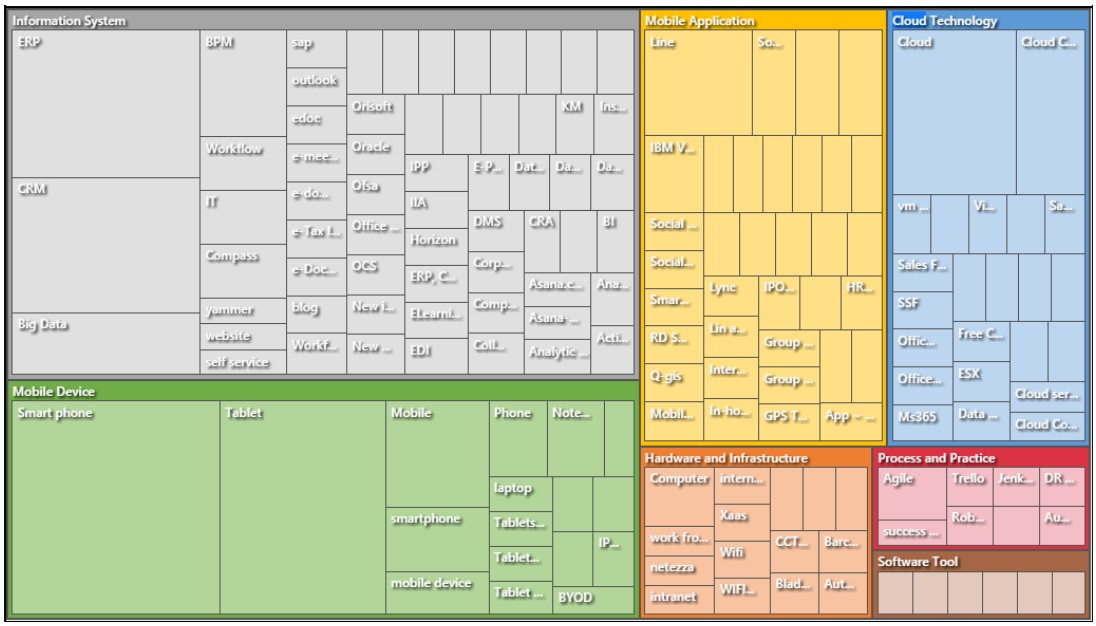

Figure 6.2: Technology being adopted/recently adopted

According to these seven categories, particularly hardware and infrastructure (16 technologies), process and practice (7 technologies), and software tool (7 technologies) (see table 6.6), the sample sizes are not large enough to be considered as moderators in SEM analysis. Therefore, the technologies need to be re-categorised (reviewing themes) accordingly, into 2 groups: mobile and non-mobile (see table 6.6). These categories gave satisfactory proportion, (non-

mobile = 152 and mobile = 99) to support the analysis of moderating effects between the relationships in SEM structural model.

Table 6.6: Technology Type from Data Collection

	Nonmobile	**Mobile**	**Total**
Cloud Technology	34		
Hardware and Infrastructure	16		
Information System	88		
Mobile Application		41	
Mobile Device		58	
Process and Practice	7		
Software Tool	7		
	152	99	251

To test the hypotheses 1-6, used as the basis of the proposed theoretical model (see figure 6.1), we applied the SEM analysis process.

6.6 SEM Data Analysis Process

In this analysis, structural equation modelling (SEM) was applied as the analysis method, whereby SPSS + AMOS 21 were selected as the tool for SEM. The process for structural equation modelling, consisting of 6 steps (as described in chapter 3) are explained in detail within the following subsections.

6.6.1 Define Individual Constructs, and Develop and Specify the Measurement Model - Steps 1 and 2

Step 1 relates to defining the individual SEM constructs that are to be included in the measurement model. To consider the hypothesis, defined in the theoretical model (figure 6.1), nine variables were included in the analysis; these are: the five theoretical dimensions from CVScale (Yoo et al., 2011); the two theoretical constructs from 3D-RAB — Attitude towards Targeted Behaviour (ATTB) and Attitude towards Changing or Maintaining Behaviour (ATCMB) (described in chapter 3 and 4) (Wiafe, 2012), and the two moderators (i.e. technology type and gender). Technology type was analysed and classified into two groups (non-mobile and mobile).

Step 2 specified the measurement model, in order to confirm the reliability of the operationalised items. In this study only the 26 CVScale items were evaluated – as ATTB and ATCMB items were already evaluated in chapter 4. Factor analysis was conducted to confirm the relationship between the 26 CVScale items and the 5 output Hofstede dimensions (i.e. PO, UN, CO, MA and LTO).

6.6.2 Analyse Empirical Results and Validate Measurement Model - Steps 3 and 4

In analysing empirical results (step 3), this study applied the complete case approach (listwise deletion – delete record if any value is missing), and imputation techniques (e.g. replacing missing value with the mean) (Hair et al., 2009). 196 of 217 responses were included within the analysis, which contained feedback concerning 251 technologies. For each technology type, participant cultural dimension data was considered.

The results from factor analysis (both EFA and CFA, see table 6.7), showed that 23 of 26 items were reliable. Three factors were dropped because factor loading values were less than the satisfactory level (>0.45) (Hair et al., 2009). After poor factors were removed, Cronbach's alpha was used to confirm the reliability. The result showed that all five dimensions presented strong reliability—0.700, 0.867, 0.851, 0.663 and 0.785 for PO, UN, CO, MA and LTO respectively (Cronbach, 1951).

Table 6.7: Constructs Reliability and Validity

Constructs	Items	EFA Factor Loading	CFA Factor Loading
PO Cronbach's Alpha = .700	PO5	.518	.707
	PO4	.662	.605
	PO3	.667	.581
	PO2	.640	.546
	PO1	.676	.423
UN Cronbach's Alpha = .867	UN5	.730	.785
	UN4	.766	.737
	UN3	.725	.763
	UN2	.733	.815
	UN1	.679	.684
CO Cronbach's Alpha = .851	CO6	.778	.640
	CO5	.760	.620
	CO4	.718	.744
	CO3	.828	.819
	CO2	.531	.653
	CO1	.606	.662
MA Cronbach's Alpha = .663	~~MA4~~	<.4	-
	MA3	.847	.832
	MA2	.847	.651
	MA1	.697	.670
LTO Cronbach's Alpha = .785	~~LT6~~	<.4	-
	~~LT5~~	<.4	-
	LT4	.704	.623
	LT3	.851	.859
	LT2	.878	.920
	LT1	.660	.701

Figure 6.3 shows the measurement model, which includes the valid 23 operationalised items in relation to the 5 theoretical constructs.

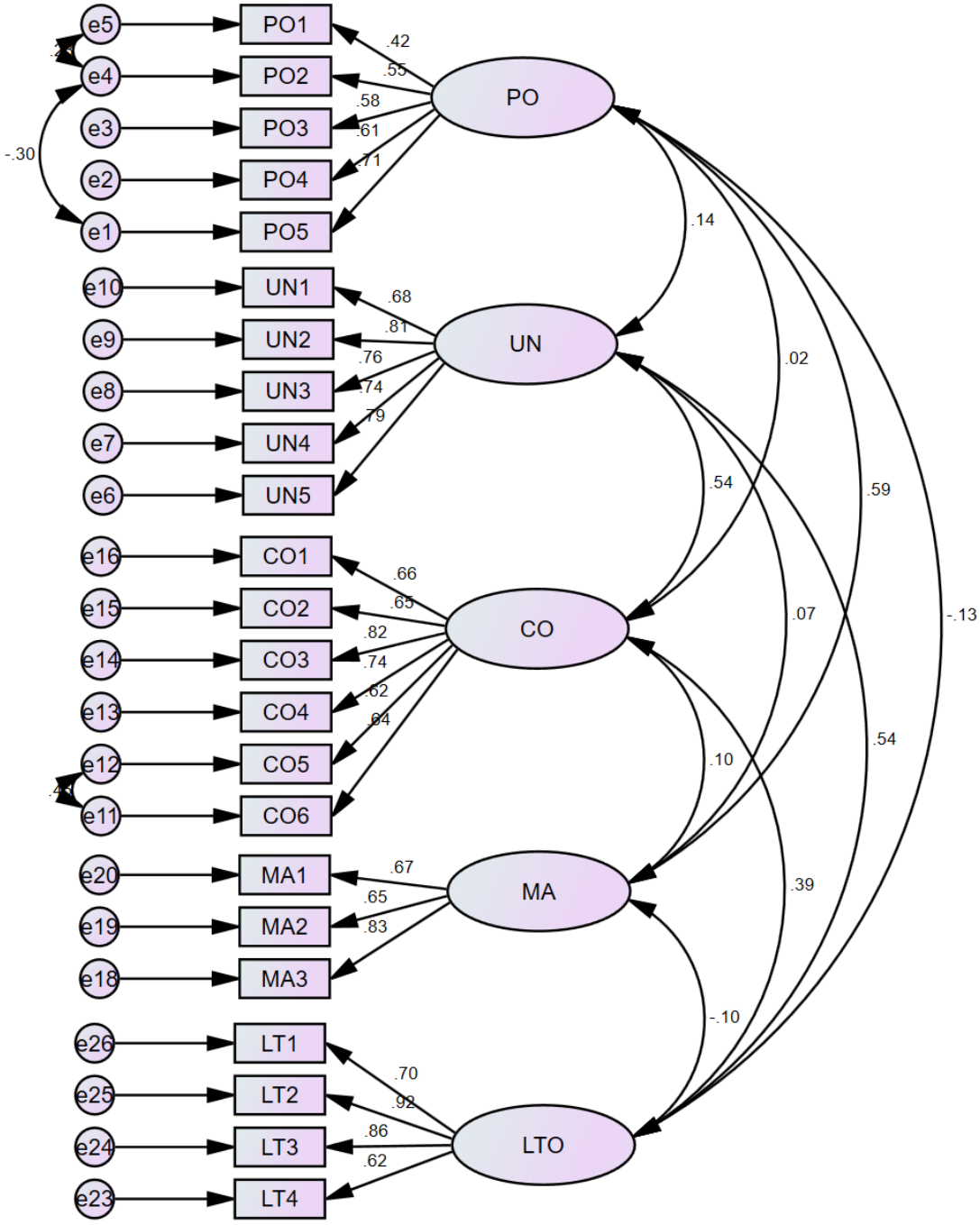

Figure 6.3: Measurement Model

Once the measurement model had been developed and specified (Step 4), see figure 6.3, the model was validated using Confirmatory Factor Analysis (CFA). Table 6.8 shows that the measurement model fitness was acceptable, apart from the GFI value, which was slightly below the recommend value (0.890 < 0.900). This, however, is not considered to be a significant

problem, as GFI is not considered essential by all researchers (see Table 6.8). Accordingly, our results confirmed that all 23 items were satisfactory allowing us to proceed towards further analysis.

Table 6.8: CFA Model Fit Index

Indicators	Hair et al. (2009)	Bagozzi and Yi (2012)	This Model
χ^2			
CMIN/DF			1.42
RMSEA	<.08	<=.07	.044
SRMR	<.08	<=.07	.067
CFI	>.95	>=.93	.964
GFI	>.9		.890

6.6.3 Specify and Validate Structural Model - Step 5 and 6

The structural model was specified (step 5) in line with the theoretical model (see figure 6.1). Figure 6.4 shows the results of SEM analysis indicating the regression weight of each individual relationships. The result confirmed that H1a, H1b, H2, H3, H4, H5a and H5b were accepted (* p-value < 0.1, ** p-value < 0.05, *** p-value < 0.01).

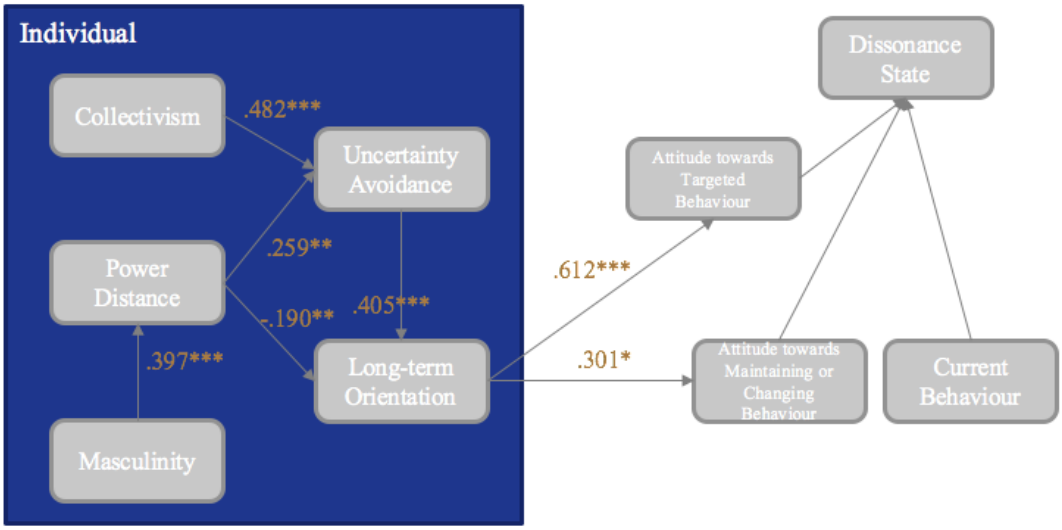

Figure 6.4: Validated Model – Individual Core Value vs 3D-RAB

The validity of the SEM structural model (step 6) was confirmed as shown in table 6.9. All the fit indexes were deemed to be at an acceptable value except CFI and GFI, which was slightly below the recommended value. This is not considered, however, to be a significant problem, as GFI is not considered essential by all researchers.

Table 6.9: SEM Model Fit Index

Indicators	Hair et al. (2009)	Bagozzi and Yi (2012)	This Model
χ^2			
CMIN/DF			1.50
RMSEA	<.08	<=.07	.060
SRMR	<.08	<=.07	.067
CFI	>.95	>=.93	.900
GFI	>.9		.863

A satisfactory result was obtained using SEM analysis. In the following section the moderating effects from technology type and gender will be discussed.

6.6.4 Assess Moderating Effects

In this section, the moderating effects of technology type and gender were evaluated – see H6a and H6b on figure 6.1. From the analysis, the result shows that technology type moderate the model with .90 significance level and p-value = 0.0755 (see table 6.10).

Table 6.10: Technology Type moderates the model at 90% significant level

	Overall model	Chi-square	df	p-value
Technology	Unconstrained	856.047	540	
	Fully constrained	888.16	562	
		32.113	22	**0.0755**

Gender moderates the model with .90 significance level and p-value = 0.0580 (see table 6.11).

Table 6.11: Gender moderates the model at 90% significant level

	Overall model	Chi-square	df	p-value
Gender	Unconstrained	939.256	540	
	Fully constrained	972.541	562	
		33.285	22	**0.0580**

Technology type and Gender, as moderators, have an effect on the relationship between: CO and UN, MA and PO, UN and LTO and LTO and ATTB. The regression weight of technology

type in both groups (i.e. nonmobile and mobile) and gender (male and female) are shown in table 6.12 and 6.13.

Table 6.12: Moderating Effect from Technology Type

Relationships	Non-mobile	Mobile
Uncertainty avoidance ← collectivism	.434	.577
Power distance ← masculinity	.430	.423
Long-term orientation ← uncertainty avoidance	.422	.316
Attitude towards targeted behaviour ← long-term orientation	.701	.387

Table 6.13: Moderating Effect from Gender

Relationships	Male	Female
Uncertainty avoidance ← collectivism	.521	.424
Power distance ← masculinity	.596	.337
Long-term orientation ← uncertainty avoidance	.457	.307
Attitude towards targeted behaviour ← long-term orientation	.607	.606

All the results from SEM analysis including moderating effects from technology type and gender were combined in figure 6.5.

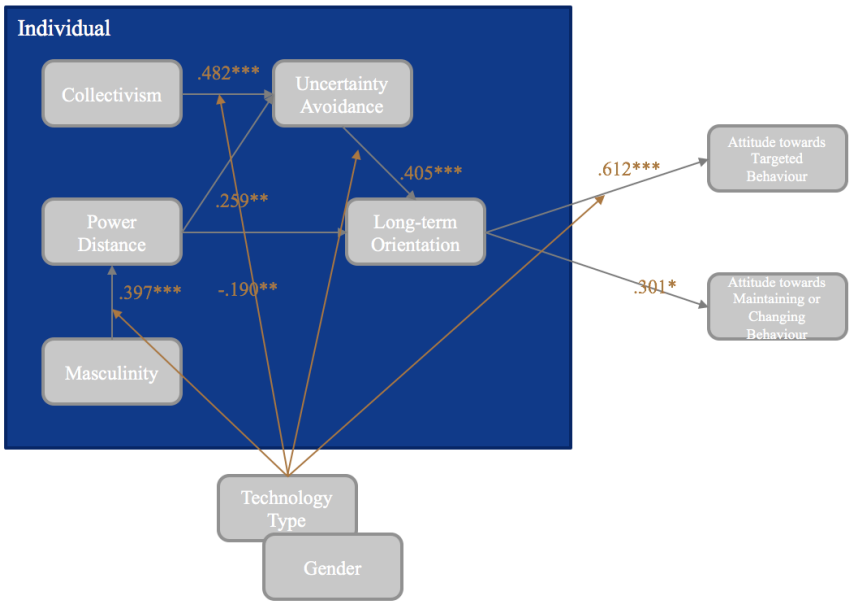

Figure 6.5: Moderating Effect – Technology (non-mobile, mobile), Gender (male, female)

Chapter 7
Conclusion, Contributions, and Future Work

This chapter concludes the research conducted and reported in chapters 2 to 6. In section 7.1, we present the reader with a clear summary of the work undertaken, with critical consideration of the research contributions, and future work. In section 7.2 we explicitly discuss the research contributions; separated into two categories, i.e. academic contributions and practical contribution. In section 7.3, we openly discuss the research limitations, and propose linked areas of future research.

7.1 Research Summary

In this section, we summarise the PhD research, considering each chapter in turn, and present the reader with a clear evaluation of the work undertaken.

7.1.1 Problem Definition

In chapter one, the research background and motivation was considered at an abstract level. We define the research problem, questions and activities, yet this only justified in detail within chapter two. The aim of chapter two was to focus on, and discuss, the relevant theories from literature concerning innovation use, adoption and diffusion. Innovation has many definitions: an approach that creates value/advantage (Oxford University Press, 2009); and idea practice, or object that is perceived as new by an individual or other unit of adoption (Rogers, 2003); innovation = creativity (Stokes & Wilson, 2010); technical application of theoretical ideas (Tidd & Bessant, 2009); innovation as a new outcome (Cevahir et al., 2013); innovation as a new approach (Joshi et al., 2010). Despite differences in definition it seems clear that within an organisation, innovation of limited value unless the innovation is accepted, adopted and/or used by the individuals within the organisation. Individuals often possess negative preconceptions; since implementation of new technologies may negatively impact both organisational structures, individual roles (Liang et al., 2007), and individual self-worth (Goodhue & Thompson, 1995). Accordingly, this research justified consideration of the impact of the individual on innovation adoption, and placed significant greater emphasis on user perception and social norms (Davis et al., 1989; Venkatesh et al., 2003).

To consider the impact of the individual on innovation adoption, the issue of innovation pattern was investigated. An adoption pattern, within this thesis was defined as the structure of the relationship that exists between organisations, individuals (a stakeholder within the organisation), and technologies; i.e. what defines the context of a future innovation adoption. Adoption pattern analysis focuses on explaining and breaking down the complexity of the adoption process; so that innovation adoption can be understood and encouraged within the organisations (Gallouj & Weinstein, 1997). Understanding innovation adoption patterns can provide useful information for decision makers concerning how to support the shift of activity towards positive adoption of innovation within an organisation (Adomavicius et al., 2008).

Innovation research speaks primarily into three significant domains, i.e. innovation use, innovation adoption, and innovation diffusion. Innovation usage relates to factors that influence usage behaviour. To understand innovation usage, we investigated existing innovation adoption theories, focusing on technology selection, adoption, and continuance stages. 'Selection' is the stage where an innovation is proposed to solve problems, and an agreement has to be reached. Adoption relates to the innovation being supported by the stakeholders in organisations. Continuance relates to the response given to the problems and effects as a result of the use of the innovation within daily business operations. In general literature focuses on individual technology adoption, e.g. Social Cognitive Theory (SCT) (Compeau & Higgins, 1995); Technology Acceptance Model (TAM) (Davis et al., 1989) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). Such theories, however, only focus on individual level adoption; ignoring the wider organisational level adoption and/or cultural factors. Since individual usage represents only a small proportion of the adoption context, and does not consider the organisational changes, relationship changes, and user dissonance that may be caused within the organisation as a result of a new innovation, an approach is needed that allows a wider appreciation of the organisational / individual issues. The conceptions of semiotics and semiosis (Peirce, 1931-35) introduced the idea that organisational perception, i.e. the value and benefits perceived from the new innovation, shown to influence individual adoption, is driven by alignment interpretation; in turn driven by organisational technical, formal, and informal norms (Stamper, 1993). Stamper (1993) proposed, within the semiotic onion, that an organisation can be seen as an information system. Informal norms, influenced by society, are facilitated, by development of formal structures, which subsequently result in the development/adoption of technology solutions that meet the

functional needs of the organisation. Technology and individuals can be seen as component parts of the organisational system, or alternatively as separate systems with distinct informal, formal, and technical norms. To the best our knowledge, there exists no models that facilitate alignment of organisational, individuals, and technology systems. To appreciate the individual, we introduced the work of Hall (1959), whose anthropological study considered the cultural root of difference in individual interpretation. Hall's work was central to the development of Stamper's, the first person to propose, and apply, the "crucial trio" concept, which defines processes into three different layers: formal, informal and technical (Hall, 1959, p. 66). Interestingly, however, Hall's layer definitions varied significantly. Hall, unlike Stamper, refers to the formal system as the core, which is defined by the core, largely unchangeable, beliefs and concepts learnt in early life. The informal level is the informal expression of these beliefs, which is then shaped into tangible structures of meaning; e.g. gestures, ideas of learning, social structures, expression of attitudes, allocation of tasks, etc. The technical level is the practical express of these informal structure, i.e. language, education, law, structure of government.

Hall's work emphasises that the individual, and their personal reaction to a new influence, is influenced by their learnt structures, which are often hard to change. Accordingly, Hall's work implies that two people, with very different beliefs, cultures, upbringing, education, and social expression, will find it hard to appreciate each other. Stamper's work largely on organisational IT development, and does not explicitly consider the impacting differences of individual.

Since no model, to the best of our knowledge, allows comparison of individual, technology and organisational the identified and justified research gap was to investigate adoption patterns and/or relationship structures that encourage positive individual adoption activities in organisations. Identifying such patterns gives us a better understanding of conflicts that are created between individuals, technologies, and organisational structures, as a result of technology and innovation adoption. The following research questions were identified:

RQ1 - What models identify new technology adoption misalignment?
RQ2 - What model and relationships will help to align?
RQ3 - How can we validate the model?
RQ4 - What framework would help to identify misalignment?
RQ5 - What factors would help to identify better technology adoption alignment?

7.1.2 Research Design and Methodology

Research philosophies and paradigms play an important role in bridging the gap between data and theory, and influence how the research is ultimately conducted. The aim of chapter 3 was to design the research by critically considering relevant research paradigm, methods and strategies. All research methods, designs and philosophies, were carefully researched, defined and selected, for the sole purpose of fulfilling the research questions, aim and activities. By initially considering the philosophical background, and the research paradigm, we were able to discuss, in context of the research question, relevant methods for obtaining and analysing data in our research.

The research aim is to investigate innovation adoption patterns and/or relationship structures that encourage positive individual adoption activities in organisations. Pragmatism was chosen as the research paradigm for this study and a mixed method approach was selected as the process for this research; since the mixed method approach was found to align suitably with the pragmatism paradigm. Mixed method approach, utilises both quantitative and qualitative methods, which differs from the multi-method approach, which tend to apply either but not both of the quantitative and qualitative techniques. Furthermore, these two methods can be used either in parallel or sequentially (Saunders et al., 2009).

This aim was broken into three activities: i) To identify a classification scheme to support innovation adoption pattern analysis; ii) To develop a framework, to identify, in context of business, potential conflict caused by technology adoption; iii) to investigate the relationship between innovations and individual factors, i.e. to support enhancement of the conceptual adoption model. Research strategies were selected to match the type of research being conducted (Saunders et al., 2009). Survey strategy and questionnaire technique was selected as the most appropriate and viable form for data collection, towards fulfilling the activities and answering the research questions. To answer research questions 1 - 3, a quantitative method was applied via use of a questionnaire. The questionnaire (see appendix A) was developed to include three parts: Part one contains relevant demographic questions and requested details about the respondents' profile, which included the CVScale (Yoo et al., 2011). Part two, referred individually to each technology. Part two set out to elicited the perception of each respondent towards an individual technology using the Kano model (Kano et al., 1984). Part 3 was specifically designed to validate the proposed model. Part 3 consisted of eight

operationalised questions, with the aim of obtaining views / opinions / perceptions of respondents to validate the proposed model. Structural Equation Modelling (SEM) was used to analyse and validate, the structural relationships between influencing factors. To answer RQ4, this study qualitatively validated the developed approach by utilising case studies. To answer RQ5, SEM was used to quantitatively evaluate the factors in relation with individual aspect.

7.1.3 Proposing the Dual Aspect Adoption Model

The aim of chapter four was to investigated innovation adoption patterns and/or the relationship structures that encourage positive individual adoption activities in organisations. We aim to address research questions RQ1, RQ2, and RQ3 i.e.: What models identify new technology adoption misalignment? What model and relationships will help to align? How can we validate the model?

To achieve this a classification scheme is required that facilitated consideration of the interaction between individuals, organisations, and/or technologies, in context of innovation adoption. Since it was important that systems aligned to the organisational perspective, the initial classification scheme, termed the dual-aspect model. The original dual aspect model was strongly influenced by Stamper's semiotic onion and Edward T. Hall's 'Crucial Trio Concept'; with two semiotic onions (Stamper, 1993) coming together; i.e. allowing us to investigate the interaction relationships that occur (see figure 7.1a).

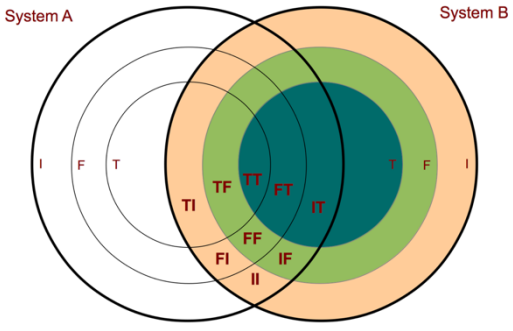

Figure 7.1a: Initial Dual Aspect Model

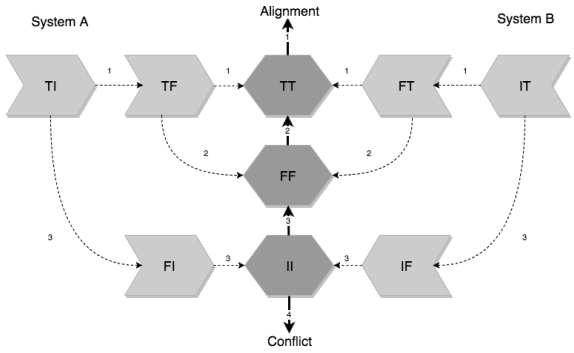

Figure 7.1b: Initial Dual Alignment Framework

Within this model, the research identified three adoption routes consisting of nine points of potential conflicts. By decomposing the dual-aspect model into these nine states (see figure 7.1b), we hoped to better understand the factors influencings misalignment between two interacting systems. We evaluated our classification scheme using a survey questionnaire. As

part of this questionnaire, we included consideration of individual cognitive dissonance (Festinger, 1962) and technology perception (Kano et al., 1984), to allow us quantitatively determine whether the individual's internal state was critical to systems alignment. Structured Equation Modelling (SEM) analysis was used to analyse the relationship between the classification scheme and individual attitude and perception, however empirical results did not match the meaning layers, and/or flow directions between layers, as defined in Stamper's semiotic onion. The findings highlighted that the order and flow between norms in Stamper's organisational semiotics onion is not evidenced within empirical data. Moreover, it soon became clear that the semiotic onion was unable to effectively represent individuals, preventing consideration of individuals as system; which was deemed as the core to the research problem.

To align with the results, we re-evaluated the work of Hall and proposed an alternative organisational onion, which was not focused on IT development, but systems (individuals, organisations, and technology) interaction and alignment. The new organisational onion (TFIC) consisted of four layers, i.e. technical (outer), formal, informal and concept (core), and significantly differs from the original Stamper's onion. To allow consideration of core beliefs (see table 7.1), as proposed in the formal layer of Halls, we included a new concept layer (C); to effectively consider individual cognitive dissonance state and technology perception. Although, we continued to used Stamper's layer definitions, as this allowed additional distinction between documented and undocumented formal structures, we changed the flow of direction between layers; i.e. so the core beliefs influence informal structure, which influence formal processes, which in turn influence use of technology (as expression in Hall, 1959). When tested, using SEM, this direction of flow matched empirical data, validating our model, and allowing consideration of interaction between any two systems (individual, organisational, or technical). Accordingly, the new version of the onion supports, and facilitates consideration of, interaction between individual, organisation and technology systems, and was validated by empirical questionnaire data.

Table 7.1: Comparison of Crucial Trio and Organisational Onion

	Hall's crucial trio	**Stamper's onion**
Layer 1 (core)	formal (f) - beliefs	Technical (T)– technology, software systems
Layer 2	informal (i) – behaviour, action	Formal (F) – written rules, processes
Layer 3 (outer)	technical (t) – logics, rules, processes	Informal (I) – meanings, intentions, beliefs

As well as validating our model, results showed that the importance given to the formal layer (i.e. the importance of documented formal structures) varied between companies, and that

formal structures were bypassed, i.e. technology was used informally even though not formally approved.

As a result of the changes to the onion (see figure 7.2a), the interaction points between conflicting systems needed changing to reflect the proposed TFIC layers.

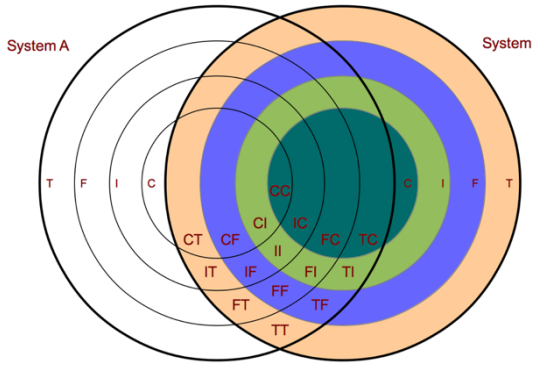

Figure 7.2a: Reshaped Dual Aspect Model

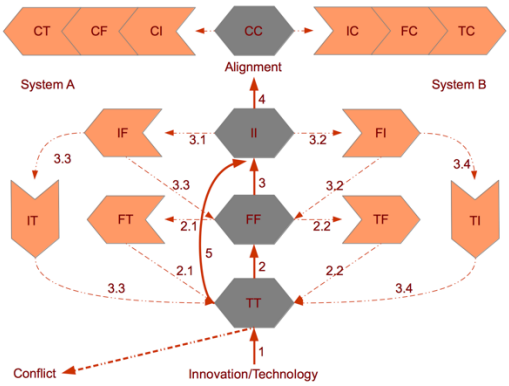

Figure 7.2b: Reverse Dual Alignment Framework

As a result of reshaping the dual aspect model, the dual alignment framework was also reshaped (see figure 7.2b); and seven new states were added due to the additional 'core' layer. The 'reverse dual alignment framework' was presented in our work, and an additional link (see link no. 5 in figure 7.2b) was proposed to facilitate consideration of the direct flow in the empirical data between the technical layer and the informal layer; caused as a result of organisational variation in the thickness of the formal layer.

We believe that creation of the reshaped dual-aspect addresses research questions **RQ1-2**, i.e.: What models identify new technology adoption misalignment? What model and relationships will help to align? This research was able to design the classification scheme to investigate the individual and organisation dimensions; i.e. by adopting and combining the layers of the organisational onion (Stamper, 1993), with the core layer and flow structure from Hall (1959). The reshaped dual aspect model and reverse dual alignment framework was validated using empirical data collection, thus satisfying **RQ3**, i.e. How can we validate the model?

The reverse dual alignment framework suggests that a number of steps are required to achieve complete systems alignment, however that total alignment at all levels may not be required, especially within business, if only formal and technical systems layers overlap. The first step is

technology misalignment/conflict, which highlights the technology customisation and amendment that is needed within systems A and B to reach alignment. The second step is process misalignment/conflict, which highlights the formal customisation and amendment that is needed in systems A and B to reach alignment. The third step is people's behaviour misalignment/conflict, which was assessed to observe whether any changes were required in informal processes in system A or B to reach alignment.

In addition, the research was also able to investigate, and evaluate, the classification scheme to show how individual cognitive dissonance and technology perception are effectively incorporated within the reshaped dual aspect model; at the core level. The research analysed the effects of technology alignment / conflict against individual cognitive dissonance. The analysis shows how individual cognitive dissonance impacts individual technology perception. By evaluating the interaction between systems, in connection with individual cognitive dissonance and individual technology perception, as a result from misalignment / conflict from those interactions, we argued that the newly found central layer, i.e. the Concept (C) layer allows us to reflect on how adopting technology relate to core individual/organisation beliefs. Assessing cognitive dissonance and technology perception therefore, helps us to explain internal processes in terms of conflict and satisfaction, and helps us to understand the interplay of organisational, individual and technology systems.

Interestingly, we believe that full alignment at the conceptual layer is not required within businesses. Stamper assumes that informal and formal systems have to be aligned if technologies can be aligned, but that does not reflect the experiences of the researcher in industry. The new alignment framework assumes that technology alignment can exist between two systems without having formal or informal alignment. Moreover, it suggests that even within an organisation alignment of different formal and informal systems may not be required for them to integrate technically. It is unlikely that conceptual alignment will occur within business systems, which means that focus should be placed on the nine lower states. Accordingly, consideration of these nine states are more functionally critical to obtaining TT, FF and II alignment within the organisation. If the systems are 'a technology' and 'an organisation', then technical, formal and informal alignment allow functional integration. If the systems are the integration of two people, or possibly an organisation and the person, in

consideration of the conceptual layer is possible, yet not essential; since two individuals do not have to align their belief systems before they are able to effectively work together.

7.1.4 Identifying Conflict from Technology adoption

The aim of chapter 5 was to develop a framework, to identify in context of business, potential aspect conflict impacting technology adoption; i.e. to support problem identification, communicate and support resolution of aspect conflict, and affiliate management of change. The research in this chapter aimed to address **RQ4**, i.e. What framework would help to identify misalignment? To achieve this aim, we presented the application of norm analysis and the business process model to help identify the potential conflicts from technology adoption.

The foundation of the concepts of norm relates to the documentation of behaviour. Accordingly, in table 5.1, a link was defined between the dual aspect model layers (technical, formal, informal and conceptual) and the related norm activity. Norms at each of these levels were then formed into detailed norm specifications (see table 5.2); based on the norms specification adapted from Liu and Dix (1997) and Stamper et al. (2000).

To investigate the relevant structures, identified in literature, and capture conflicts that arises from technology adoption, this framework adopted detailed norm specification (DNS) (Liu & Dix, 1997; Stamper et al., 2000; Liu & Li, 2015). We applied both a standard language to represent the organisational norms (Stamper et al., 1988), which was combined with an adapted version of business process modelling notations (BPMN) to visualise how multiple norms visually represent both the individual norms, and norm interaction (White, 2004). Unified Modelling Language (UML) class diagrams were also used to highlight potential conflict states (Selic, 2012), and BPMN was modified to represent the business norms, i.e. by adding annotation for three separate types of norms specifications (i.e. permitted, obliged, prohibited); enhancing the DNS to support direct BPMN conversion.

Using the classification scheme allowed us to highlight and understand, in context of the reshaped dual aspect model and the reverse dual alignment framework, conflicts that arise as a result of from innovation adoption. The research subsequently, using case examples, qualitative problem identification, conflict resolution, and management of change, can be contextually handled in a range of business contexts. Design science approach was applied to consider,

iteratively: i) identification of technical, formal, and informal norm conflicts; ii) a need to customise the norm specification format (as defined by Liu & Dix, 1997; Stamper et al., 2000); and iii) enhancing existing modelling notation to support visualisation, and hence communication to management, of norm conflicts. By adapting the norm specification format, see table 5.8, and/or by using, and extending, common business methods, i.e. BPMN / UML components and norm analysis, the thesis presents a framework that can be used to help capture and manage aspect conflicts.

The framework, see figure 5.9, was validated via the use of relevant case study examples of systems conflict. Accordingly this research was able to answer to the research question **RQ4:** What framework would help to identify misalignment?

The research expanded our understanding of the technology adoption conflicts, i.e. by developing a framework for identifying alignment conflicts. Within the framework, detailed norms specification was applied, and enhanced, to represent the detailed interaction between two systems; where system made represent organisations, technology and/or individuals. The framework was then validated through the use of relevant case studies.

It is worth critically noting, that there could be an issue when applying the Norm Capturing Framework, as the framework only allows us to capture explicit activities, and therefore is not able to represent conceptual norms; as only technical, formal and informal norm activities are documented. As the framework compares two norm snapshots, it primarily acts to highlight high-level potential conflicts, and does not practically consider capture of individual internal dimensions; additional work is required to consider and incorporate the individual dimension. A specific instrument needs to be incorporated that captures conceptual norms, e.g. 3D-RAB or Kano model; implying a need to develop an appropriate structured questionnaire.

7.1.5 Assessing Individual and Technology Variation

The research in chapter sixe considered how individual factors impact innovation adoption in business, which allowed us to be able to answer the research question **RQ5:** What factors would help to identify better technology adoption alignment? To investigate the relationship between innovation adoption and individual factors, we considered demographic and individual cultural aspects, i.e. whether individual difference impacts the likelihood of aspect conflict and

innovation adoption problems. This investigation supports and enhancement understanding of the concept (C) layer in the reshaped dual aspect model. By employing CVScale, 3D-RAB and Kano model, i.e. to investigate the relationship between innovation, technology and the individual dimensions, we show the importance of the individual's concept layer on user behavioural activity. By adopting structural equation modelling (SEM) this research confirmed that individual dimensions influence the individual's cognitive dissonance state, i.e. the individual's attitude towards target behaviour and the individual's attitude towards changing / maintaining behaviour. SEM was also used to investigate and report how technology type affects the relationship between individual cultural dimensions and individual cognitive dissonance states.

To enhance the conceptual innovation adoption model by considering individual culture, this study was broken down into three activities. Activity 3.1 investigates the relationship between innovation, technology and individual cultural dimension; defining hypotheses (H1-H4) which reflect the relationship between Hofstede's five individual dimensions (assuming individual use via application of the CV Scale). The SEM analysis confirms that long-term orientation (LTO) was confirmed as the main mediator between the other four individual dimensions (PO, UN, CO and MA). Activity 3.2 investigates how individual dimensions influence the individual in cognitive dissonance states; such as the attitude towards target behaviour and attitude towards changing / maintaining behaviour, by defining hypotheses (H5a and H5b), which reflect the relationship between long-term orientation (LTO) and attitude towards targeted behaviour (ATTB) and attitude towards maintaining or changing behaviour (ATCMB). ATTB and ATCMB factors are the indicators of individual cognitive dissonance state. The SEM analysis confirms that LTO have relationship with ATTB and ATCMB. Activity 3.3 investigates how technology type affects the relationship between individual dimensions and individual cognitive dissonance state, by defining hypotheses (H6a and H6b) that investigate the moderation effects of technology type, genders. The SEM analysis confirmed that not only do the five CVScale individual cultural dimensions, from Hofstede's national dimensions influence individual attitude or perception, but that biographical factors i.e. gender, and external factors i.e. technology type, have moderating effects. This result means that there are possibilities to include other factors in consideration of innovation adoption that might influence individual attitude and perception.

The research investigated the impact of individuals by applying the CVScale, which captures Hofstede's five cultural dimensions enhanced for measurement at the individual level. The result from SEM analysis shows that long-term orientation (LTO), influences the attitude towards targeted behaviour (ATTB) and the attitude towards changing non-target and/or maintaining current target behaviour (ATCMB); sub factors of individual cognitive dissonance. Moreover, it was shown that gender and technology type has a moderating effect on the relationship between LTO and ATTB.

7.2 Research Contributions

Research contributions are separated into two categories, i.e. academic and practical in nature. This thesis, as a whole, provides a significant contribution to the existing innovation literature by proposing the reshaped dual aspect approach; validating the norm ordering used in Edward T. Hall's 'Crucial Trio Concept'; highlighting a link between business innovation and individual cognitive dissonance and the individual dimensions. In terms of an academic contribution, the research provides a debate concerning the existing innovation literature; combining consideration of individual, organisational and technology aspects to support explanation and prediction within the innovation process. The reshaped dual aspect model, and the reversed dual alignment framework, emphasise the focus on consideration of the interplay of organisational, individual and technological aspects in the innovation process. The new organisational onion contributes to the literature concerning organisational structure, as the new onion support interactions between systems; and is not only limited to consideration of technical and/or organisational systems. In terms of practical contribution, practitioners can apply the developed framework to guide their gap analysis process, and apply the bundled framework as a guidance towards detailed analysis, towards detecting possible conflicts arising from innovation adoption. The practical contribution, from this thesis, is that business users can fundamentally apply the framework for analysis of their current systems, and identify potential conflicts and changes that must be implemented to support innovation adoption. This framework can be considered as a method for capturing and highlighting conflict in the innovation adoption process.

7.3 Limitations and Future Work

In the following sections, we critically identify limitations to the research, and highlight areas that have been defined, throughout the research thesis, as areas for possible future research.

Data Capture: Context, Domain, and Sector

The research result is dependent on the data collected; i.e. from a range of computer and development experts working in Thailand. Although this context was carefully selected, due to their interest in innovation development and/or the regular turnover of technology within this domain/country, it is important to critically comment that the context of data collection is narrow. Individuals with a technical background, particularly those developing technologies, are more likely to be positive attitude towards technology adoption and/or use. Although this should not influence the dependent relationships between technical, formal, informal, and conceptual layers, additional future research is required to extend and compare participant samples. Inclusion of individuals for a range of industrial domains, and from a number of countries, would be encouraged, as this would allow differences in the country and/or industrial domain to be considered. We hypothesise that although dependencies between norm layers would remain consistent, the importance (i.e. the thickness) of layers may vary significantly; in line with discussions raised by Lewin (1936). Appreciation of difference, as a result of nationality and/or domain, would support a fuller understanding of whether conflicts in technology adoption is a localised of a global focused concern.

Organisational / System Type

Although data was captured from a range of SMEs, information about the business context was neither explicitly captured and/or included as part of data analysis. Consideration of the business type, domain, context, and inclusion of such information within the analysis would have helped the researchers appreciate whether variation exists in the fitness of the reshaped dual aspect model within different organisations.

Considerable future work is required to look at how the reshaped dual aspect model, and reverse dual alignment framework can be practically used, and whether variation exists as a result of the systems type and/or level of systems overlap. What are the functional implications of different levels of systems overlap. i.e. technical alignment only versus formal/technical alignment versus informal/formal/technical alignment. Does type of conflict (informal, formal, technical) influence the change of resolution? Does system type influence whether resolution is possible in that system? Does domain and/or organisational structure influence ability to achieve alignment as a result of technical innovation?

Although these, and many more questions need to be considered in the future, the defined reshaped dual aspect model, and reverse dual alignment framework, provide an excellent structure and framework for consideration of these questions.

Individual difference

Although personal (i.e. age, gender) and individual difference (personal culture) has been considered as part of this research, numerous other individual difference dimension remains unconsidered. It is clear from this research that the conceptual layer is important. Accordingly, it can be argued that additional research is required to investigate whether personal and individual differences (e.g. personality, information processing style, ability levels, job role, social background, ethical and morality attitudes) influence technology adoption. If we are able to identify if personal and individual difference influences technology adoption, then we can either adapt technology and/or adjust complementary assets to support adoption to support certain clusters of individuals. By personalising the adoption process for different individuals / stakeholder groups, we hope to increase adoption and manage business change.

Research Instrument – SEM

In this research, Structure Equation Modelling (SEM) was used to analyse and validate, the structural relationships between influencing factors. SEM, often called LISREL (Linear Structural Relations) models allows us to consider the dependency relationship between variable. SEM, due to its ability to combine statistical procedures, is sometimes seen as overly complex, making the methodology hard to understand. Data processing, cleaning, and/or reprocessing is seen as a complicated, making SEM appear an abstract; despite the fact that clear definition of the model and/or sample is critical to model validation success. Model hypothesis is sometimes misunderstood and confused by readers as relating to the research hypothesis, and results must be interpreted in context of the defined model.

Questionnaire

A questionnaire was used to empirically validate. However, there is limitation in Q06. People will need to change the way that they work once the technology is adopted in place, which could imply technical and formal but might be not informal. It will depend on how people see the way they work. This will depend on the amount of informal rules people use in their work environment. Many people will think it relates to process and possible event the existing technical rules within a process. It depends if people were asked as a user of the new system

or an onlooker or other stakeholder (if we ask an IT professional, this depends on technology flexibility and role and freedom). It seems to be expected here that this to refer to informal. To ensure this is the case, an indisputable element of the informal aspect must be added, to be certain of capturing this relationship.

Evaluation of the Norm Capturing Framework

The norm capturing framework, proposed in chapter 5, proposes an analysis process (case study text, norms activities, process models, conflict situation), which captures an overview of actor/system activity. This activity can be used to classify activity as technical, formal and informal, and can help highlight the independence of norms; reconciling what changes that are needed to accomplish full alignment. Although the norm capturing framework was evaluated in this work using a range of relevant case studies, additional evaluation, and validation would be welcomed. Consideration across a wider range of situations would allow the framework to be developed for practical use, and use within practical domains.

Conceptual Alignment

In our proposed reverse alignment framework, only technical, formal and informal alignments are required to achieve ideal alignment. The conceptual alignment is arguably optional for organisations and/or technology, and is only required when the interaction involves an individual aspect. There could be a situation that the ideal alignment is achieved between a technology and an organisation, but later on, the technology is discontinued. Discontinuance would happen, in this example, because the conceptual alignment was ignored, i.e. the product was no longer believed to be strategically critical to the business of the supplier. This example situation stresses that benefit could be gained by incorporating investigation of conceptual alignment for technology and organisation aspects – accordingly development of a method for evaluating and comparing conceptual norms is required.

In addition, since the position of routing states have changed, as a result of adding the concept (C) layer and/or reshaping dual aspect model, routing questionnaire questions would need to be redesign/mapped to allow effective capture of routing states; thus, facilitating practical use future use of the reversed alignment framework.

Capturing Conceptual Norm

The proposed norm capturing framework only allows capturing of explicit activities; i.e. technical, formal and informal norm activities. In order to capture conceptual norm activities, a specific instrument is needed e.g. 3D-RAB or Kano model. These methods, however, were neither originally designed to, and/or evaluated for, use capturing and comparing conceptual norms. In addition, the framework considers comparison of two contextual snapshots to highlight potential conflicts, which implies comparison of conceptual norms (beliefs/attitudes) is not possible unless the individual is already in that state; which cannot be guaranteed. Further investigation is required to determine how conceptual norm can be captured, compared and predicted to support the underlining potential conflicts.

Exploring Other Factors affecting Individuals

In this research, we investigated the impact of individual cultural dimensions, however there are numerous of other possible instruments, such as personality, which may be directly and/or indirectly influential on user behaviour. The implication was confirmed by the results in chapter six that biographical factors i.e. gender, and external factors i.e. technology type, have a moderating (indirect) effects on individual attitudes and perceptions – considerable work is required to understand the interplay of individual factors and so that organisations can provide supporting environments, via formal, informal, and technical changes, to encourage effective innovation adoption.

References

Abbasi, M. S., Tarhini, A. and Hassouna, M. (2015) 'Social, Organizational, Demography and Individuals' Technology Acceptance Behaviour: A Conceptual Model', *European Scientific*, vol. 11, no. 9, pp. 48–76.

Adomavicius, G., Bockstedt, J. C., Gupta, A. and Kauffman, R. J. (2008) 'Making Sense of Technology Trends in the Information Technology Landscape: A Design Science Approach', *MIS Quarterly*, vol. 32, no. 4, pp. 779–809.

Agerfalk, J., P., Aakhus, M., Lind and M. (2008) 'What Kind of Pragmatism in Information Systems Research?', *In AIS Special Interest Group on Pragmatist IS Research, Inaugural Meeting in Conjunction with the Twenty Ninth International Conference on Information Systems*, vol. 8, Paris, France, pp. 3–8.

Ajzen, I. (1991) 'The Theory of Planned Behavior', *Organizational Behavior and Human Decision Processes*, vol. 50, no. 2, pp. 179–211.

Albuloushi, N. and Algharaballi, E. (2014) 'Examining the Influence of the Cultural Aspect of Uncertainty Avoidance on Supply Chain Coordination', *Journal of Applied Business Research*, vol. 30, no. 3, pp. 847–862.

An, D. and Kim, S. (2007) 'Relating Hofstede's Masculinity Dimension to Gender Role Portrayals in Advertising', *International Marketing Review*, vol. 24, no. 2, pp. 181–207.

An, D. T. M., Van Minh, H., Huong, L. T., Giang, K. B., Xuan, L. T. T., Hai, P. T., Nga, P. Q. and Hsia, J. (2013) 'Knowledge of the Health Consequences of Tobacco Smoking: A Cross-Sectional Survey of Vietnamese Adults', *Global Health Action*, vol. 6, pp. 1–9.

Anuwichanont, J. (2010) 'Examining the Relationship between Commitment and Airline Loyalty and the Moderating Effect of Uncertainty Avoidance', *Journal of Business & Economics Research*, vol. 8, no. 9, pp. 127–137.

Arbuckle, J. L. (2012) 'IBM SPSS Amos 21 User's Guide', *IBM Corp* [Online]. Available at: ftp://public.dhe.ibm.com/software/analytics/spss/documentation/amos/21.0/en/Manuals/IBM_SPSS_Amos_Users_Guide.pdf (Accessed 29 February 2016).

Avgerou, C. (2008) 'Information Systems in Developing Countries: A Critical Research Review', *Journal of Information Technology*, vol. 23, no. 3, pp. 133–146.

Bagozzi, R. P. (2011) 'Measurement and Meaning in Information Systems and Organizational Research: Methodological and Philosophical Foundations', *MIS Quarterly*, vol. 35, no. 2, pp. 261–292.

Bagozzi, R. P. and Yi, Y. (2012) 'Specification, Evaluation, and Interpretation of Structural Equation Models', *Academy of Marketing Science Journal*, vol. 40, no. 1, pp. 8–34.

Bao, G., Zhang, Z. and Chen, J. (2015) 'The Mediation of in-Group Identification between Collectivism and Knowledge Sharing', *Innovation : Management, Policy & Practice*, vol. 17, no. 3, pp. 341–363.

Baptista, G. and Oliveira, T. (2015) 'Understanding Mobile Banking: The Unified Theory of Acceptance and Use of Technology Combined with Cultural Moderators', *Computers in Human Behavior*, vol. 50, pp. 418–430.

Baregheh, A., Rowley, J. and Sambrook, S. (2009) 'Towards a Multidisciplinary Definition of Innovation', *Management Decision*, vol. 47, no. 8, pp. 1323–1339.

Begley, T. M., Lee, C., Fang, Y. and Li, J. (2002) 'Power Distance as a Moderator of the Relationship between Justice and Employee Outcomes in a Sample of Chinese Employees', *Journal of Managerial Psychology*, vol. 17, no. 7/8, pp. 692–711.

Beynon-Davies, P. (2013) *Business Information Systems*, 2nd ed. Basingstoke, Hampshire, Palgrave Macmillan.

Bhattacherjee, A. (2001) 'Understanding Information Systems Continuance: An Expectation-Confirmation Model', *MIS Quarterly*, vol. 25, no. 3, pp. 351–370.

Bluedorn, A. C. (1998) 'An Interview with Anthropologist Edward T. Hall', *Journal of Management Inquiry*, vol. 7, no. 2, pp. 109–115.

Blunch, N. J. (2013) *Introduction to Structural Equation Modeling using IBM SPSS Statistics and Amos*, 2nd ed. SAGE Publications.

Brambilla, M., Fraternali, P. and Vaca, C. (2012) 'BPMN and Design Patterns for Engineering Social BPM Solutions', In Daniel, F., Barkaoui, K., and Dustdar, S. (eds.), *Business Process Management Workshops*, Lecture Notes in Business Information Processing, Springer Berlin Heidelberg, vol. 99, pp. 219–230.

Braun, V. and Clarke, V. (2006) 'Using Thematic Analysis in Psychology', *Qualitative Research in Psychology*, vol. 3, no. 2, pp. 77–101.

Brooks, I. (2009) *Organisational Behaviour: Individuals, Groups and Organisation*, 4th ed. Harlow, Essex, Pearson Education Limited.

Bysted, R. (2013) 'Innovative Employee Behaviour', *European Journal of Innovation Management*, vol. 16, no. 3, pp. 268–284.

Carlo, J. L., Lyytinen, K. and Rose, G. M. (2011) 'Internet Computing as a Disruptive Information Technology Innovation: The Role of Strong Order Effects', *Information Systems Journal*, vol. 21, no. 1, pp. 91–122.

Cevahir, U., Kumar, R., Kimzan, H. S. and Eminoglu, G. (2013) 'Role of Innovation in the Relationship between Organizational Culture and Firm Performance', *European Journal of Innovation Management*, vol. 16, no. 1, pp. 92–117.

Chai-Arayalert, S. and Nakata, K. (2013) 'Semiotic Approach to A Practice-Oriented Knowledge Transfer', In Liu, K., Li, W., and Gulliver, S. R. (eds.), *14th International Conference on Informatics and Semiotics in Organisation (ICISO 2013)*, Sweden.

Chatterjee, S., Atav, G., Min, J. and Taylor, D. (2014) 'Choosing the Sure Gain and the Sure Loss: Uncertainty Avoidance and the Reflection Effect', *The Journal of Consumer Marketing*, vol. 31, no. 5, pp. 351–359.

Chaudron, M. R. V., Heijstek, W. and Nugroho, A. (2012) 'How Effective Is UML Modeling?', *Software & Systems Modeling*, Springer-Verlag, vol. 11, no. 4, pp. 571–580.

Chiarakul, T. and Igel, B. (2016) 'Integrating "Tech and Touch" to Achieve Widespread Internet Banking Acceptance in Asian Cultures: The Case of Thailand', *Social Science Research Network* [Online]. Available at SSRN: http://ssrn.com/abstract=2724984 (Accessed 06 October 2016).

Cho, S., Mathiassen, L. and Gallivan, M. (2009) 'Crossing the Diffusion Chasm: From Invention to Penetration of a Telehealth Innovation', *Information Technology & People*, vol. 22, no. 4, pp. 351–366.

Chui, A. C. W. and Kwok, C. C. Y. (2008) 'National Culture and Life Insurance Consumption', *Journal of International Business Studies*, vol. 39, no. 1, p. 88.

Clemons, E. K. (2010) 'The Power of Patterns and Pattern Recognition When Developing Information-Based Strategy', *Journal of Management Information Systems*, vol. 27, no. 1, pp. 69–96.

Cohen, L., Manion, L. and Morrison, K. (2011) *Research Methods in Education*, 7th (ed.), London, Routledge.

Compeau, D. R., Higgins, C. A. and Huff, S. (1999) 'Social Cognitive Theory and Individual Reactions to Computing Technology: A Longitudinal Study', *MIS Quarterly*, vol. 23, no. 2, pp. 145–158.

Compeau, D. R. and Higgins, C. A. (1995) 'Computer Self-Efficacy: Development of a Measure and Initial Test', *MIS Quarterly*, vol. 19, no. 2, p. 189.

Creswell, J. W. (2009) *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, 3rd ed. Thousand Oak, CA, SAGE Publications.

Cronbach, L. J. (1951) 'Coefficient Alpha and the Internal Structure of Tests', *Psychometrika*, vol. 16, no. 3, pp. 297–334.

Crossan, M. M. and Apaydin, M. (2010) 'A Multi-Dimensional Framework of Organizational Innovation: A Systematic Review of the Literature', *Journal of Management Studies*, vol. 47, no. 6, pp. 1154–1191.

Cruz, E. F., Machado, R. J. and Santos, M. Y. (2015) 'Bridging the Gap between a Set of Interrelated Business Process Models and Software Models', *In ICEIS 2015 - 17th International Conference on Enterprise Information Systems*, vol. 2, pp. 338–345.

Damanpour, F. (1991) 'Organizational Innovation: A Meta-Analysis of Effects of Determinants and Moderators', *Academy of Management journal. Academy of Management*, vol. 34, no. 3, pp. 555–590.

Davis, F. D., Bagozzi, R. P. and Warshaw, P. R. (1989) 'User Acceptance of Computer Technology: A Comparison of Two Theoretical Models', *Management Science*, vol. 35, no. 8, pp. 982–1003.

Davis, F. D., Bagozzi, R. P. and Warshaw, P. R. (1992) 'Extrinsic and Intrinsic Motivation to Use Computers in the Workplace', *Journal of Applied Social Psychology*, vol. 22, no. 14, pp. 1111–1132.

Dawes, J. G. (2008) 'Do Data Characteristics Change according to the Number of Scale Points Used? An Experiment Using 5 Point, 7 Point and 10 Point Scales', *International Journal of Market Research*, vol. 51, no. 1, pp. 61–77.

Duffield, S. and Whitty, S. J. (2016) 'How to Apply the Systemic Lessons Learned Knowledge Model to Wire an Organisation for the Capability of Storytelling', *International Journal of Project Management*, vol. 34, no. 3, pp. 429–443.

Easterby-Smith, M., Thorpe, R. and Jackson, P. R. (2012) *Management Research*, SAGE Publications.

Erden, N. S. (2013) 'Power Distance Leads to Corporate Grapevine: The Mediating Role of Perceptions of Uncertainty', *Multidisciplinary Journal of Educational Research*, vol. 5, no. 1, pp. 95–104.

Fabrizio, K. R. (2009) 'Absorptive Capacity and the Search for Innovation', *Research Policy*, vol. 38, no. 2, pp. 255–267.

Festinger, L. (1962) *A Theory of Cognitive Dissonance*, London, Tavistock Publications.

Fichman, R. G. (2004) 'Going Beyond the Dominant Paradigm for Information Technology Innovation Research: Emerging Concepts and Methods', *Journal of the Association for Information Systems*, vol. 5, no. 8, pp. 314–355.

Fichman, R. G. and Melville, N. P. (2014) 'How Posture-Profile Misalignment in IT Innovation Diminishes Returns: Conceptual Development and Empirical Demonstration', *Journal of Management Information Systems*, vol. 31, no. 1, pp. 203–240.

Finkelstein, M. A. (2012) 'Individualism/Collectivism and Organizational Citizenship Behavior: An Integrative Framework', *Social Behavior and Personality*, vol. 40, no. 10, pp. 1633–1643.

Fishbein, M. and Ajzen, I. (1975) *Belief, Attitude, Intention and Behavior : An Introduction to Theory and Research*, Reading, Mass. ; London, Addison-Wesley.

Gallivan, M. J. (1995) 'Reskilling IS Professionals: Individual and Organizational Adaptation to Software Process Innovations', *In Proceedings of the 1995 ACM SIGCPR conference on Supporting Teams, Groups, and Learning Inside and Outside the IS Function Reinventing IS*, ACM, pp. 103–116.

Gallivan, M. J. (2001) 'Organizational Adoption and Assimilation of Complex Technological Innovations: Development and Application of a New Framework', *Database for Advances in Information Systems*, vol. 32, no. 3, pp. 51–85.

Gallivan, M. J. (2003) 'The Influence of Software Developers' Creative Style on Their Attitudes to and Assimilation of a Software Process Innovation', *Information & Management*, vol. 40, no. 5, pp. 443–465.

Gallouj, F. and Weinstein, O. (1997) 'Innovation in Services', *Research Policy*, vol. 26, no. 4–5, pp. 537–556.

Gefen, D., Straub, D. and Boudreau, M.-C. (2000) 'Structural Equation Modeling and Regression: Guidelines for Research Practice', *Communications of the Association for Information Systems*, vol. 4, pp. 1–76.

Gire, J. T. (1997) 'The Varying Effect of Individualism-Collectivism on Preference for Methods of Conflict Resolution', *Canadian Journal of Behavioural Science*, vol. 29, no. 1, pp. 38–43.

Goldkuhl, G. (2004) ‘Meanings of Pragmatism: Ways to Conduct Information Systems Research’, *In Proceedings of the 2nd International Conference on Action in Language, Organisations and Information Systems (ALOIS)*, Linkoping University, Linkoping.

Goldkuhl, G. (2012) ‘Pragmatism vs Interpretivism in Qualitative Information Systems Research’, *European Journal of Information Systems*, vol. 21, no. 2, pp. 135–146.

Goodhue, D. L. and Thompson, R. L. (1995) ‘Task-Technology Fit and Individual Performance’, *MIS Quarterly*, vol. 19, no. 2, pp. 213–233.

Gregor, S. (2006) ‘The Nature of Theory in Information Systems’, *MIS Quarterly*, vol. 30, no. 3, pp. 611–642.

Gundlach, M., Zivnuska, S. and Stoner, J. (2006) ‘Understanding the Relationship between Individualism-Collectivism and Team Performance through an Integration of Social Identity Theory and the Social Relations Model’, *Human Relations*, vol. 59, no. 12, pp. 1603–1632.

Gupta, A. K., Tesluk, P. E. and Taylor, M. S. (2007) ‘Innovation at and across Multiple Levels of Analysis’, *Organization Science*, vol. 18, no. 6, pp. 885–897.

Hair, J. F., Black, W. C., Babin, B. J. and Anderson, R. E. (2009) *Multivariate Data Analysis*, 7th ed. Upper Saddle River, New Jersey, Pearson Prentice Hall.

Hall, E. T. (1959) The Silent Language, New York, Doubleday.

Hall, E. T. (1998) ‘Three Domains of Culture and the Triune Brain’, In Niemeier, S., Campbell, C. P., and Dirven, R. (eds.), *The Cultural Context in Business Communication*, Amsterdam, John Benjamins Publishing Company, pp. 13–30.

He, H. (2015) ‘Virtual Resource Provision Based on Elastic Reservation in Cloud Computing’, *International Journal of Networking and Virtual Organisations*, vol. 15, no. 1, p. 30.

Hevner, A. R., March, S. T., Park, J. and Ram, S. (2004) ‘Design Science in Information Systems Research’, *MIS Quarterly*, vol. 28, no. 1, pp. 75–105.

Hofstede, G. (2001) *Culture’s Consequences: Comparing Values, Behaviors, Institutions and Organizations across Nations*, Thousand Oaks, California, SAGE Publications.

Hofstede, G. and Bond, M. H. (1988) ‘The Confucius Connection: From Cultural Roots to Economic Growth’, *Organizational Dynamics*, vol. 16, no. 4, pp. 5–21.

Hofstede, G., Hofstede, G. J. and Minkov, M. (2010) *Cultures and Organizations: Software of the Mind*, McGraw-Hill Education.

Hofstede, G. and Regout, I. (1996) 'Riding the Waves of Commerce: A Test of Trompenaars' "Model" of National Culture Differences', *International Journal of Intercultural Rrelations: IJIR*, vol. 20, no. 2, pp. 189–198.

House, R. J., Hanges, P. J., Javidan, M., Dorfman, P. W. and Gupta, V. (2004) *Culture, Leadership, and Organizations : The GLOBE Study of 62 Societies*, Thousand Oaks, California, Sage Publications.

Hoyle, R. H. (1995) 'The Structural Equation Modeling Approach: Basic Concepts and Fundamental Issues', In Hoyle, R. H. (ed.), *Structural Equation Modeling: Concepts, Issues, and Applications*, London, Sage Publications.

Hwang, Y. (2005) 'Investigating Enterprise Systems Adoption: Uncertainty Avoidance, Intrinsic Motivation, and the Technology Acceptance Model', *European Journal of Information Systems*, vol. 14, no. 2, pp. 150–161.

Jacobs, A. and Nakata, K. (2012) 'Organisational Semiotics Methods to Assess Organisational Readiness for Internal Use of Social Media', *In AMCIS 2012 Proceedings*, Seattle, Washington.

Ji, Y., Zhou, E., Li, C. and Yan, Y. (2015) 'Power Distance Orientation and Employee Help Seeking: Trust in Supervisor as a Mediator', *Social Behavior and Personality*, vol. 43, no. 6, pp. 1043–1054.

Joshi, K. D., Chi, L., Datta, A. and Han, S. (2010) 'Changing the Competitive Landscape: Continuous Innovation Through IT-Enabled Knowledge Capabilities', *Information Systems Research*, vol. 21, no. 3, pp. 472–495,655–656.

Kaganer, E., Pawlowski, S. D. and Wiley-Patton, S. (2010) 'Building Legitimacy for IT Innovations: The Case of Computerized Physician Order Entry Systems', *Journal of the Association for Information Systems*, vol. 11, no. 1, pp. 1–33.

Kano, N., Seraku, N., Takahashi, F. and Tsuji, S. (1984) 'Attractive Quality and Must-Be Quality', *Journal of the Japanese Society for Quality Control*, vol. 14, no. 2, pp. 147–156.

Kapoor, K. K., Dwivedi, Y. K. and Williams, M. D. (2014) 'Rogers' Innovation Adoption Attributes: A Systematic Review and Synthesis of Existing Research', *Information Systems Management*, vol. 31, no. 1, pp. 74–91.

Kawabata, M. (2013) 'Is Collectivism Good for Health Promotion? Experiences of Day Labourers in Japan', *Global Health Promotion*, vol. 20, no. 4, pp. 44–51.

Khan, S. R., Bashir, M., Saqib, S., Abbas, G. and Nazir, N. (2015) 'Impact of Supervisory Support on Organizational Commitment in the Presence of Power Distance: A Quantitative Study of Textile Sector of Faisalabad, Pakistan', *International Journal of Information, Business and Management*, vol. 7, no. 4, pp. 259–270.

Kim, J., Lee, S., Geum, Y. and Park, Y. (2012) 'Patterns of Innovation in Digital Content Services: The Case of App Store Applications', *Innovation: Management, Policy & Practice*, vol. 14, no. 4, pp. 540–556.

Kim, Y. (2011) 'Understanding Green Purchase: The Influence of Collectivism, Personal Values and Environmental Attitudes, and the Moderating Effect of Perceived Consumer Effectiveness', *Seoul Journal of Business*, vol. 17, no. 1, pp. 65–92.

Komarraju, M., Dollinger, S. J. and Lovell, J. L. (2008) 'Individualism-Collectivism in Horizontal and Vertical Directions as Predictors of Conflict Management Styles', *International Journal of Conflict Management*, vol. 19, no. 1, pp. 20–35.

Koslowsky, M., Baharav, H. and Schwarzwald, J. (2011) 'Management Style as a Mediator of the Power Distance-Influence Tactics Relationship', *International Journal of Conflict Management*, vol. 22, no. 3, pp. 264–277.

Kuhn, T. S. (1996) *The Structure of Science Revolutions*, 3rd ed. London, The University of Chicago Press.

Kushnareva, E., Rychkova, I. and Le Grand, B. (2015) Modeling Business Processes for Automated Crisis Management Support: Lessons Learned, June. Rolland C., Anagnostopoulos D., Loucopoulos P., and Gonzales-Perez C. (eds.), *IEEE Computer Society*, vol. 2015-June.

Leach-López, M. A. (2013) 'Moderating Effect of Hofstede's Cultural Values on the Locus of Control/Job Performance Relationship of Managers in USA, Mexico, South Korea and Hong Kong', *Journal of Business Strategies*, vol. 30, no. 1, pp. 15–34.

Le Bas, C., Mothe, C. and Nguyen-Thi, T. U. (2015) 'The Differentiated Impacts of Organizational Innovation Practices on Technological Innovation Persistence', *European Journal of Innovation Management*, vol. 18, no. 1, p. 110.

Lee, J. A., Garbarino, E. and Lerman, D. (2007) 'How Cultural Differences in Uncertainty Avoidance Affect Product Perceptions', *International Marketing Review*, vol. 24, no. 3, pp. 330–349.

Lewin, K. (1936) 'Some Social-Psychological Differences Between the United States and Germany', *Journal of Personality*, vol. 4, no. 4, pp. 265–293.

Liang, H., Saraf, N., Hu, Q. and Xue, Y. (2007) 'Assimilation of Enterprise Systems: The Effect of Institutional Pressures and the Mediating Role of Top Management', *MIS Quarterly*, vol. 31, no. 1, pp. 59–87.

Limayem, M., Sabine Gabriele, H. and Cheung, C. M. K. (2007) 'How Habit Limits the Predictive Power of Intention: The Case of Information Systems Continuance', *MIS Quarterly*, vol. 31, no. 4, pp. 705–737.

Lim, K. H., Leung, K., Sia, C. L. and Matthew, K. O. L. (2004) 'Is eCommerce Boundary-Less? Effects of Individualism-Collectivism and Uncertainty Avoidance on Internet Shopping', *Journal of International Business Studies*, vol. 35, no. 6, pp. 545–559.

Litvin, S. W., Crotts, J. C. and Hefner, F. L. (2004) 'Cross-Cultural Tourist Behaviour: A Replication and Extension Involving Hofstede's Uncertainty Avoidance Dimension', *International Journal of Tourism Research*, vol. 6, no. 1, pp. 29–37.

Liu, K. and Dix, A. (1997) 'Norm Governed Agents in CSCW', *In the 1st International Workshop on Computational Semiotics*, Pole Universitaire Leonard de Vinci, Paris - La Defense - France.

Liu, K. and Li, W. (2015) *Organisational Semiotics for Business Informatics*, Abingdon, UK, Routledge.

Liu, S.-M. and Liao, J.-Q. (2013) 'Transformational Leadership and Speaking Up: Power Distance and Structural Distance as Moderators', *Social Behavior and Personality*, vol. 41, no. 10, pp. 1747–1756.

Li, W., Liu, K., Yang, H. and Yu, C. (2014) 'Integrated Clinical Pathway Management for Medical Quality Improvement-Based on a Semiotically Inspired Systems Architecture', *European Journal of Information Systems*, vol. 23, no. 4, pp. 400–417.

Lyytinen, K. and Damsgaard, J. (2001) 'What's Wrong with the Diffusion of Innovation Theory?', In Ardis, M. and Marcolin, B. (eds.), *Diffusing Software Product and Process Innovations*, IFIP — The International Federation for Information Processing, Springer US, vol. 59, pp. 173–190.

Magnusson, P., Peterson, R. and Westjohn, S. A. (2014) 'The Influence of National Cultural Values on the Use of Rewards Alignment to Improve Sales Collaboration', *International Marketing Review*, vol. 31, no. 1, pp. 30–50.

Mangalaraj, G., Mahapatra, R. and Nerur, S. (2009) 'Acceptance of Software Process Innovations - The Case of Extreme Programming', *European Journal of Information Systems*, vol. 18, no. 4, pp. 344–354.

Martin, J. and Fellenz, M. (2010) *Organizational Behaviour & Management*, 4th ed. Andover, Hampshire, Cengage Learning EMEA.

Maruping, L. M., Venkatesh, V. and Agarwal, R. (2009) 'A Control Theory Perspective on Agile Methodology Use and Changing User Requirements', *Information Systems Research*, vol. 20, no. 3, pp. 377–399.

McCoy, S., Galletta, D. F. and King, W. R. (2007) 'Applying TAM across Cultures: The Need for Caution', *European Journal of Information Systems*, vol. 16, no. 1, pp. 81–90.

McLeod, L. and Macdonell, S. G. (2011) 'Factors That Affect Software Systems Development Project Outcomes: A Survey of Research', *ACM Computing Surveys*, vol. 43, no. 4, pp. 24.1–24.56.

Meyer, J.-U. (2014) 'Strengthening Innovation Capacity through Different Types of Innovation Cultures', *Technology Innovation Management Review*, vol. 4, no. 12, pp. 6–16.

Mustonen-Ollila, E. and Lyytinen, K. (2003) 'Why Organizations Adopt Information System Process Innovations: A Longitudinal Study Using Diffusion of Innovation Theory', *Information Systems Journal*, vol. 13, no. 3, pp. 275–297.

Myers, M. D. and Tan, F. B. (2003) 'Beyond Models of National Culture in Information Systems Research', *Advanced Topics in Global Information Management*, vol. 2, pp. 14–29.

Nadhrah, N. and Michell, V. (2014) 'Workarounds: Risk or Benevolence for Patient Safety?', *In Healthcare Administration: Concepts, Methodologies, Tools, and Applications*, vol. 1, pp. 285–322.

Odekerken-Schroder, G., De Wulf, K. and Hofstee, N. (2002) 'Is Gender Stereotyping in Advertising More Prevalent in Masculine Countries? A Cross-National Analysis', *International Marketing Review*, vol. 19, no. 4/5, pp. 408–419.

Onita, C. and Dhaliwal, J. (2011) 'Alignment within the Corporate IT Unit: An Analysis of Software Testing and Development', *European Journal of Information Systems*, vol. 20, no. 1, pp. 48–68.

Oxford University Press (2009) *A Dictionary of Business and Management* - Online, Oxford, Oxford University Press.

Parboteeah, K. P., Hoegl, M. and Cullen, J. B. (2008) 'Managers' Gender Role Attitudes: A Country Institutional Profile Approach', *Journal of International Business Studies*, vol. 39, no. 5, pp. 795–813.

Park, H., Rehg, M. T. and Lee, D. (2005) 'The Influence of Confucian Ethics and Collectivism on Whistleblowing Intentions: A Study of South Korean Public Employees', *Journal of Business Ethics: JBE*, vol. 58, no. 4, pp. 387–403.

Parveen, F., Jaafar, N. I. and Ainin, S. (2015) 'Social Media Usage and Organizational Performance: Reflections of Malaysian Social Media Managers', *Telematics and Informatics*, vol. 32, no. 1, pp. 67–78.

Peirce, C. S. (1931-35) *The Collected Papers of Charles Sanders Peirce*, Cambridge, MA, Harvard University Press.

Prasongsukarn, K. (2009) 'Validating the Cultural Value Scale (CVSCALE): A Case Study of Thailand', *ABAC Journal*, vol. 29, no. 2, pp. 1–13.

Purohit, Y. S. and Simmers, C. A. (2006) 'Power Distance and Uncertainty Avoidance: A Cross-National Examination of Their Impact on Conflict Management Modes', *International Journal of Business and Systems Research*, vol. 5, no. 1, pp. 1–19.

Rhee, J., Dedahanov, A. and Lee, D. (2014) 'Relationships Among Power Distance, Collectivism, Punishment, and Acquiescent, Defensive, or Prosocial Silence', *Social Behavior and Personality*, vol. 42, no. 5, pp. 705–720.

Riemer-Reiss, M. L. and Wacker, R. R. (2000) 'Factors Associated with Assistive Technology Discontinuance among Individuals with Disabilities', *Journal of Rehabilitation*, vol. 66, no. 3, pp. 44–50.

Roberts, N., Galluch, P. S., Dinger, M. and Grover, V. (2012) 'Absorptive Capacity and Information Systems Research: Review, Synthesis, and Directions for Future Research', *MIS Quarterly*, vol. 36, no. 2, pp. 625–648.

Robertson, C. J. and Hoffman, J. J. (2000) 'How Different Are We? An Investigation of Confucian Values in the United States', *Journal of Managerial Issues*, vol. 12, no. 1, pp. 34–47.

Rogers, E. M. (1995) *Diffusion of Innovations*, Fourth edition. New York, Free Press.

Rogers, E. M. (2003) *Diffusion of Innovations*, Fifth edition. New York, Free Press.

Sarker, S., Sarker, S., Sahaym, A. and Bjørn-Andersen, N. (2012) 'Exploring Value Cocreation in Relationships between an ERP Vendor and Its Partners: A Revelatory Case Study', *MIS Quarterly*, vol. 36, no. 1, pp. 317–338.

Saunders, M., Lewis, P. and Thornhill, A. (2009) *Research Methods for Business Students*, 5th ed. Harlow, Essex, FT Prentice Hall.

Scott, S. G. and Bruce, R. A. (1994) 'Determinants of Innovative Behavior: A Path Model of Individual Innovation in the Workplace', *The Academy of Management Journal*, vol. 37, no. 3, pp. 580–607.

Seale, C. (2011) *Researching Society and Culture*, Thousand Oaks, California, Sage Publications, Inc.

Selic, B. (2012) 'The Less Well Known UML', In Bernardo, M., Cortellessa, V., and Pierantonio, A. (eds.), *Formal Methods for Model-Driven Engineering*, Lecture Notes in Computer Science, Springer Berlin Heidelberg, pp. 1–20.

Shah, A. (2012) 'Uncertainty Avoidance Index and Its Cultural/Country Implications Relating to Consumer Behavior', *International Journal of Business and Systems Research*, vol. 11, no. 1, pp. 119–134.

Singh, S. (2006) 'Cultural Differences In, and Influences On, Consumers' Propensity to Adopt Innovations', *International Marketing Review*, vol. 23, no. 2, pp. 173–191.

Sorrells, K. (1998) 'Gifts of Wisdom: An Interview with Dr. Edward T. Hall', *The Edge: The E-Journal of Intercultural Relations*, vol. 1, no. 3, pp. 1–12.

Stamper, R. (1988) 'Analysing the Cultural Impact of a System', *International Journal of Information Management*, vol. 8, no. 2, pp. 107–122.

Stamper, R., Althans, K. and Backhouse, J. (1988) 'MEASUR: Method for Eliciting, Analysing and Specifying User Requirements', In Olle, T. W., Verrijn Stuart, A. A., and Bhabuta, L. (eds.), *Computerized Assistance during the Information Systems Life Cycle*, Amsterdam ; Oxford, North-Holland, p. xvi, 539p. : ill. ; 24 cm.

Stamper, R. K. (1973) *Information in Business and Administrative Systems*, London: Batsford and New York: Wiley.

Stamper, R. K. (1993) 'A Semiotic Theory of Information and Information Systems', *In Invited papers for the ICL/University of Newcastle Seminar on 'Information'*.

Stamper, R. K., Liu, K. and Huang, K. (1994) 'Organisational Morphology in Re-Engineering', *In the Second European Conference on Information Systems*, Nijenrode.

Stamper, R., Liu, K., Hafkamp, M. and Ades, Y. (2000) 'Understanding the Roles of Signs and Norms in Organizations - a Semiotic Approach to Information Systems Design', *Behaviour & Information Technology*, vol. 19, no. 1, pp. 15–27.

StataCorp (2015) 'Stata Structural Equation Modeling Reference Manual Release 14', College Station, Texas, A Stata Press Publication [Online]. Available at: http://www.stata.com/manuals14/sem.pdf (Accessed 29 July 2016).

Stokes, D. and Wilson, N. (2010) *Small Business Management and Entrepreneurship*, Cengage Learning.

Sun, L., Liu, K., Jambari, D. I. and Michell, V. (2014) 'Evaluating Business Value of IT towards Optimisation of the Application Portfolio', *Enterprise Information Systems*, pp. 1–22.

Swaidan, Z. (2012) 'Culture and Consumer Ethics', *Journal of Business Ethics: JBE*, vol. 108, no. 2, pp. 201–213.

Swanson, E. B. and Ramiller, N. C. (2004) 'Innovating Mindfully with Information Technology', *MIS Quarterly*, vol. 28, no. 4, pp. 553–583.

Swanson, E. B. and Wang, P. (2005) 'Knowing Why and How to Innovate with Packaged Business Software', *Journal of Information Technology*, vol. 20, no. 1, p. 20.

Tang, L. (2012) 'The Direction of Cultural Distance on FDI: Attractiveness or Incongruity?', *Cross Cultural Management*, vol. 19, no. 2, pp. 233–256.

Tang, L. and Koveos, P. E. (2008) 'A Framework to Update Hofstede's Cultural Value Indices: Economic Dynamics and Institutional Stability', *Journal of International Business Studies*, vol. 39, no. 6, pp. 1045–1063.

Tehrani, J., Liu, K. and Michell, V. (2012) 'Ontology Modeling for Generation of Clinical Pathways', *Journal of Industrial Engineering and Management*, vol. 5, no. 2, pp. 442–456.

Thomas, K. W. (1992) 'Conflict and Conflict Management: Reflections and Update', *Journal of Organizational Behavior*, vol. 13, no. 3, p. 265.

Thomson, G. (2012) 'BYOD: Enabling the Chaos', *Network Security*, vol. 2012, no. 2, pp. 5–8.

Tidd, J. and Bessant, J. (2009) *Managing Innovation: Integrating Technological, Market and Organizational Change*, 4th ed. West Sussex, England, John Wiley & Sons.

Trompenaars, F. (1993) *Riding the Waves of Culture*, London, Nicholas Brealey Publishing.

Venkatesh, V. and Bala, H. (2008) 'Technology Acceptance Model 3 and a Research Agenda on Interventions', *Decision Sciences*, vol. 39, no. 2, pp. 273–315.

Venkatesh, V., Brown, S. A. and Bala, H. (2013) 'Bridging the Qualitative-Quantitative Divide: Guidelines for Conducting Mixed Methods Research in Information Systems', *MIS Quarterly*, vol. 37, no. 1, pp. 21–54.

Venkatesh, V. and Davis, F. D. (2000) 'A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies', *Management Science*, vol. 46, no. 2, p. 186.

Venkatesh, V. and Morris, M. G. (2000) 'Why Don't Men Ever Stop to Ask for Directions? Gender, Social Influence, and Their Role in Technology Acceptance and Usage Behavior', *MIS Quarterly*, vol. 24, no. 1, pp. 115–139.

Venkatesh, V., Morris, M. G., Davis, G. B. and Davis, F. D. (2003) 'User Acceptance of Information Technology: Toward a Unified View', *MIS Quarterly*, vol. 27, no. 3, pp. 425–478.

Venkatesh, V., Thong, J. Y. L. and Xu, X. (2012) 'Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology', *MIS Quarterly*, vol. 36, no. 1, pp. 157–178.

Vidgen, R. and Wang, X. (2009) 'Coevolving Systems and the Organization of Agile Software Development', *Information Systems Research*, vol. 20, no. 3, pp. 355–376.

Wang, P. (2009) 'Popular Concepts beyond Organizations: Exploring New Dimensions of Information Technology Innovations', *Journal of the Association for Information Systems*, vol. 10, no. 1, pp. 1–30.

Wang, X., Conboy, K. and Pikkarainen, M. (2012) 'Assimilation of Agile Practices in Use', *Information Systems Journal*, vol. 22, no. 6, pp. 435–455.

Wastell, D. G., McMaster, T. and Kawalek, P. (2007) 'The Rise of the Phoenix: Methodological Innovation as a Discourse of Renewal', *Journal of Information Technology*, vol. 22, no. 1, 59–68.

Wennekers, S., Thurik, R., André van, S. and Noorderhaven, N. (2007) 'Uncertainty Avoidance and the Rate of Business Ownership across 21 OECD Countries, 1976-2004', *Journal of Evolutionary Economics*, vol. 17, no. 2, pp. 133–160.

White, S. A. (2004) 'Introduction to BPMN', *IBM Corporation* [Online]. Available at: https://www.ibm.com/developerworks/community/files/basic/anonymous/api/library/7624eb5a-089a-41bf-9b71-b3c33739e18d/document/e908d328-7b50-40e3-8107-70af4e6bb48f/media (Accessed 5 September 2016).

Wiafe, I. (2012) 'A Framework for Analysing, Designing and Evaluating Persuasive Technologies', *PhD Thesis*, University of Reading.

Wiafe, I., Nakata, K., Moran, S. and Gulliver, S. (2011) 'Considering User Attitude and Behaviour in Persuasive Systems Design: The 3D-RAB Model', *In ECIS, Helsinki, Finland* [Online]. Available at: http://aisel.aisnet.org/ecis2011/186.

Wickert, C., Vaccaro, A. and Cornelissen, J. (2015) '"Buying" Corporate Social Responsibility: Organisational Identity Orientation as a Determinant of Practice Adoption', *Journal of Business Ethics: JBE*, Springer Netherlands, pp. 1–18.

Wright, G. H. von (1963) *Norm and Action : A Logical Enquiry, London*, Routledge & Kegan Paul.

Wu, J. and Lu, X. (2013) 'Effects of Extrinsic and Intrinsic Motivators on Using Utilitarian, Hedonic, and Dual-Purposed Information Systems: A Meta-Analysis', *Journal of the Association for Information Systems*, vol. 14, no. 3, pp. 153–191.

Xu, Q., Jiao, R. J., Yang, X., Helander, M., Khalid, H. M. and Opperud, A. (2009) 'An Analytical Kano Model for Customer Need Analysis', *Design Studies*, vol. 30, no. 1, pp. 87–110.

Yeniyurt, S. and Townsend, J. D. (2003) 'Does Culture Explain Acceptance of New Products in a Country? An Empirical Investigation', *International Marketing Review*, vol. 20, no. 4, pp. 377–396.

Yin, R. K. (2014) *Case Study Research : Design and Methods*, Fifth edition. Thousand Oaks, California, SAGE.

Yi, Z. (2013) 'Power Distance in Online Learning: Experience of Chinese Learners in U.S. Higher Education', *International Review of Research in Open and Distance Learning*, vol. 14, no. 4.

Yoo, B., Donthu, N. and Lenartowicz, T. (2011) 'Measuring Hofstede's Five Dimensions of Cultural Values at the Individual Level: Development and Validation of CVSCALE', *Journal of International Consumer Marketing*, vol. 23, no. 3–4, pp. 193–210.

Yousfi, A., Bauer, C., Saidi, R. and Dey, A. K. (2016) 'UBPMN: A BPMN Extension for Modeling Ubiquitous Business Processes', *Information and Software Technology*, vol. 74, pp. 55–68.

Zhang, Q. (2005) 'Immediacy, Humor, Power Distance, and Classroom Communication Apprehension in Chinese College Classrooms', *Communication Quarterly*, vol. 53, no. 1, pp. 109–124.

Zhang, S., Liu, W. and Liu, X. (2012) 'Investigating the Relationship Between Protestant Work Ethic and Confucian Dynamism: An Empirical Test in Mainland China', *Journal of Business Ethics: JBE*, vol. 106, no. 2, pp. 243–252.

Zhu, K., Kraemer, K. L. and Xu, S. (2006) 'The Process of Innovation Assimilation by Firms in Different Countries: A Technology Diffusion Perspective on E-Business', *Management Science*, vol. 52, no. 10, pp. 1557–1576.

Appendix A

A1. Questionnaire – English Version

Information Sheet and Consent Form

Dear Participants,

Thank you for agreeing to participate in my research under the supervision of Dr Stephen R. Gulliver at the University of Reading. The objective of the study is to investigate innovation pattern and relationship structures in Thai companies to propose positive activities for knowledge workers (practitioners). To accomplish this study, I am conducting a case study with companies in Thailand. The study will be based on structured interviews with organisation members like yourself. In order to achieve sufficient accuracy for my analysis, I would like to record the interview with a digital device. All data collected will be treated confidentially and privacy of participants is secured.

Your participation is entirely voluntary and you have the right to withdraw from the study at any time, without any detriment. If you agree to take part in the study, please sign the consent below and return it to me. I confirm that this study has been reviewed by the School of Management Research Ethics Committee and has been given a favourable ethical opinion for conduct. Please provide your email address if you would like to receive the results of the research. Also do not hesitate to email w.nadee@pgr.reading.ac.uk for any issues regarding this interview.

Best Regards,

Winai Nadee
Business Informatics, Systems & Accounting
Henley Business School | University of Reading | Whiteknights | READING RG6 6UD | UK
Email: w.nadee@pgr.reading.ac.uk

.....Participant part.....

I have received a copy of this consent form:

Name: .....

Signature: .....

Date: .....

No. _____
Date _____
Start _____ End_____
Interviewer _____
Editor _____

Part 1

	Demographic Information	
D01	Name	_____
D02	Gender	_____ Male _____ Female
D03	Age	_____ year(s)
D04	Organisation	_____
D05	Position/organizational title	_____
D06	Experience in the organisation	_____ year(s) _____ month(s)
D07	Experience in the industry	_____ year(s) _____ month(s)
D08	Email	_____
D09	Telephone	_____

	Power distance		Strongly disagree		Strongly agree
PO1	People in higher positions should make most decisions without consulting people in lower positions.	_____	1	⟷	10
PO2	People in higher positions should not ask the opinions of people in lower positions too frequently.	_____	1	⟷	10
PO3	People in higher positions should avoid social interaction with people in lower positions.	_____	1	⟷	10
PO4	People in lower positions should not disagree with decisions by people in higher positions.	_____	1	⟷	10
PO5	People in higher positions should not delegate important tasks to people in lower positions.	_____	1	⟷	10
	Uncertainty avoidance				
UN1	It is important to have instructions spelled out in detail so that I always know what I'm expected to do.	_____	1	⟷	10
UN2	It is important to closely follow instructions and procedures.	_____	1	⟷	10
UN3	Rules and regulations are important because they inform me of what is expected of me.	_____	1	⟷	10
UN4	Standardized work procedures are helpful.	_____	1	⟷	10
UN5	Instructions for operations are important.	_____	1	⟷	10
	Collectivism				
CO1	Individuals should sacrifice self-interest for the group (either at school or the work place).	_____	1	⟷	10
CO2	Individuals should stick with the group even through difficulties.	_____	1	⟷	10
CO3	Group welfare is more important than individual rewards.	_____	1	⟷	10
CO4	Group success is more important than individual success.	_____	1	⟷	10
CO5	Individuals should only pursue their goals after considering the welfare of the group.	_____	1	⟷	10
CO6	Group loyalty should be encouraged even if individual goals suffer.	_____	1	⟷	10
	Masculinity				
MA1	It is more important for men to have a professional career than it is for women.	_____	1	⟷	10
MA2	Men usually solve problems with logical analysis; women usually solve problems with intuition.	_____	1	⟷	10
MA3	Solving difficult problems usually requires an active, forcible approach, which is typical of men.	_____	1	⟷	10
MA4	There are some jobs that a man can always do better than a woman.	_____	1	⟷	10

	Long-term Orientation	 Extremely unimportant	 Extremely important
LT1	Careful management of money (Thrift)	_____ 1 ⟷	10
LT2	Going on resolutely in spite of opposition (Persistence)	_____ 1 ⟷	10
LT3	Personal steadiness and stability	_____ 1 ⟷	10
LT4	Long-term planning	_____ 1 ⟷	10
LT5	Giving up today's fun for success in the future	_____ 1 ⟷	10
LT6	Working hard for success in the future	_____ 1 ⟷	10

	Information of adopting of recently adopted technology in your organisation (innovation profile) - IT system (i.e. ERP, CRM, BPM) or communication device (smart phone, tablet, wearable device) for improving performance at work or any new form of working with technology i.e. marketing via social media
I01	Please identify the current on-going technology adoption project(s) and what is the main purpose of the adoption(s)? (The answer could be more than one technology)

	Technology	Purposes
1		
2		
3		

Please answer the questions in part 2 according to the identified technologies in I01 (remember that 1 technology per one instance of part 2)

Part 2 Questionnaire will have multiple occurrences according to the number of technologies in I01.

Questions according to the technology in I011.

		I like it	I expect it	I am neutral	I can tolerate it	I dislike it
KN01	How do you describe your perception regarding the implementation of this technology?					
KN02	How do you describe your perception if your company do not implement this technology?					

		 Strongly disagree		 Strongly agree
R01	I find using this technology is an interesting activity.	_____	1 ⟷	10
R02	I like the benefits of using this technology.	_____	1 ⟷	10
R03	To me, using this technology is a good way of improving efficiency.	_____	1 ⟷	10
R04	I have use this technology before.	_____	1 ⟷	10
	If disagree with R04, please skip the following questions and then go to R09.			
R05	I would continue using this technology as a regular activity.	_____	1 ⟷	10
R06	I believe that using this technology is now a part of my daily life.	_____	1 ⟷	10
R07	I am not certain that I will continue to use this technology.	_____	1 ⟷	10
R08	I believe I am capable of using this technology.	_____	1 ⟷	10
R09	I believe it would be difficult for me to use this technology.	_____	1 ⟷	10
R10	For me to use this technology is extremely difficult.	_____	1 ⟷	10
R11	For me I am sure it would be easy to use this technology.	_____	1 ⟷	10

	Issue - Pathway	 Strongly disagree		 Strongly agree
Q01	The new technology can be fully used in the organisation.	_____	1 ⟷	10
Q01.1	If you ***DISAGREE*** with Q01, please specify issue(s) or problem(s) that cause the customisation.	_____		
Q02	The new technology is required to be customised as it doesn't fit well at the first place.	_____	1 ⟷	10
Q02.1	If you ***AGREE*** with Q02, please specify issue(s) or problem(s) that cause the customisation.	_____		
Q03	The existing technology is required to be customised to be compatible with the adopting technology.	_____	1 ⟷	10
Q03.1	If you ***AGREE*** with Q03, please specify issue(s) or problem(s) that cause the customisation.	_____		
Q04	The new process is required to change to fit with the current business system.	_____	1 ⟷	10
Q04.1	If you ***AGREE*** with Q04, please specify issue(s) or problem(s) that cause the change of the new process.	_____		
Q05	The existing process is required to change to support the new adopting process.	_____	1 ⟷	10
Q05.1	If you ***AGREE*** with Q05, please specify issue(s) or problem(s) that cause the change of the existing process.	_____		
Q06	People will need to change their way they work once the technology is adopted in place.	_____	1 ⟷	10
Q06.1	If you ***AGREE*** with Q06, please specify issue(s) or problem(s) that cause the change of people's way.	_____		
Q07	Interaction with the adopting technology is required to be customised to minimise impacts to people's behaviour.	_____	1 ⟷	10
Q07.1	If you ***AGREE*** with Q07, please specify issue(s) or problem(s) that cause the customisation.	_____		
Q08	People won't use the new adopting technology at all.	_____	1 ⟷	10

	Issue - Pathway	 Strongly disagree	 Strongly agree
Q08.1	If you ***AGREE*** with Q08, please specify issue(s) or problem(s) that cause people to not use the new adopting technology.	_____	

Part 2 Questionnaire will have multiple occurrences according to the number of technologies in I01.

Questions according to the technology in I012.

		I like it	I expect it	I am neutral	I can tolerate it	I dislike it
KN01	How do you describe your perception regarding the implementation of this technology?					
KN02	How do you describe your perception if your company do not implement this technology?					

		 Strongly disagree		 Strongly agree
R01	I find using this technology is an interesting activity.	_____	1 ⟷	10
R02	I like the benefits of using this technology.	_____	1 ⟷	10
R03	To me, using this technology is a good way of improving efficiency.	_____	1 ⟷	10
R04	I have use this technology before.	_____	1 ⟷	10
	If disagree with R04, please skip the following questions and then go to R09.			
R05	I would continue using this technology as a regular activity	_____	1 ⟷	10
R06	I believe that using this technology is now a part of my daily life.	_____	1 ⟷	10
R07	I am not certain that I will continue to use this technology.	_____	1 ⟷	10
R08	I believe I am capable of using this technology.	_____	1 ⟷	10
R09	I believe it would be difficult for me to use this technology.	_____	1 ⟷	10
R10	For me to use this technology is extremely difficult.	_____	1 ⟷	10
R11	For me I am sure it would be easy to use this technology.	_____	1 ⟷	10

	Issue - Pathway	 Strongly disagree		 Strongly agree
Q01	The new technology can be fully used in the organisation.	_____	1 ⟷	10
Q01.1	If you ***DISAGREE*** with Q01, please specify issue(s) or problem(s) that cause the customisation.	_____		
Q02	The new technology is required to be customised as it doesn't fit well at the first place.	_____	1 ⟷	10
Q02.1	If you ***AGREE*** with Q02, please specify issue(s) or problem(s) that cause the customisation.	_____		
Q03	The existing technology is required to be customised to be compatible with the adopting technology.	_____	1 ⟷	10
Q03.1	If you ***AGREE*** with Q03, please specify issue(s) or problem(s) that cause the customisation.	_____		
Q04	The new process is required to change to fit with the current business system.	_____	1 ⟷	10
Q04.1	If you ***AGREE*** with Q04, please specify issue(s) or problem(s) that cause the change of the new process.	_____		
Q05	The existing process is required to change to support the new adopting process.	_____	1 ⟷	10
Q05.1	If you ***AGREE*** with Q05, please specify issue(s) or problem(s) that cause the change of the existing process.	_____		
Q06	People will need to change their way they work once the technology is adopted in place.	_____	1 ⟷	10
Q06.1	If you ***AGREE*** with Q06, please specify issue(s) or problem(s) that cause the change of people's way.	_____		

	Issue - Pathway	Strongly disagree		Strongly agree
Q07	Interaction with the adopting technology is required to be customised to minimise impacts to people's behaviour.	_____ 1	⟷	10
Q07.1	If you ***AGREE*** with Q07, please specify issue(s) or problem(s) that cause the customisation.	_____		
Q08	People won't use the new adopting technology at all.	_____ 1	⟷	10
Q08.1	If you ***AGREE*** with Q08, please specify issue(s) or problem(s) that cause people to not use the new adopting technology.	_____		

Part 2 Questionnaire will have multiple occurrences according to the number of technologies in I01.

Questions according to the technology in I013.

		I like it	I expect it	I am neutral	I can tolerate it	I dislike it
KN01	How do you describe your perception regarding the implementation of this technology?					
KN02	How do you describe your perception if your company do not implement this technology?					

		Strongly disagree		Strongly agree
R01	I find using this technology is an interesting activity.	_____ 1	⟷	10
R02	I like the benefits of using this technology.	_____ 1	⟷	10
R03	To me, using this technology is a good way of improving efficiency.	_____ 1	⟷	10
R04	I have use this technology before.	_____ 1	⟷	10
	If disagree with R04, please skip the following questions and then go to R09.			
R05	I would continue using this technology as a regular activity	_____ 1	⟷	10
R06	I believe that using this technology is now a part of my daily life.	_____ 1	⟷	10
R07	I am not certain that I will continue to use this technology.	_____ 1	⟷	10
R08	I believe I am capable of using this technology.	_____ 1	⟷	10
R09	I believe it would be difficult for me to use this technology.	_____ 1	⟷	10
R10	For me to use this technology is extremely difficult.	_____ 1	⟷	10
R11	For me I am sure it would be easy to use this technology.	_____ 1	⟷	10

	Issue - Pathway	Strongly disagree		Strongly agree
Q01	The new technology can be fully used in the organisation.	_____ 1	⟷	10
Q01.1	If you ***DISAGREE*** with Q01, please specify issue(s) or problem(s) that cause the customisation.	_____		
Q02	The new technology is required to be customised as it doesn't fit well at the first place.	_____ 1	⟷	10
Q02.1	If you ***AGREE*** with Q02, please specify issue(s) or problem(s) that cause the customisation.	_____		
Q03	The existing technology is required to be customised to be compatible with the adopting technology.	_____ 1	⟷	10
Q03.1	If you ***AGREE*** with Q03, please specify issue(s) or problem(s) that cause the customisation.	_____		
Q04	The new process is required to change to fit with the current business system.	_____ 1	⟷	10
Q04.1	If you ***AGREE*** with Q04, please specify issue(s) or problem(s) that cause the change of the new process.	_____		
Q05	The existing process is required to change to support the new adopting process.	_____ 1	⟷	10

	Issue - Pathway	 Strongly disagree	 Strongly agree
Q05.1	If you ***AGREE*** with Q05, please specify issue(s) or problem(s) that cause the change of the existing process.	_____	
Q06	People will need to change their way they work once the technology is adopted in place.	_____ 1	10
Q06.1	If you ***AGREE*** with Q06, please specify issue(s) or problem(s) that cause the change of people's way.	_____	
Q07	Interaction with the adopting technology is required to be customised to minimise impacts to people's behaviour.	_____ 1	10
Q07.1	If you ***AGREE*** with Q07, please specify issue(s) or problem(s) that cause the customisation.	_____	
Q08	People won't use the new adopting technology at all.	_____ 1	10
Q08.1	If you ***AGREE*** with Q08, please specify issue(s) or problem(s) that cause people to not use the new adopting technology.	_____	

A2. Questionnaire – Thai Version

Information Sheet and Consent Form

เรียน ผู้เข้าร่วมให้ข้อมูลวิจัย,

ขอขอบคุณที่ตกลงที่จะมีส่วนร่วมในการวิจัยของข้าพเจ้า ภายใต้การดูแลของ Dr Stephen R. Gulliver จาก University of Reading วัตถุประสงค์ของการศึกษาคือ to investigate innovation pattern and relationship structures in Thai companies to propose positive activities for knowledge workers (practitioners) เพื่อให้บรรลุการศึกษาครั้งนี้ ข้าพเจ้าจะทำการรวิจัยกรณีศึกษากับหลาย ๆ บริษัทในประเทศไทย การศึกษาจะต้องขึ้นอยู่กับการออกแบบสอบถาม และสัมภาษณ์ กับ พนักงาน/ผู้บริหารของหลาย ๆ องค์กร เช่น ตัวท่านเอง และเพื่อให้บรรลุความถูกต้อง และเพียงพอสำหรับการวิเคราะห์ของข้าพเจ้า ๆ อาจจะต้องมีการ บันทึกการให้สัมภาษณ์ (ถ้ามี)กับอุปกรณ์ดิจิตอล ทั้งนี้ ข้อมูลทั้งหมดที่เก็บรวบรวมจะได้รับการรักษาความลับ เพื่อความเป็นส่วนตัวของผู้เข้าร่วมโครงการวิจัย

การมีส่วนร่วมของท่านเป็นไปด้วยความสมัครใจทั้งหมด และท่านมีสิทธิที่จะถอนตัวออกจากการตอบแบบสอบถาม หรือสัมภาษณ์ได้ตลอดเวลา ถ้าคุณเห็นด้วยกับการมีส่วนร่วมในการศึกษา กรุณาลงนามในแบบฟอร์มได้รับความยินยอมด้านล่างและส่งกลับให้ข้าพเจ้า ข้าพเจ้ายืนยันว่าการศึกษาครั้งนี้ได้รับการตรวจสอบโดย คณะกรรมการจริยธรรมการวิจัยและได้รับความเห็นจริยธรรมที่ดีสำหรับการดำเนินการ โปรดระบุที่อยู่อีเมลของท่าน ถ้าท่านต้องการที่จะรับทราบผลของการวิจัย นอกจากนี้ท่านสามารถติดต่อข้าพเจ้าผ่านทางอีเมล์ w.nadee@pgr.reading.ac.uk หากท่านมีคำถาม หรือปัญหาใด ๆ เกี่ยวกับการสัมภาษณ์ครั้งนี้

ขอแสดงความนับถือ,

วินัย นาดี
Business Informatics, Systems & Accounting
Henley Business School | University of Reading | Whiteknights | READING RG6 6UD | UK
Email: w.nadee@pgr.reading.ac.uk

.....ส่วนสำหรับ ผู้ถูกสัมภาษณ์.....

ข้าพเจ้าได้อ่านข้อความข้างต้นแล้ว และมีความเข้าใจดีทุกประการ และได้ลงนามในใบยินยอม นี้ด้วยความเต็มใจ

ชื่อ: .....

ลายเซ็นต์: .....

วันที่: .....

No. _____
Date _____
Start _____ End_____
Interviewer _____
Editor _____

ส่วนที่ 1

	ข้อมูลทั่วไป	
D01	ชื่อ	_____
D02	เพศ	_____ ชาย _____ หญิง
D03	อายุ	_____ ปี
D04	บริษัท	_____
D05	ตำแหน่ง	_____
D06	ประสบการณ์ในบริษัทปัจจุบัน	_____ ปี _____ เดือน
D07	ประสบการณ์ในสายงาน	_____ ปี _____ เดือน
D08	อีเมล์	_____
D09	เบอร์โทรศัพท์	_____

โปรดระบุความเห็นของท่านเป็นคะแนนระหว่าง 1 ถึง 10 โดย 1 หมายถึง **ไม่เห็นด้วยอย่างยิ่ง** และ 10 หมายถึง **เห็นด้วยอย่างยิ่ง**

		คะแนน	 ไม่เห็นด้วยอย่างยิ่ง		 เห็นด้วยอย่างยิ่ง
PO1	บุคคลที่มีตำแหน่งสูง โดยมากแล้วควรตัดสินใจโดยไม่ต้องปรึกษาบุคคลที่มีตำแหน่งต่ำกว่า	_____	1	⟷	10
PO2	บุคคลที่มีตำแหน่งสูง ไม่ควรที่จะถามความเห็นของผู้ที่มีตำแหน่งต่ำกว่าบ่อยจนเกินไปนัก	_____	1	⟷	10
PO3	บุคคลที่มีตำแหน่งสูง ควรหลีกเลี่ยงการมีปฏิสัมพันธ์ทางสังคมกับบุคคลที่มีตำแหน่งต่ำกว่า	_____	1	⟷	10
PO4	บุคคลที่มีตำแหน่งต่ำไม่ควรโต้แย้งการตัดสินใจของบุคคลที่มีตำแหน่งสูงกว่า	_____	1	⟷	10
PO5	บุคคลที่มีตำแหน่งสูง ไม่ควรมอบหมายงานสำคัญให้กับบุคคลที่มีตำแหน่งต่ำกว่ารับผิดชอบ	_____	1	⟷	10
UN1	การให้คำแนะนำพร้อมรายละเอียดเป็นสิ่งสำคัญ เพราะฉันจะได้รู้ตลอดเวลาว่าฉันถูกคาดหวังให้ทำอะไร	_____	1	⟷	10
UN2	มันเป็นสิ่งสำคัญในการทำตามคำสั่งและขั้นตอนอย่างเคร่งครัด	_____	1	⟷	10
UN3	กฎและข้อบังคับเป็นสิ่งสำคัญ เพราะมันเป็นสิ่งที่บอกให้ฉันรู้ว่าฉันถูกคาดหวังให้ทำอะไรบ้าง	_____	1	⟷	10
UN4	ขั้นตอนการทำงานที่เป็นมาตรฐานเป็นสิ่งที่มีประโยชน์	_____	1	⟷	10
UN5	คำแนะนำต่างๆ สำหรับการทำงานเป็นสิ่งสำคัญ	_____	1	⟷	10
CO1	บุคคลควรเสียสละผลประโยชน์ส่วนตนเพื่อส่วนรวม (ไม่ว่าจะเป็นที่โรงเรียนหรือที่ทำงาน)	_____	1	⟷	10
CO2	บุคคลควรที่จะยึดติดกับกลุ่มแม้ว่าจะอยู่ในช่วงที่กลุ่มประสบความยากลำบาก	_____	1	⟷	10
CO3	ความสุขสบายของกลุ่มสำคัญกว่าผลตอบแทนของแต่ละบุคคล	_____	1	⟷	10
CO4	ความสำเร็จของกลุ่มสำคัญกว่าความสำเร็จของตัวบุคคล	_____	1	⟷	10
CO5	บุคคลควรดำเนินเป้าหมายส่วนตัว หลังจากคำนึงถึงสิ่งที่ดีที่สุดสำหรับกลุ่มแล้วเท่านั้น	_____	1	⟷	10
CO6	ความจงรักภักดีต่อกลุ่มควรได้รับการสนับสนุน แม้ว่าเป้าหมายส่วนบุคคลจะถูกบั่นทอนไป	_____	1	⟷	10
MA1	การประกอบวิชาชีพเฉพาะ (Professional career) เป็นเรื่องสำคัญสำหรับผู้ชายมากกว่าผู้หญิง	_____	1	⟷	10
MA2	ในการแก้ปัญหาใดใดก็ตาม ผู้ชายมักใช้การวิเคราะห์เชิงเหตุผล ส่วนผู้หญิงจะนิยมแก้ปัญหาโดยใช้สัญชาติญาณ	_____	1	⟷	10
MA3	การแก้ปัญหาที่ยุ่งยาก โดยปกติแล้ว ต้องอาศัยความกระตือรือร้นและวิธีการที่มีพลัง ซึ่งถือเป็นลักษณะเฉพาะอย่างหนึ่งของผู้ชาย	_____	1	⟷	10
MA4	มีงานบางประเภทซึ่งผู้ชายสามารถทำได้ดีกว่าผู้หญิงอยู่เสมอ	_____	1	⟷	10

โปรดระบุความเห็นของท่านเป็นคะแนนระหว่าง 1 ถึง 10 โดย 1 หมายถึง **ไม่สำคัญอย่างยิ่ง** และ 10 หมายถึง **สำคัญอย่างยิ่ง**

		คะแนน  ไม่สำคัญอย่างยิ่ง	 สำคัญอย่างยิ่ง
LT1	ความระมัดระวังในการบริหารจัดการด้านการเงิน	_____ 1 ⟷	10
LT2	ความไม่ท้อถอย (ความแน่วแน่)	_____ 1 ⟷	10
LT3	ความมั่นคงและความมีเสถียรภาพของบุคคล	_____ 1 ⟷	10
LT4	การวางแผนในระยะยาว	_____ 1 ⟷	10
LT5	การละทิ้งความสนุกในวันนี้ เพื่อความสำเร็จในอนาคต	_____ 1 ⟷	10
LT6	การทำงานอย่างหนักเพื่อความสำเร็จในอนาคต	_____ 1 ⟷	10

	ข้อมูลส่วนของ "เทคโนโลยีในองค์กร" ตัวอย่างเช่น ระบบเทคโนโลยีสารสนเทศ IT (i.e. ERP, CRM, BPM) หรืออุปกรณ์สื่อสาร (smart phone, tablet, wearable device) เพื่อใช้ในการเพิ่มประสิทธิภาพการทำงาน หรือรูปแบบการทำงานผ่านเทคโนโลยี เช่น การตลาดผ่านโซเชียลมีเดีย
I01	โปรดระบุ ***เทคโนโลยี*** ที่กำลังจะถูกนำมาใช้ หรือเพิ่งถูกนำมาใช้ และ*วัตถุประสงค์*หลักของการนำเทคโนโลยีเหล่านั้นมาใช้ ในองค์กรของท่าน (โปรดตอบอย่างน้อยหนึ่งเทคโนโลยี หรือมากกว่า)

	เทคโนโลยี	**วัตถุประสงค์**
1		
2		
3		

กรุณาตอบคำถามในส่วนที่ 2 โดยส่วนที่ 2 แยกตาม 3 เทคโนโลยีที่ท่านได้ตอบในข้อ I01 นี้

ส่วนที่ 2 แบบสอบถามส่วนนี้จะต้องตอบ 1 ชุด ต่อ 1 เทคโนโลยี ตามจำนวนของเทคโนโลยีที่ท่านตอบใน I01 **เทคโนโลยีจากข้อ I011.**

	กรุณาทำเครื่องหมาย X ในตัวเลือกที่ตรงกับความรู้สึกของท่าน โดยเลือกเพียงตัวเลือกเดียว	ฉันชอบ	ฉันคาดหวัง	ฉันเฉยๆ	ฉันยอมรับได้	ฉันไม่ชอบ
KN01	ความรู้สึกของคุณถ้า**ได้มี**การนำเทคโนโลยีนี้มาใช้งาน					
KN02	ความรู้สึกของคุณถ้า**ไม่ได้มี**การนำเทคโนโลยีนี้มาใช้งาน					

		คะแนน	ไม่เห็นด้วยอย่างยิ่ง		เห็นด้วยอย่างยิ่ง
R01	ฉันพบว่าการใช้งานเทคโนโลยีนี้เป็นกิจกรรมที่น่าสนใจ	_____	1	⟷	10
R02	ฉันชอบประโยชน์จากการใช้เทคโนโลยีนี้	_____	1	⟷	10
R03	สำหรับฉันแล้ว การใช้เทคโนโลยีนี้เป็นทางเลือกที่ดี ในการปรับปรุงประสิทธิภาพในการทำงาน	_____	1	⟷	10
R04	ฉันเคยใช้เทคโนโลยีนี้มาก่อน	_____	1	⟷	10
	ถ้าคุณไม่เห็นด้วยกับข้อ R04 (ให้คะแนนน้อยกว่าหรือเท่ากับ 6) กรุณาข้ามไปตอบข้อ R09				
R05	ฉันจะยังคงใช้เทคโนโลยีนี้ต่อจนเป็นกิจวัตรปกติ	_____	1	⟷	10
R06	ฉันเชื่อว่าการใช้เทคโนโลยีนี้เป็นส่วนหนึ่งของชีวิตประจำวันของฉัน	_____	1	⟷	10
R07	ฉันไม่แน่ใจว่าฉันจะยังคงใช้เทคโนโลยีนี้	_____	1	⟷	10
R08	ฉันเชื่อว่าฉันมีความสามารถในการใช้เทคโนโลยีนี้	_____	1	⟷	10
R09	ฉันเชื่อว่ามันจะเป็นเรื่องยากสำหรับฉันที่จะใช้เทคโนโลยีนี้	_____	1	⟷	10
R10	สำหรับฉันการที่จะใช้เทคโนโลยีนี้เป็นเรื่องยากมาก	_____	1	⟷	10
R11	สำหรับฉัน ๆ มั่นใจว่ามันจะเป็นเรื่องง่ายที่จะใช้เทคโนโลยีนี้	_____	1	⟷	10

		คะแนน	ไม่เห็นด้วยอย่างยิ่ง		เห็นด้วยอย่างยิ่ง
Q01	เทคโนโลยีใหม่นี้สามารถนำมาใช้ในองค์กรได้เลย โดยไม่ต้องมีการแก้ไขหรือเปลี่ยนแปลงใด ๆ ทั้งในส่วนของเทคโนโลยี กระบวนการทำงานปัจจุบัน และวิธีการทำงานบุคลากรในองค์กร	_____	1	⟷	10
Q01.1	ถ้าท่าน **ไม่เห็นด้วย** กับข้อ Q01, กรุณาเขียนรายการ ***ประเด็นหรือปัญหา*** ที่เป็นสาเหตุที่ทำให้ต้องเกิดการเปลี่ยนแปลงนี้	_____			
Q02	เทคโนโลยีใหม่นี้จะต้องมีการแก้ไขหรือเปลี่ยนแปลง เพื่อให้เข้ากันได้กับส่วนของเทคโนโลยี กระบวนการทำงานปัจจุบัน และพฤติกรรมของบุคลากรในองค์กร	_____	1	⟷	10
Q02.1	ถ้าท่าน **เห็นด้วย** กับข้อ Q02, กรุณาเขียนรายการ ***ประเด็นหรือปัญหา*** ที่เป็นสาเหตุที่ทำให้ต้องเกิดการเปลี่ยนแปลงนี้	_____			
Q03	เทคโนโลยีปัจจุบันในองค์กรจะต้องมีการแก้ไขหรือเปลี่ยนแปลง เพื่อให้รองรับได้กับ เทคโนโลยีใหม่ที่กำลังจะนำมาใช้งาน	_____	1	⟷	10
Q03.1	ถ้าท่าน **เห็นด้วย** กับข้อ Q03, กรุณาเขียนรายการ ***ประเด็นหรือปัญหา*** ที่เป็นสาเหตุที่ทำให้ต้องเกิดการเปลี่ยนแปลงนี้	_____			
Q04	กระบวนการใหม่ที่เกิดจากการนำเทคโนโลยีใหม่มาใช้ในองค์กรที่ จะต้องมีการแก้ไขหรือเปลี่ยนแปลงเพื่อให้เข้ากันได้กับกระบวนการของระบบธุรกิจในปัจจุบัน	_____	1	⟷	10
Q04.1	ถ้าท่าน **เห็นด้วย** กับข้อ Q04, กรุณาเขียนรายการ ***ประเด็นหรือปัญหา*** ที่เป็นสาเหตุที่ทำให้ต้องเกิดการเปลี่ยนแปลงนี้	_____			
Q05	กระบวนการที่มีอยู่จะต้องมีการแก้ไขหรือเปลี่ยนแปลงให้สนับสนุนกับการนำกระบวนการใหม่ที่เกิดจากการนำเทคโนโลยีใหม่มาใช้ในองค์กร	_____	1	⟷	10
Q05.1	ถ้าท่าน **เห็นด้วย** กับข้อ Q05, กรุณาเขียนรายการ ***ประเด็นหรือปัญหา*** ที่เป็นสาเหตุที่ทำให้ต้องเกิดการเปลี่ยนแปลงนี้	_____			
Q06	บุคลากรในองค์กรจะต้องเปลี่ยนแปลงวิถีการทำงานเมื่อเทคโนโลยีใหม่ถูกนำมาใช้งาน	_____	1	⟷	10
Q06.1	ถ้าท่าน **เห็นด้วย** กับข้อ Q06, กรุณาเขียนรายการ ***ประเด็นหรือปัญหา*** ที่เป็นสาเหตุที่ทำให้ต้องเกิดการเปลี่ยนแปลงนี้	_____			
Q07	วิธีการใช้งานเทคโนโลยีใหม่ของผู้ใช้งานจะต้องมีการปรับปรุงเพื่อลดผลกระทบต่อการทำงานของผู้ใช้งาน ปัจจุบัน	_____	1	⟷	10
Q07.1	ถ้าท่าน **เห็นด้วย** กับข้อ Q07, กรุณาเขียนรายการ ***ประเด็นหรือปัญหา*** ที่เป็นสาเหตุที่ทำให้ต้องเกิดการปรับปรุงเปลี่ยนแปลงนี้	_____			
Q08	บุคลากรในองค์กรจะไม่ใช้งานเทคโนโลยีใหม่นี้	_____	1	⟷	10

Q08.1	ถ้าท่าน **เห็นด้วย** กับข้อ Q08, กรุณาเขียนรายการ ***ประเด็นหรือปัญหา*** ที่เป็นสาเหตุที่ทำให้บุคลากรในองค์กรไม่ใช้งานเทคโนโลยีใหม่นี้	_____

เทคโนโลยีจากข้อ I01.2

	กรุณาทำเครื่องหมาย X ในตัวเลือกที่ตรงกับความรู้สึกของท่าน โดยเลือกเพียงตัวเลือกเดียว	ฉันชอบ	ฉันคาดหวัง	ฉันเฉยๆ	ฉันยอมรับได้	ฉันไม่ชอบ
KN01	ความรู้สึกของคุณถ้า**ได้มี**การนำเทคโนโลยีนี้มาใช้งาน					
KN02	ความรู้สึกของคุณถ้า**ไม่ได้มี**การนำเทคโนโลยีนี้มาใช้งาน					

		คะแนน	ไม่เห็นด้วยอย่างยิ่ง		เห็นด้วยอย่างยิ่ง
R01	ฉันพบว่าการใช้งานเทคโนโลยีนี้เป็นกิจกรรมที่น่าสนใจ	_____	1	⟷	10
R02	ฉันชอบประโยชน์จากการใช้เทคโนโลยีนี้	_____	1	⟷	10
R03	สำหรับฉันแล้ว การใช้เทคโนโลยีนี้เป็นทางเลือกที่ดี ในการปรับปรุงประสิทธิภาพในการทำงาน	_____	1	⟷	10
R04	ฉันเคยใช้เทคโนโลยีนี้มาก่อน	_____	1	⟷	10
	ถ้าคุณไม่เห็นด้วยกับข้อ R04 (ให้คะแนนน้อยกว่าหรือเท่ากับ 6) กรุณาข้ามไปตอบข้อ R09				
R05	ฉันจะยังคงใช้เทคโนโลยีนี้ต่อจนเป็นกิจวัตรปกติ	_____	1	⟷	10
R06	ฉันเชื่อว่าการใช้เทคโนโลยีนี้เป็นส่วนหนึ่งของชีวิตประจำวันของฉัน	_____	1	⟷	10
R07	ฉันไม่แน่ใจว่าฉันจะยังคงใช้เทคโนโลยีนี้	_____	1	⟷	10
R08	ฉันเชื่อว่าฉันมีความสามารถในการใช้เทคโนโลยีนี้	_____	1	⟷	10
R09	ฉันเชื่อว่ามันจะเป็นเรื่องยากสำหรับฉันที่จะใช้เทคโนโลยีนี้	_____	1	⟷	10
R10	สำหรับฉันการที่จะใช้เทคโนโลยีนี้เป็นเรื่องยากมาก	_____	1	⟷	10
R11	สำหรับฉัน ๆ มั่นใจว่ามันจะเป็นเรื่องง่ายที่จะใช้เทคโนโลยีนี้	_____	1	⟷	10

		คะแนน	ไม่เห็นด้วยอย่างยิ่ง		เห็นด้วยอย่างยิ่ง
Q01	เทคโนโลยีใหม่นี้สามารถนำมาใช้ในองค์กรได้เลย โดยไม่ต้องมีการแก้ไขหรือเปลี่ยนแปลงใด ๆ ทั้งในส่วนของเทคโนโลยี กระบวนการทำงานปัจจุบัน และวิธีการทำงานบุคลากรในองค์กร	_____	1	⟷	10
Q01.1	ถ้าท่าน **ไม่เห็นด้วย** กับข้อ Q01, กรุณาเขียนรายการ ***ประเด็นหรือปัญหา*** ที่เป็นสาเหตุที่ทำให้ต้องเกิดการเปลี่ยนแปลงนี้	_____			
Q02	เทคโนโลยีใหม่นี้จะต้องมีการแก้ไขหรือเปลี่ยนแปลง เพื่อให้เข้ากันได้กับส่วนของเทคโนโลยี กระบวนการทำงานปัจจุบัน และพฤติกรรมของบุคลากรในองค์กร	_____	1	⟷	10
Q02.1	ถ้าท่าน **เห็นด้วย** กับข้อ Q02, กรุณาเขียนรายการ ***ประเด็นหรือปัญหา*** ที่เป็นสาเหตุที่ทำให้ต้องเกิดการเปลี่ยนแปลงนี้	_____			
Q03	เทคโนโลยีปัจจุบันในองค์กรจะต้องมีการแก้ไขหรือเปลี่ยนแปลง เพื่อให้รองรับได้กับ เทคโนโลยีใหม่ที่กำลังจะนำมาใช้งาน	_____	1	⟷	10
Q03.1	ถ้าท่าน **เห็นด้วย** กับข้อ Q03, กรุณาเขียนรายการ ***ประเด็นหรือปัญหา*** ที่เป็นสาเหตุที่ทำให้ต้องเกิดการเปลี่ยนแปลงนี้	_____			
Q04	กระบวนการใหม่ที่เกิดจากการนำเทคโนโลยีใหม่มาใช้ในองค์กรที่ จะต้องมีการแก้ไขหรือเปลี่ยนแปลงเพื่อให้เข้ากันได้กับกระบวนการของระบบธุรกิจในปัจจุบัน	_____	1	⟷	10
Q04.1	ถ้าท่าน **เห็นด้วย** กับข้อ Q04, กรุณาเขียนรายการ ***ประเด็นหรือปัญหา*** ที่เป็นสาเหตุที่ทำให้ต้องเกิดการเปลี่ยนแปลงนี้	_____			
Q05	กระบวนการที่มีอยู่จะต้องมีการแก้ไขหรือเปลี่ยนแปลงให้สนับสนุนกับการนำกระบวนการใหม่ที่เกิดจากการนำเทคโนโลยีใหม่มาใช้ในองค์กร	_____	1	⟷	10
Q05.1	ถ้าท่าน **เห็นด้วย** กับข้อ Q05, กรุณาเขียนรายการ ***ประเด็นหรือปัญหา*** ที่เป็นสาเหตุที่ทำให้ต้องเกิดการเปลี่ยนแปลงนี้	_____			
Q06	บุคลากรในองค์กรจะต้องเปลี่ยนแปลงวิถีการทำงานเมื่อเทคโนโลยีใหม่ถูกนำมาใช้งาน	_____	1	⟷	10
Q06.1	ถ้าท่าน **เห็นด้วย** กับข้อ Q06, กรุณาเขียนรายการ ***ประเด็นหรือปัญหา*** ที่เป็นสาเหตุที่ทำให้ต้องเกิดการเปลี่ยนแปลงนี้	_____			
Q07	วิธีการใช้งานเทคโนโลยีใหม่ของผู้ใช้งานจะต้องมีการปรับปรุงเพื่อลดผลกระทบต่อการทำงานของผู้ใช้งาน ปัจจุบัน	_____	1	⟷	10
Q07.1	ถ้าท่าน **เห็นด้วย** กับข้อ Q07, กรุณาเขียนรายการ ***ประเด็นหรือปัญหา*** ที่เป็นสาเหตุที่ทำให้ต้องเกิดการปรับปรุงเปลี่ยนแปลงนี้	_____			

		คะแนน  ไม่เห็นด้วยอย่างยิ่ง	 เห็นด้วยอย่างยิ่ง
Q08	บุคลากรในองค์กรจะไม่ใช้งานเทคโนโลยีใหม่นี้	_____ 1	10
Q08.1	ถ้าท่าน **เห็นด้วย** กับข้อ Q08, กรุณาเขียนรายการ ***ประเด็นหรือปัญหา*** ที่เป็นสาเหตุที่ทำให้บุคลากรในองค์กรไม่ใช้งานเทคโนโลยีใหม่นี้	_____	

เทคโนโลยีจากข้อ I01.3

	กรุณาทำเครื่องหมาย X ในตัวเลือกที่ตรงกับความรู้สึกของท่าน โดยเลือกเพียงตัวเลือกเดียว	ฉันชอบ	ฉันคาดหวัง	ฉันเฉยๆ	ฉันยอมรับได้	ฉันไม่ชอบ
KN01	ความรู้สึกของคุณถ้า**ได้มี**การนำเทคโนโลยีนี้มาใช้งาน					
KN02	ความรู้สึกของคุณถ้า**ไม่ได้มี**การนำเทคโนโลยีนี้มาใช้งาน					

		คะแนน  ไม่เห็นด้วยอย่างยิ่ง	 เห็นด้วยอย่างยิ่ง
R01	ฉันพบว่าการใช้งานเทคโนโลยีนี้เป็นกิจกรรมที่น่าสนใจ	_____ 1	10
R02	ฉันชอบประโยชน์จากการใช้เทคโนโลยีนี้	_____ 1	10
R03	สำหรับฉันแล้ว การใช้เทคโนโลยีนี้เป็นทางเลือกที่ดี ในการปรับปรุงประสิทธิภาพในการทำงาน	_____ 1	10
R04	ฉันเคยใช้เทคโนโลยีนี้มาก่อน	_____ 1	10
	ถ้าคุณไม่เห็นด้วยกับข้อ R04 (ให้คะแนนน้อยกว่าหรือเท่ากับ 6) กรุณาข้ามไปตอบข้อ R09		
R05	ฉันจะยังคงใช้เทคโนโลยีนี้ต่อจนเป็นกิจวัตรปกติ	_____ 1	10
R06	ฉันเชื่อว่าการใช้เทคโนโลยีนี้เป็นส่วนหนึ่งของชีวิตประจำวันของฉัน	_____ 1	10
R07	ฉันไม่แน่ใจว่าฉันจะยังคงใช้เทคโนโลยีนี้	_____ 1	10
R08	ฉันเชื่อว่าฉันมีความสามารถในการใช้เทคโนโลยีนี้	_____ 1	10
R09	ฉันเชื่อว่ามันจะเป็นเรื่องยากสำหรับฉันที่จะใช้เทคโนโลยีนี้	_____ 1	10
R10	สำหรับฉันการที่จะใช้เทคโนโลยีนี้เป็นเรื่องยากมาก	_____ 1	10
R11	สำหรับฉัน ๆ มั่นใจว่ามันจะเป็นเรื่องง่ายที่จะใช้เทคโนโลยีนี้	_____ 1	10

		คะแนน  ไม่เห็นด้วยอย่างยิ่ง	 เห็นด้วยอย่างยิ่ง
Q01	เทคโนโลยีใหม่นี้สามารถนำมาใช้ในองค์กรได้เลย โดยไม่ต้องมีการแก้ไขหรือเปลี่ยนแปลงใด ๆ ทั้งในส่วนของเทคโนโลยี กระบวนการทำงานปัจจุบัน และวิธีการทำงานบุคลากรในองค์กร	_____ 1	10
Q01.1	ถ้าท่าน **ไม่เห็นด้วย** กับข้อ Q01, กรุณาเขียนรายการ ***ประเด็นหรือปัญหา*** ที่เป็นสาเหตุที่ทำให้ต้องเกิดการเปลี่ยนแปลงนี้	_____	
Q02	เทคโนโลยีใหม่นี้จะต้องมีการแก้ไขหรือเปลี่ยนแปลง เพื่อให้เข้ากันได้กับส่วนของเทคโนโลยี กระบวนการทำงานปัจจุบัน และพฤติกรรมของบุคลากรในองค์กร	_____ 1	10
Q02.1	ถ้าท่าน **เห็นด้วย** กับข้อ Q02, กรุณาเขียนรายการ ***ประเด็นหรือปัญหา*** ที่เป็นสาเหตุที่ทำให้ต้องเกิดการเปลี่ยนแปลงนี้	_____	
Q03	เทคโนโลยีปัจจุบันในองค์กรจะต้องมีการแก้ไขหรือเปลี่ยนแปลง เพื่อให้รองรับได้กับ เทคโนโลยีใหม่ที่กำลังจะนำมาใช้งาน	_____ 1	10
Q03.1	ถ้าท่าน **เห็นด้วย** กับข้อ Q03, กรุณาเขียนรายการ ***ประเด็นหรือปัญหา*** ที่เป็นสาเหตุที่ทำให้ต้องเกิดการเปลี่ยนแปลงนี้	_____	
Q04	กระบวนการใหม่ที่เกิดจากการนำเทคโนโลยีใหม่มาใช้ในองค์กรที่ จะต้องมีการแก้ไขหรือเปลี่ยนแปลงเพื่อให้เข้ากันได้กับกระบวนการของระบบธุรกิจในปัจจุบัน	_____ 1	10
Q04.1	ถ้าท่าน **เห็นด้วย** กับข้อ Q04, กรุณาเขียนรายการ ***ประเด็นหรือปัญหา*** ที่เป็นสาเหตุที่ทำให้ต้องเกิดการเปลี่ยนแปลงนี้	_____	
Q05	กระบวนการที่มีอยู่จะต้องมีการแก้ไขหรือเปลี่ยนแปลงให้สนับสนุนกับการนำกระบวนการใหม่ที่เกิดจากการนำเทคโนโลยีใหม่มาใช้ในองค์กร	_____ 1	10
Q05.1	ถ้าท่าน **เห็นด้วย** กับข้อ Q05, กรุณาเขียนรายการ ***ประเด็นหรือปัญหา*** ที่เป็นสาเหตุที่ทำให้ต้องเกิดการเปลี่ยนแปลงนี้	_____	
Q06	บุคลากรในองค์กรจะต้องเปลี่ยนแปลงวิถีการทำงานเมื่อเทคโนโลยีใหม่ถูกนำมาใช้งาน	_____ 1	10

Q06.1	ถ้าท่าน **เห็นด้วย** กับข้อ Q06, กรุณาเขียนรายการ ***ประเด็นหรือปัญหา*** ที่เป็นสาเหตุที่ทำให้ต้องเกิดการเปลี่ยนแปลงนี้	_____
Q07	วิธีการใช้งานเทคโนโลยีใหม่ของผู้ใช้งานจะต้องมีการปรับปรุงเพื่อลดผลกระทบต่อการทำงานของผู้ใช้งาน ปัจจุบัน	_____ 1 ⟷ 10
Q07.1	ถ้าท่าน **เห็นด้วย** กับข้อ Q07, กรุณาเขียนรายการ ***ประเด็นหรือปัญหา*** ที่เป็นสาเหตุที่ทำให้ต้องเกิดการปรับปรุงเปลี่ยนแปลงนี้	_____
Q08	บุคลากรในองค์กรจะไม่ใช้งานเทคโนโลยีใหม่นี้	_____ 1 ⟷ 10
Q08.1	ถ้าท่าน **เห็นด้วย** กับข้อ Q08, กรุณาเขียนรายการ ***ประเด็นหรือปัญหา*** ที่เป็นสาเหตุที่ทำให้บุคลากรในองค์กรไม่ใช้งานเทคโนโลยีใหม่นี้	_____

Appendix B

Summary of Technologies from Data Collection

Technology Types	Technology Name	Dissonance State	Technology Perception
Mobile Application	Social Media	1	A
Mobile Device	Tablets for executives	1	O
Software Tool	Remote Access via OTP	1	I
Mobile Application	HR application on Mobile	7	I
Information System	Workflow	6	I
Mobile Application	Mobile App	1	I
Information System	Workflow	3	I
Mobile Application	MaaS360	2	I
Information System	TQF	3	R
Mobile Device	เครื่อง Tablet	6	A
Information System	ระบบ Busines Intilligence	1	A
Mobile Application	Q-gis	1	I
Hardware and Infrastructure	Video Conference	1	A
Process and Practice	Automate testing	6	I
Cloud Technology	Cloud Computing Technology	6	A
Information System	CRA	6	A
Information System	IPP	1	M
Information System	มคอ	5	I
Information System	edoc	6	A
Mobile Device	Smart phone	1	A
Mobile Application	IBM Verse	6	I
Mobile Application	Line	6	I
Mobile Application	Facebook	6	I
Information System	ERP	6	O
Mobile Application	Internal social network	4	I
Mobile Application	Group chat in LINE among colleages	3	I
Cloud Technology	Free Cloud infastructure	1	M
Information System	PeopleSoft HCM	2	A
Mobile Device	smart phone, tablet (personal)	1	I
Mobile Application	GPS Tracking System	6	I
Cloud Technology	Office 365	8	I
Information System	Microsoft Dynamics	6	A
Cloud Technology	Cloud	6	A
Mobile Application	security for mobile devices	6	A
Information System	ERP	6	M
Process and Practice	HTML5	1	I
Mobile Application	Line	1	A

Technology Types	Technology Name	Dissonance State	Technology Perception
Software Tool	share drive	1	A
Information System	CRM	8	I
Mobile Application	Group Line	1	A
Hardware and Infrastructure	Xaas	8	R
Information System	ERP	6	O
Mobile Device	TABLET	1	A
Hardware and Infrastructure	WIFI with EAP TTLS	1	O
Mobile Device	Smart Phone	6	I
Mobile Device	Smart phone	1	O
Information System	BPM	6	O
Information System	New insurance core system	5	O
Information System	ระบบฐานข้อมูล	6	M
Hardware and Infrastructure	เครื่องคอมพิวเตอร์ที่ดี รุ่นใหม่	1	O
Hardware and Infrastructure	Wifi	1	O
Hardware and Infrastructure	Blade Server	1	O
Mobile Device	Tablet	1	O
Information System	Compass Software (Java/Oracle)	6	M
Information System	Compass	6	A
Information System	CRM	2	A
Information System	BPM	1	A
Information System	Insurance Core System	1	A
Information System	Compass	1	M
Cloud Technology	Salesforce.com	6	I
Information System	ERP	6	A
Mobile Device	Tablet	1	O
Hardware and Infrastructure	เครื่องสแกนบาร์โค้ดรุ่นใหม่	6	O
Information System	Active Directory	1	I
Cloud Technology	ESX	6	I
Information System	ERP	1	A
Information System	BI	8	I
Software Tool	Lotus note	6	I
Mobile Application	Lin application	1	A
Cloud Technology	Google Docs & Google Drive	1	O
Process and Practice	Trello	6	O
Mobile Application	Line	3	I
Software Tool	Sharedrive	1	I
Mobile Device	Smart Phone	1	A
Software Tool	VPN	1	A
Information System	ERP	1	O
Cloud Technology	Cloud	1	A

Technology Types	Technology Name	Dissonance State	Technology Perception
Information System	ERP	1	O
Mobile Application	Social media	1	I
Mobile Application	application line	3	I
Mobile Application	IPOS plus	6	I
Mobile Device	Smart phone	1	I
Mobile Device	Smart phone	1	M
Process and Practice	Agile	6	I
Mobile Application	MobileFirst	7	I
Information System	MS Access	6	A
Information System	yammer	6	I
Mobile Device	Tablet	6	A
Mobile Application	App : Line	1	O
Information System	ระบบ Pottal	6	I
Information System	Horizon	6	M
Mobile Device	Tablet	1	R
Mobile Device	Tablet	1	O
Mobile Device	Smartphones	1	O
Process and Practice	DR site	2	I
Mobile Application	mobile app	1	A
Information System	self service	1	A
Mobile Application	Line	1	A
Mobile Device	tablet	6	I
Hardware and Infrastructure	Computer	1	I
Cloud Technology	Virtual Desktop Infrastructure	1	A
Information System	ระบบการหาเอกสารอนุมัติออนไลน์	6	I
Information System	e-document	6	A
Information System	e-meeting	6	A
Mobile Device	smart phone	1	O
Information System	crm	6	O
Information System	CRM	6	A
Hardware and Infrastructure	เครื่องตัดเนื้อไก่อัตโนมัติ ตามแบบที่ต้องการ	6	I
Information System	website	1	O
Mobile Application	Mobile Banking	1	A
Information System	Corporate internet banking	6	A
Information System	Knowledge Management	1	I
Mobile Application	Social Network	1	I
Cloud Technology	Cloud Computing	1	M
Information System	blog	4	I
Mobile Application	MASS360 for iphone	6	A
Mobile Application	IBM Verse - mail on cloud	6	A

Technology Types	Technology Name	Dissonance State	Technology Perception
Mobile Application	Mobile banking	1	A
Mobile Application	Mobile Chat	1	I
Mobile Application	Mail on Cloud	6	M
Hardware and Infrastructure	computer	1	O
Information System	Erp	8	I
Information System	IIA	6	M
Mobile Device	smart phone	1	A
Mobile Device	SMART PHONE	1	A
Cloud Technology	Cloud	6	A
Information System	ระบบสารสนเทศของสำนักงาน	1	A
Mobile Device	Tablet	1	A
Mobile Application	IBM Verse	6	I
Mobile Device	Notebook	1	I
Information System	outlook	6	I
Information System	Orisoft	8	I
Mobile Device	Phone	1	I
Information System	OCS	1	O
Information System	IT	1	O
Hardware and Infrastructure	intranet	1	O
Hardware and Infrastructure	internet	1	O
Information System	SAP System	6	O
Mobile Device	IPhone	1	I
Mobile Application	Lync	6	A
Mobile Device	Tablet	6	A
Mobile Device	Tablet	1	A
Cloud Technology	Cloud	4	I
Cloud Technology	Cloud	8	I
Mobile Device	Notebook	8	M
Mobile Device	Tablet	6	I
Hardware and Infrastructure	Digital Fabrication	6	A
Cloud Technology	Cloud Computing	1	A
Cloud Technology	Cloud	1	O
Mobile Application	social	1	O
Mobile Device	Smart Phone	2	I
Mobile Device	Mobile	1	A
Mobile Application	RD SMART TAX	1	A
Information System	e-Tax Invoice / e-Receipt	6	A
Hardware and Infrastructure	Wifi	1	A
Information System	ERP	2	M
Mobile Device	tablet	1	I

Technology Types	Technology Name	Dissonance State	Technology Perception
Mobile Device	smartphone	1	O
Information System	IT	1	O
Cloud Technology	Office365	6	O
Cloud Technology	Data Virtualization	6	A
Information System	Big Data	8	I
Cloud Technology	Cloud service	1	O
Mobile Device	Smart phone	1	O
Mobile Device	Smart phone	1	O
Information System	ERP	6	O
Mobile Device	mobile device	1	A
Hardware and Infrastructure	netezza	6	A
Cloud Technology	Sales Force	6	I
Mobile Application	Smartphone application	1	I
Hardware and Infrastructure	กล้องวงจรปิด	1	A
Mobile Application	Verse	6	A
Mobile Device	smart phone	1	A
Information System	DMS	6	I
Information System	Web configure	1	I
Information System	CRM	1	A
Mobile Application	Messaging Software (Line, Whatsapp)	1	A
Information System	big data	6	M
Information System	CRM	6	I
Cloud Technology	Cloud	8	A
Information System	sap	6	O
Mobile Device	phone	1	A
Mobile Device	laptop	1	O
Mobile Device	Smartphone	1	I
Mobile Application	Line	1	A
Mobile Device	Mobile Device	1	A
Information System	CRM	1	I
Cloud Technology	SSF	6	I
Mobile Device	Mobile	1	A
Mobile Device	smart phone	1	O
Information System	Ofsa	6	I
Information System	Oracle	6	I
Software Tool	sharedrive	1	I
Cloud Technology	Ms365	6	A
Information System	การทำระบบ Workflow เพื่อลดขั้นตอนการทำงาน	7	I
Mobile Device	Mobile	1	O
Cloud Technology	Cloud	1	A

Technology Types	Technology Name	Dissonance State	Technology Perception
Information System	Data & Analytics	1	A
Information System	Crm	1	I
Information System	Big Data	1	O
Information System	ERP	1	M
Information System	CRM	1	M
Mobile Device	smart phone	1	O
Information System	Analytic tool	6	I
Information System	Collaboration tool	6	I
Process and Practice	agile	6	I
Information System	Asana- Project management tool	6	A
Cloud Technology	VM ware	8	I
Information System	New Core bank	1	I
Cloud Technology	Cloud	1	A
Mobile Device	Mobile	1	R
Mobile Device	Smart Phone	1	O
Mobile Device	BYOD	1	O
Mobile Application	Social and security	1	I
Information System	KM	1	O
Mobile Device	smart phone	1	O
Information System	big data	6	I
Information System	SMS management	1	O
Cloud Technology	Cloud Computing	8	I
Cloud Technology	Google sheet	1	I
Cloud Technology	Google application	6	M
Cloud Technology	Cloud computing	6	I
Cloud Technology	Cloud systems-Accounting software	6	A
Mobile Device	Phone and tablet for employee productivity improvement	1	A
Cloud Technology	Cloud Computing	6	I
Information System	E-Payroll	2	A
Cloud Technology	Storage on cloud	1	I
Mobile Device	Mobile	1	O
Information System	Analytic data	6	A
Information System	Asana.com	1	A
Information System	ELearning	1	A
Information System	MOOCs	1	I
Mobile Device	Smartphone	1	O
Mobile Device	Tablet	1	O
Mobile Application	In-house social network	6	I
Process and Practice	Jenkin	1	O

Technology Types	Technology Name	Dissonance State	Technology Perception
Mobile Device	tablet	1	A
Information System	BPM	8	I
Information System	Big Data	6	I
Information System	ERP	6	I
Mobile Device	Smart Phone	1	A
Mobile Device	Tablet (iPad)	1	A
Software Tool	Web Portal	6	A
Mobile Application	Social media marketing	1	I
Mobile Device	Smart phone	1	A
Information System	Data Analytics	6	I
Mobile Device	Tablet, wearable device	8	A
Cloud Technology	Customer communication service for collection on cloud technology	6	A
Information System	Web Service	1	O
Mobile Device	Smart phone	1	A
Cloud Technology	Microsoft Lync	1	O