THE CONCEPTUALIZATION AND INVESTIGATION OF USER CAPITAL AND ITS IMPACT ON EFFECTIVE USE AND INFORMATION SYSTEMS SUCCESS

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Statement of Original Authorship

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

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Abstract

Information Systems (IS) scholars have continuously highlighted the necessity for IS to be effectively used in order to drive business value (e.g. Burton-Jones & Grange, 2013). Consequently, rigorous research has been devoted to examining the notion of IS use (e.g. Burton-Jones & Straub, 2006). Comprehensive research has also been performed into understanding how a plethora of user characteristics uni-dimensionally influence an individual's intention to use an IS (e.g.Venkatesh & Davis, 2000; Venkatesh, Morris, Davis, & Davis, 2003). Yet, a systematic review of the literature undertaken as part of this research, identified that critically analysing the characteristics of users in a parsimonious, theoretically grounded, multidimensional manner which recognises the complex nuances in users' characteristics, has to a large extent been neglected by the IS field.

In order to address this shortcoming, this study sought to conceptualize, develop and test a construct around the idea of 'User Capital', which considers the complex nuances of users, in which, for example, a user can be knowledgeable and skilled but lack the required motivation to perform their job tasks using an IS. Specifically, this research is scoped to focus on the operational use of contemporary enterprise resource planning systems in the post implementation phase of the lifecycle.

Drawing upon the human capital and attitude-behaviour literature, as well as the theory of performance, this research defined user capital as *the attributes possessed by an individual that enable them to use an IS to perform tasks.* This research conceptualises user capital as a multidimensional construct consisting of the

cognitive characteristics, skills, motivation, and affective attitude possessed by IS users. The operationalisation of this construct was informed by the Learning Outcomes Model, as such user capital was formed by the dimensions of metacognitive self-regulation, user competence, mastery motivational disposition and attitude towards using IS.

To examine user capital and its resultant influence on effective use and IS success, a field study approach was followed, with emphasis placed on quantitative data collection via a survey methodology. 223 completed surveys were collected from the field organization to test the proposed hypotheses. IBM SPSS was used to examine the factor loadings of the reflectively measured constructs, and SmartPLS was used to analyse the measurement and structural models.

The results obtained provided evidence to support the multidimensional construct of user capital with all the dimensions reporting as statistically significant. Furthermore, the demographical information provided by the survey respondents indicated that the demarcations between operational and managerial users were blurring, with both groups using the IS in an operational capacity. In addition, user capital was a statistically significant driver of effective use explaining 49.20% of its variance. This analysis, represents one of the first quantitative assessments of effective use.

Further insights were also provided into user capital and effective use through the examination of the DeLone and McLean (1992) IS Success model. The DeLone and McLean (1992) IS Success model was extended to include user capital, and the use construct was replaced by the stronger theoretically and empirically supported construct *effective use*. The results provided statistical evidence to support the relationships between user capital, systems quality, and information quality with effective use and user satisfaction. Effective use was also a key driver of user satisfaction and both effective use and user satisfaction were antecedents of individual impact. However, the direct relationship that was hypothesised between user capital and individual impact was not supported as the relationship was completely mediated by effective use and user satisfaction.

Polynomial regression with response surface analysis was also performed to see how different combinations of variables predicted effective use and individual impact. The results obtained illustrated that optimal levels of effective use are only obtained when high levels of both user capital and technical capital (e.g. information quality and system quality) are present. In addition, optimal levels of effective use are only obtained if the user also reports high levels of both capabilities and affective (e.g. attitude and motivation) components of user capital. Furthermore, to achieve high levels of individual impact both effective use and user satisfaction need to be high.

In summary, this research is rigorous and relevant, contributing to both theory and practice in a number of ways, including: (i) the conceptualization of a new construct indicative of user capital; (ii) offering the first quantitative assessment of potential drivers for effective use; (iii) the extension of the current conceptualization of Information Systems Success with the inclusion of user capital and effective use; and (iv) explaining how the combinations of different variables influence effective use and individual impact. Organizations could draw upon these insights to target where investments should be made to improve the outcomes generated from their IS.

Keywords

Attitude, effective use, enterprise systems, formative, goal orientation, human capital, Information Systems, IS Success, Learning Outcomes Model, mastery, motivational disposition, multidimensional construct, nomological network, operational users, performance, polynomial regression, reflective, Social Cognitive Theory, self-regulation, smartPLS, survey, theory of performance, user capital, user competence, user satisfaction.

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List of Abbreviations

Abbreviation	Term
EFA	Exploratory Factor Analysis
EIT	Enterprise Information Technology
ERP	Enterprise Resource Planning Systems
ES	Enterprise Systems
FIT	Functional Information Technology
IS	Information Systems
IT	Information Technology
HPWO	High Performance Work Organization
LOM	Learning Outcomes Model
MSLQ	Motivated Strategies for Learning Questionnaire
NIT	Network Information Technology
SCT	Social Cognitive Theory
ToP	Theory of Performance
TAM	Technology Acceptance Model
UC	User Capital

Chapter 1: Introduction

Perpetual improvements in information technology are ultimately changing the nature of tasks that individuals are required to perform in the workplace (Burton-Jones, 2014; Zuboff, 1988). Consequently with individuals' job roles being tightly coupled to mandatory integrated Information Systems (IS) (e.g. Brown, Massey, Montoya-Weiss, & Burkman, 2002) there is a necessity for individuals to be competent at using IS (e.g. Burton-Jones, 2014). Furthermore with the increasingly blurred demarcations present in organizational structures, individuals need to be highly motivated (e.g. Berry & Mok, 2014; Kashefi, 2011). Yet to a large extent, there is a paucity of literature that systematically analyses the characteristics of IS users in a holistic manner that considers the complex nuances in their behaviour. Given that it is imperative that users effectively execute tasks using an IS (Burton-Jones & Grange, 2013) coupled with organizations struggling to attain benefits from their IS investments (e.g. Ghazali, Ahmad, & Zakaria, 2014; Panorama Consulting Solutions, 2013; Sasidharan, Santhanam, Brass, & Sambamurthy, 2012; Schubert & Williams, 2010; Shaul & Tauber, 2013); it is vital to comprehensively understand users. Consequently, this thesis seeks to define and develop a construct that recognises the complex nuances of users' behaviour through the multidimensional treatment of their characteristics (henceforth referred to as User Capital).

The objective of this chapter is to provide an overview of the research background, scope, purpose, contributions, and design. This chapter is organized as follows: firstly (i) the background of the research is discussed; followed by (ii) the rationale for investigating the research problem. Subsequently (iii) the research questions and objectives are specified. Next (iv) the research scope is justified. Then (v) the research design is illustrated. Thereafter (vi) the significance and the contributions of this study are explored, followed by (vii) an outline of the thesis structure. The chapter concludes with (viii) a summary of the motivations, research questions, and contributions of this thesis. Table 1 provides a summary of the key themes present in this chapter. The key terms utilised throughout this thesis are detailed in Appendix A.

Table 1: Objectives of the Key Themes Present in the Introduction

Theme	Objective
1.1 Research Background	▪ Discuss how IS have transformed organizations and users. ▪ Explain how users have been examined in past literature.
1.2 Research Problem and Rationale	▪ Briefly introduce the central theme of user capital. ▪ Discuss the pertinence of the effective use of IS for deriving business value. ▪ Articulate the theoretical and practical issues related to obtaining value from IS investments.
1.3 Research Questions and Objectives	▪ Explain the research objectives. ▪ Clearly specify the research questions.
1.4 Research Scope	▪ Illustrate the research scope considerations. ▪ Rationalise why the selected scope was determined to be necessary.
1.5 Research Design	▪ Discuss the epistemology of the research. ▪ Justify the research methodologies used. ▪ Graphically depict the research design.
1.6 Research Contributions	▪ Discuss the theoretical and practical contributions of this research. ▪ Provide a high level conceptual model of the research.
1.7 Thesis Structure	▪ Graphically depict the thesis structure. ▪ Summarise the key objectives of each thesis chapter.

1.1 Research Background

Enterprise Systems (ES) form the backbone of the vast majority of large scale organizations and are defined as "*comprehensive, package software solutions that seek to integrate the complete range of a business's processes and functions in order to present a holistic view of the business from a single information and IT architecture*" (Klaus, Rosemann, & Gable, 2000, p. 141). Perpetual improvements in technology have resulted in continual updates and extensions to ES. With ES being mandatory to use and tightly coupled to employees' job tasks (e.g. Brown et al., 2002), the updates to ES have ultimately transformed the tasks that individuals perform. Traditionally, the individuals who routinely used the ES (henceforth termed operational users) performed narrow, simple, and highly structured data entry tasks (Murphy, 2014). However, these tasks are becoming increasingly automated. As such, these operational users now need to perform more complex tasks and engage with the information generated by the ES (Burton-Jones, 2014; Zuboff, 1988). Furthermore, whilst ES are mandatory to use, individuals can still intentionally avoid using them (Boudreau & Robey, 2005) or use them in less optimal ways (Strong & Volkoff, 2010). Therefore with operational users now performing more complex tasks within ES and recognising the variations in use that can still occur within mandatory settings, there is a need for competent users.

The necessity for competent employees is further reflected in organizational psychology and human resource management disciplines. Due to continual improvements in technology which have transformed the operating environment of organizations into a hypernetworked, hypercompetitive, globalised marketplace; operational employees now have to complete broader and more complex tasks than ever before (Chaykowski & Gunderson, 2013). They need to work in an autonomous manner (Kashefi, 2011), under reduced supervision (Belanger, Giles, & Murray, 2013) as well as solve problems and partake in decision making (Kashefi, 2011). Therefore, in an environment where the vast majority of tasks are mediated by ES, users need to be both competent and motivated to use the ES in an effective capacity.

Literature has made important strides into understanding the users of Information Systems (IS) and has largely examined two key themes, which are the social and individual levels. Analysis at the social level largely adhered to the qualitative perspective and recognised the complex interactions between IS and organizations (e.g. DeSanctis & Poole, 1994; Jones & Karsten, 2008; Lamb & Kling, 2003; Orlikowski, 2000). Whereas the individual level was largely quantitative in nature and sought to examine an individual's acceptance of volitional technology through the exploration of the technology acceptance model (e.g. Agarwal, 2000; Davis, 1989; Venkatesh, 2000; Venkatesh, Brown, Maruping, & Bala, 2008; Venkatesh et al., 2003). Despite these bodies of literature, more research is warranted into understanding the complex nuances of users' behaviour in the contemporary organizational environment where increased pressures, demands and requirements are placed on users.

In summary, continual improvements in technology have resulted in the automization of simple, routine tasks, which have ultimately transformed the requirements of operational users. Consequently operational users need to be knowledgeable, competent, and motivated at using the ES where they face reduced supervision and increased pressure. However, there is a paucity of literature in the discipline which has sought to systematically understand contemporary users. This is clearly an evident gap in the literature as "users can take several actions to improving their performance; they are not limited to improving it only through effective use of a system" (Burton-Jones & Grange, 2013, p. 641). Therefore the characteristics and the nature of a user's interactions with an ES is of extreme importance for deriving business value.

1.2 Research Problem and Rationale

The review of the literature conducted as part of this research identified that the characteristics of individual users have largely been examined in an isolated and piecemeal fashion within the context of volitional use settings. Furthermore it was also evident that critically analysing the characteristics of individual users in a parsimonious, theoretically grounded, multidimensional, holistic manner that is representative of the contemporary organizational environment has yet to be explored in a meaningful way. For example, a user can be knowledgeable and skilled but lack the required motivation to perform their job tasks using an IS. Organizational psychology, training, economics and human resource management disciplines regularly highlight the importance of individuals being both willing and able to effectively execute tasks (e.g. Kraiger, Ford, & Salas, 1993; Pimpakorn & Patterson, 2010; Wright & McMahan, 2011; Zhao, 2008), yet this is regularly overlooked in the IS discipline. In an attempt to fulfil this gap, this study explores the concept of User Capital (UC) which this research defines as the attributes possessed by an individual which enables them to use an IS to perform tasks. It is conceptualized as a multidimensional construct consisting of the cognitive characteristics, skills, motivation, and affective attitude possessed by IS users and is specifically operationalised using metacognitive self-regulation, user competence, mastery motivational disposition, and attitude towards using IS.

Past research which has examined the characteristics of individual users was generally constrained to the acceptance and extent of use of volitional IS. However the examination of user characteristics in mandatory settings have seldom been explored and is therefore a key gap in the disciplines understanding of users. Moreover in the context of mandatory settings, acceptance and extent of use measures are considered to be less relevant (Seddon, 1997), rather effectiveness of use should be considered (Burton-Jones, 2014). The need for effective use as being a necessary and sufficient condition for benefit attainment has been long recognised (e.g. DeLone & McLean, 2003), however it has only recently been conceptualized (e.g. Burton-Jones & Grange, 2013) and is yet to be empirically assessed. Furthermore limited research has been performed into understanding the attributes of users that enable them to effectively use IS (Eschenbrenner & Nah, 2014).

The lack of research into understanding the influence of user characteristics on effective use of ES represents not only a significant gap in the literature but is also a substantial problem for industry. Whilst organizations adopt ES to attain a myriad of both tangible and intangible benefits (Kanaracus, 2008; Markus, Axline, Petrie, & Tanis, 2003; Petter, DeLone, & McLean, 2012), as many as 80% of all ES fail to attain their expected results (Abugabah & Sanzogni, 2010). Whilst there is an array of potential explanation for the lack of benefits, one potential reason stems from ES needing to be effectively used for benefit attainment. Therefore if users do not effectively use the ES and instead perform work arounds, avoid the ES, or enter incorrect data, it will be unlikely that benefits will be obtained. A substantial body of literature has been devoted into understanding the benefits of IS, and prominent IS Success models have predominantly focused on how the technical attributes of an IS (as manifested by system quality and information quality) influence the derivation of benefits (DeLone & McLean, 1992, 2003). Yet an IS can be defined as "*an organized collection of people, information, business processes, and information technology designed to transform inputs into outputs in order to achieve a goal*" (Huber, Piercy, McKeown, & Norrie, 2007, p. 21). The aforementioned definition highlights that IS are not purely technological artefacts; rather the individual who utilises the technology (i.e. the user) is also a central component. With organizations still struggling to attain benefits from ES (Sedera, Eden, & McLean, 2013), the exploration of User Capital (UC) could provide insights into the evident gap in the literature pertaining to users, effective use and success and could provide guidance into how organizations can improve the benefits generated from their IS investments.

In summary, the complex nuances of users' behaviour has largely been overlooked in the discipline and understanding UC could provide insights into effective use and IS success. Furthermore as the conceptualization of UC will be informed by the contemporary organizational environment, it has the potential to provide insights into contemporary phenomena such as user innovation and technostress. Therefore recognising that in contemporary ES environments, organizations need UC to benefit from IS, this research seeks to explore both the intrinsic characteristics of individuals (i.e. User Capital) and the technological attributes of IS and their resultant influence on effective use, which drives business value.

1.3 Research Questions and Objectives

The key drivers of this research stem from both theory and practice, including: (i) the paucity of literature pertaining to the examination of IS users in a holistic, parsimonious, theoretically driven, multidimensional manner; (ii) the lack of empirical research investigating effective use' determinants; and (iii) the widely acknowledge sentiment that organizations are still struggling to attain benefits from their IS investments (Sedera et al., 2013) that are overwhelmingly underutilised (Bagayogo, Lapointe, & Bassellier, 2014). Thus the overall objective of this research is to critically examine the personal and cognitive characteristics of IS users and their resultant influence on effective use and benefits realization. Therefore in order to fulfil this overarching objective, the following research questions need to be examined:

RQ1: *What constitutes Information System User Capital in a contemporary enterprise system's environment?*

In answering the first research question, it is imperative to consider the contemporary enterprise system's environment and the changing demands placed on IS users. For instance, users are becoming increasingly technologically savvy and organizations are placing increased pressures on their users to be innovative, autonomous, and complete broadly defined tasks using IS (Berry & Mok, 2014). To answer this research question, literature pertaining to user' attributes will need to be explored in the IS, organizational psychology and training evaluation domains. Specifically, answering this research will involve drawing on insights from human capital, attitude-behaviour, theory of performance, and the Learning Outcomes Model. Furthermore to adequately answer this research question, the formative versus reflective composition of UC will be determined.

RQ2: *What is the relationship between User Capital and effective use?*

The second research question seeks to examine UC in the context of effective use. Research has continuously proffered the importance of effectively using IS for benefits to be obtained (e.g. Burton-Jones & Grange, 2013; Seddon, 1997). Yet until recently, limited research has been devoted to empirically assessing its antecedents and consequences (Weeger, Neff, Gewald, & Haase, 2014). Specifically, answering this question will draw upon Bandura's (1986) Social Cognitive Theory and the Burton-Jones and Grange (2013) conceptualization of effective use, to determine how personal/cognitive factors as encapsulated by UC influence the behaviour of effective use.

RQ3: *What is the relationship between User Capital, effective use, and, Information Systems' success?*

The third research question seeks to examine the impact that UC and the technical characteristics of the IS, as manifested by system quality and information quality, has on the benefits obtained from the IS. This will involve extending the prominent IS Success model as conceptualized by DeLone and McLean (1992) with UC and the Burton-Jones and Grange (2013) conceptualization of effective use.

1.4 Research Scope

Several key considerations will need to be made to determine the research scope, including: (i) unit of analysis, (ii) type of user, (iii) type of IS, and (iv) lifecycle phase. These considerations are illustrated in Figure 1[1] and are discussed in detail in the following sections.

[1] In Figure 1 the shaded ellipses denote the scope of the research, whereas the unshaded ellipses represent alternative aspects that could be investigated and represents potential areas for future research

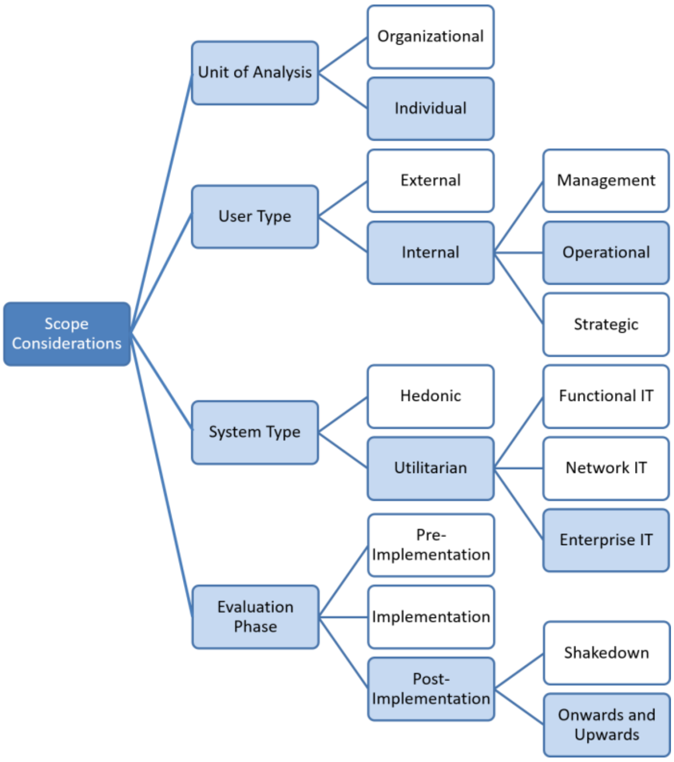


Figure 1: Research Scope Considerations

1.4.1 Unit of Analysis

In accordance with Hair, Black, Babin, and Anderson (2010, p. 692) the unit of analysis is the "*unit or level to which results apply.*" There are predominantly two units of analysis employed by IS researchers, which are the individual and organizational levels (Pinsonneault & Kraemer, 1993). Alternate units of analyses include: team, group, and systems level, however they are not widely employed in the IS discipline (Pinsonneault & Kraemer, 1993). Concepts such as competence have been utilised as a proxy for assessing the quality of an individual (e.g. Davis, 2013; Ho & Frampton, 2010) and as the IT competence of an entire organization (e.g. Trinh, Molla, & Peszynski, 2014; Zhu, Kraemer, & Xu, 2003). Therefore when developing and utilizing constructs it is imperative that the unit of analysis is clearly articulated (MacKenzie, Podsakoff, & Podsakoff, 2011). This research is scoped to the individual level unit of analysis, as it seeks to examine the effective use of an IS by individuals to obtain benefits.

1.4.2 Type of User

An IS user "*is an individual person who employs an Information System in a task"* (Burton-Jones & Straub, 2006, p. 231). As a consequence of IS transcending the organization and eliminating organizational barriers, a user can be internal or external (e.g. customers, suppliers, government bodies) to the adopting organization (Lukyanenko, Parsons, & Wiersma, 2014). Internal and external users interact with IS in different manners and ultimately have vastly different perceptions of success (Boonstra, 2006; Finney, 2011; Khoo & Robey, 2007). Therefore due to the vast differences in characteristics, nature of interactions, and perceptions of success, this research is constrained to only examine IS users who are internal to the adopting organization.

In accordance with Anthony (1988) there are three levels of planning and control activities that occur in predominantly all organizations: (i) strategic planning, (ii) management control, and (iii) task control. Distinct activities, roles, and responsibilities are discernible at each level, however the demarcation between these levels are somewhat blurred (Anthony, 1988; Gorry & Morton, 1989). Many scholars have applied Anthony's (1988) classification of planning and control to the IS field to denote the different types of IS users (e.g. Murphy, 2014; Wickramasinghe & Karunasekara, 2012). These scholars typically categorise the internal IS users as: (i) strategic, (ii) management, and (iii) operational users; which corresponds to Anthony's (1988) strategic planning, management control, and task control levels respectively (Wickramasinghe & Karunasekara, 2012). Figure 2 provides definitions and illustrates the hierarchy associated with each of the aforementioned user types.

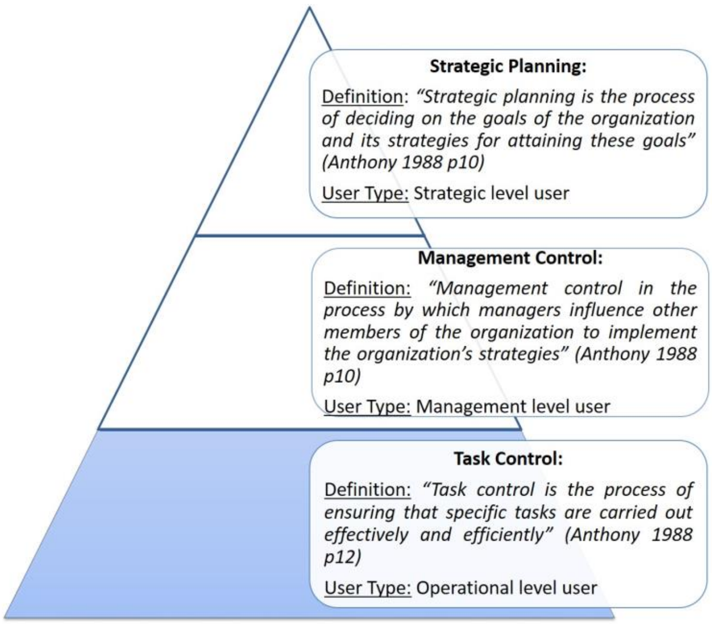


Figure 2: Adaptation of Anthony's (1988) categorization of control and planning to IS users

Due to the differences between user groups, if an omnibus measure was utilised across all cohorts the results obtained could be potentially biased. In this research we focus on operational users. This thesis acknowledges that it is no longer sufficient for operational users to simply perform routine tasks and that the creative application of technology and motivation to learn and regulate behaviour is becoming increasingly important.

1.4.3 Type of Information System

Information Systems (IS) are broadly categorized as being (i) hedonic, or (ii) utilitarian. Utilitarian IS are used in the workplace with the objective of improving the productivity of the organization and its employees (Wu & Lu, 2013). Alternatively, hedonic IS are predominantly used for enjoyment purposes (Wu & Lu, 2013). The motivations underlying the utilization of IS differ between these contexts (Wu & Lu, 2013). This research is constrained to the examination of utilitarian IS only.

In addition, McAfee (2006) identified three distinct types of information technology: (i) Functional; (ii) Network, and (iii) Enterprise IT (refer to Table 2).

Table 2: Types of Information Technology

IT Type	Definition	Examples	References
Functional IT	Specialist technologies that facilitate the execution of stand-alone activities	Spreadsheets, Word processors, etc.	McAfee (2006)
Network IT	Technologies that improve the collaboration and communication between individuals and teams	Email, intranets, etc.	McAfee (2006)
Enterprise IT	Software solutions that provide an integrated suite of applications for the common core of business processes	Enterprise resource planning systems, etc.	Hernandez (2000); Klaus, Rosemann, and Gable (2000); McAfee (2006)

Literature has examined how user attributes influence an individual's use of Functional IT and Network IT, however there is limited research examining user attributes in the context of Enterprise IT (henceforth referred to as enterprise systems) (Sedera & Dey, 2013). Unlike Functional IT and Network IT which are typically optional to use, Enterprise Systems (ES) are mandatory for operational employees. Whilst ES are mandatory to use, users can be resistant to adopting these technologies due to perceived job insecurity, and changes in business processes (Klaus & Blanton, 2010). Furthermore this type of technology is notorious for being difficult to use as a result of its interconnected nature. Due to the complexity associated with ES it is not uncommon for resistant individuals to attempt to find manual work arounds, jeopardising the integrity and potential benefits of the ES (Boudreau & Robey, 2005). As a result of the degree of differentiation between ES and alternate technology types, coupled with the difficulties associated with the use of ES, and the limited amount of research devoted to examining how user attributes influence the success of ES; this research seeks to explore the contextual scenario of

ES use and impact and recognises the human agency perspective. Therefore appreciating that individuals can ultimately determine how they use an IS, even when mandated by management.

1.4.4 Enterprise Systems Evaluation

A key component of this research is to examine how User Capital (UC) influences the effective use and success of the Enterprise System (ES). Due to the nature of ES, it is imperative to consider the lifecycle phase where it is most appropriate to measure UC, effective use, and success dimensions. The meaning of success differs throughout the lifecycle, for instance in the project phase, success is likened to the implementation going according to the timeline and budget (Urbach, Smolnik, & Riemp, 2009). Whereas post implementation, success is a complex multidimensional construct that needs to consider various stakeholders' perceptions, and can be related to both technical and social factors (Laudon & Laudon, 2012). Therefore as this research is examining how UC influences the effective use and success of an ES, this research is constrained to the post go-live phase of the IS lifecycle. However, there are complexities inherent in the ES lifecycle that demand further attention.

The post-go-live phase of the ES lifecycle is typically comprised of distinct phases, namely (i) shakedown, and (ii) onwards and upwards. The shakedown phase occurs immediately after go live and is typically associated with a dip in performance where individuals are learning how to adapt to the new ES (Markus & Tanis, 2000). Whereas the onwards and upwards phase is characterised with benefit realization and ongoing improvements (Markus & Tanis, 2000). Therefore, in order to examine the impact of UC on the effective use and success of the IS, this research is scoped to the onwards and upwards phase of the ES lifecycle.

1.5 Research Design

In accordance with Creswell (2012) research designs are the specific procedures involved in the research process. All research is to some extent influenced by the researchers philosophical, epistemological and methodological preferences (Guba & Lincoln, 1994). Therefore both the research philosophy, and research methodology are included in this section.

1.5.1 Research Paradigm

Positivism and interpretivism are the two most widely adopted research paradigms in the IS discipline (Chen & Hirschheim, 2004). However, the post-positivist research paradigm is also widely used (e.g. DeLuca, Gallivan, & Kock, 2008). The differences between these philosophical stances can be observed through analysis of ontological, epistemological, and methodological viewpoints[2] (refer to Table 3, page 16).

Positivism is overwhelmingly the most prescribed research paradigm in the IS discipline (Chen & Hirschheim, 2004), however it is associated with a number of limitations. These limitations typically pertain to positivist research omitting the context the research phenomenon is embedded in (Orlikowski & Baroudi, 1991). Context is defined by Johns (2006, p. 386) as "*situational opportunities and constraints that affect the occurrence and meaning of organizational behaviour as well as functional relationships between variables*". Understanding the research context can provide insights into: (i) explaining variations in research findings

[2] Ontology, epistemology and research methodology pertains to the researchers view of the nature of reality and people, the underlying assumptions between the research and the known, and the way to acquire and generate knowledge respectively (DeLuca et al., 2008).

between different study settings; (ii) clarifying anomalies in research findings; and (iii) enhancing the relevancy of research findings (Johns, 2006).

Table 3: Differences between Positivist and Interpretivist Research Paradigms

	Positivism	**Interpretivism**	**Post-Positivism**
Ontology	• "*Reality exists objectively and independently from human experience"* (Chen & Hirschheim, 2004, p. 201) • Human action is intentional and rational (Orlikowski & Baroudi, 1991, p. 10)	• *"Reality that is constructed and reconstructed through a human and social interaction process"* (Chen & Hirschheim, 2004, p. 201)	• *"Real reality but only imperfectly and probabilistically apprehendable" (Lincoln & Guba, 2000, p. 165)*
Epistemology	• Deductive testing of propositions, hypotheses, models and theories (Chen & Hirschheim, 2004; Orlikowski & Baroudi, 1991) • Allows verification, falsification, and generalization of results (Chen & Hirschheim, 2004) • Causal relationships with the objective of explanation, predication, and control (Chen & Hirschheim, 2004; Orlikowski & Baroudi, 1991) • Foundational theoretical component (DeLuca et al., 2008).	• Omits deductive reasoning in favour of critically understanding human and social interaction (Chen & Hirschheim, 2004) • Aims not to generalize rather to deeply understand the phenomenon (Orlikowski & Baroudi, 1991) • Acquire a shared understanding of phenomena (DeLuca et al., 2008)	• Positivist paradigm is foundational (DeLuca et al., 2008) • "*Knowledge consists of non-falsified hypotheses that can be regarded as probable facts or laws*" (Guba & Lincoln, 1994, p. 113) • Stable relationships exist between constructs (Petter & Gallivan, 2004)
Methodology	• Quantitative (Chen & Hirschheim, 2004)	• Qualitative (Chen & Hirschheim, 2004)	• Quantitative and qualitative (DeLuca et al., 2008)

Post-positivist research is fundamentally grounded in the positivist paradigm, yet acknowledges the use of qualitative methods to support the study (DeLuca et al., 2008; Guba & Lincoln, 1994). The post-positivist paradigm is similar to positivism in that they both seek to explain and predict phenomenon through hypothesis testing and cause and effect linkages. However they differ in their viewpoint of the nature of knowledge, where positivists believe that *"knowledge consists of verified hypotheses that can be accepted as facts or laws"*, post-positivists believe that "*knowledge consists of nonfalsified hypotheses that can be regarded as probable facts or laws*" (Guba & Lincoln, 1994, p. 113).

This research prescribes to a number of the assumptions bounded in positivism as it seeks to develop hypotheses and empirically test relationships. However, this research also endeavours to address the widely acknowledged limitation of positivist research, which is the omission of the research context. Thus this thesis recognises the pertinence of contextualization, which "*entails linking observation to a set of relevant facts, events, points of view that make possible research and theory that form part of a larger whole"* (Rousseau & Fried, 2001). Specifically this research seeks to employ principles of positivism and understand the context which is a central premise of interpretivism. This acknowledgement of positivist and interpretivist research paradigms is in alignment with post-positivist research.

1.5.2 Research Method

In the IS discipline quantitative and qualitative research methodologies are often treated dichotomously. Quantitative research methodologies largely align with the positivist paradigm (Lee, 1991) and facilitate "*comparison and statistical aggregation of findings"* (DeLuca et al., 2008). As such, quantitative research methods include: surveys, laboratory and field experiments. Alternatively qualitative methods are typically favoured by interpretivists (Lee, 1991) and involves case study and action research approaches. In the IS discipline, survey and case study are the two most commonly employed research methods (Chen & Hirschheim, 2004).

"The case study approach refers to a group of methods which emphasizes qualitative analysis" (Gable, 1994, p. 113) and involves the collection and analysis of interview data. Case studies are ideal for exploratory research that seeks to answer 'how' and 'why' questions (Gable, 1994) and is especially useful for organizational and group level research (DeLuca et al., 2008). Whilst the case study approach has the potential to discover new phenomena, it is limited in its ability to generalize findings (Gable, 1994). The survey approach involves the collection and analysis of quantitative data generated from objective questionnaires (Gable, 1994) and is suitable for research questions pertaining to 'what', 'how' and 'why' (Pinsonneault & Kraemer, 1993). In addition the survey method is capable of objectively testing relationships (Gable, 1994) and "*is best adapted to obtaining personal and social facts, beliefs, and attitude, and it also enjoys the merit of enhancing the generalizability of research findings*" (Fang et al., 2014). Yet, the survey method is criticized for overlooking the research context (Gable, 1994; Guba & Lincoln, 1994).

Due to the relative strengths and limitations of survey and case study research, a growing number of researchers have called for a pluralist mixed methods approach (e.g. DeLuca et al., 2008; Gable, 1994) which recognize that "*qualitative and quantitative methods can complement each other*" (DeLuca et al., 2008, p. 52). The mixed methodology approach combines both quantitative and qualitative methods with the goal of strengthening the richness, robustness, and reliability of research findings (DeLuca et al., 2008; Gable, 1994).

This research is grounded in a post-positivist research paradigm and recognizes the usefulness of both quantitative and qualitative research methodologies. Whilst in this research, the conceptualization of User Capital (UC) represents an exploratory contribution, which would typically involve a qualitative approach, a multidisciplinary review of the literature and multiple theories informed its conceptualization. Based on the extensive literature base and nomological networks surrounding the focal construct a predominantly quantitative approach was followed and the survey method was utilised. The survey method was determined to be appropriate for a number of reasons including: (i) its ability to statistically test relationships; (ii) the research questions pertained to 'what'; and (iii) the individual level focus. However, unlike traditional quantitative research which is often criticized of 'context-stripping' (e.g. Guba & Lincoln, 1994), this research emphasises the importance of the context and was embedded in a field setting.

1.5.3 Field Research

Field research is defined as "*systematic studies that rely on the collection of original data – qualitative or quantitative – in real organizations*" (Edmondson & McManus, 2007, p. 1155). There are seven key phases within field research, namely: (i) identifying the target area of interest; (ii) reviewing the literature; (iii) formulating the research question; (iv) designing the study; (v) collecting and analysing the data; (vi) writing up the results; and (vii) submitting the research findings (Edmondson & McManus, 2007). This process rather than being unidirectional includes iterative, feedback mechanisms, where the research is continually scoped and narrowed

(Edmondson & McManus, 2007). The first three phases are performed to understand the problem space and to scope the study into a meaningful and manageable project (Edmondson & McManus, 2007). Designing the study pertains to identifying the: methodology, data required, data collection site, and data analysis to be performed (Edmondson & McManus, 2007). The final three phases pertain to the collection, analysis and discussion of results (Edmondson & McManus, 2007). These phases are not rigid, rather they are partially determined by the nature of the research and the current state of related literature. For example, when there is a large body of related literature, conceptualization takes place prior to data collection; whereas when there is limited literature, conceptualization occurs subsequent to data analysis (Edmondson & McManus, 2007).

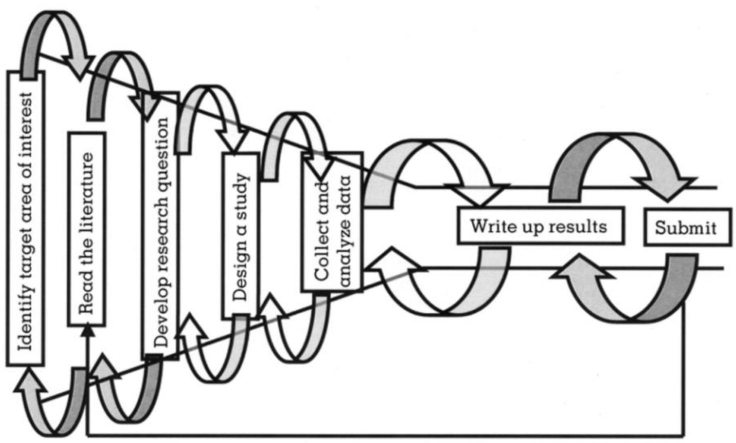


Figure 3: Field Research Process (extracted from Edmondson and McManus (2007, p. 1174)

When determining the research methodology, methodological fit is an important consideration as it aims to ensure internal consistency amongst all phases of the research (Edmondson & McManus, 2007). In order to ensure methodological fit within a field study the selection of the research design should be based on the current state of theory pertaining to the research topic (Edmondson & McManus, 2007). The state of theory is typically considered to lie on a continuum ranging from nascent to mature. Nascent theories usually involve the creation of new constructs, formal measures, and suggestive theories that provide preliminary explanations to how and why questions (Edmondson & McManus, 2007). At the other end of the spectrum, mature theories pertain to the testing of existing theories using established and validated constructs (Edmondson & McManus, 2007). In between nascent theory and mature theories lie intermediate theories, which propose relationships between new and old constructs (Edmondson & McManus, 2007). Consequently as this thesis seeks to (i) create the user capital construct, and (ii) empirically assess it with pre-existing, well validated constructs within the IS success model; this research is indicative of intermediate theory building research.

In accordance with Edmondson and McManus (2007) when the research objective pertains to intermediate theory; both qualitative and quantitative data should be used to empirically test the relationships and elaborate on research findings. Typically qualitative data is used to acquire information pertaining to the phenomenon and context, followed by quantitative data to empirically assess relationships (Edmondson & McManus, 2007). In this research, quantitative data will be obtained from the distribution of the survey at the field organization. However, prior to distributing the survey, qualitative data will be collected through interviews with key informants. The interviews will be designed to support the development of the survey and to understand the research context, including the users, the IS, and the tasks performed within the IS.

Whilst extensive research in the IS domain justifies the capability of the survey method, until recently limited research has been devoted to the formulation and validation of survey instruments (Straub, 1989). In survey research it is paramount that the survey instrument is well formulated and measures what it purports to;

otherwise the results obtained could be associated with validity concerns and surrounded with equivocal results. Therefore, this research prescribes to the survey instrument development guidelines of MacKenzie et al. (2011). Drawing upon the field research approach coupled with survey instrument development guidelines the research design was developed (refer to Figure 4).

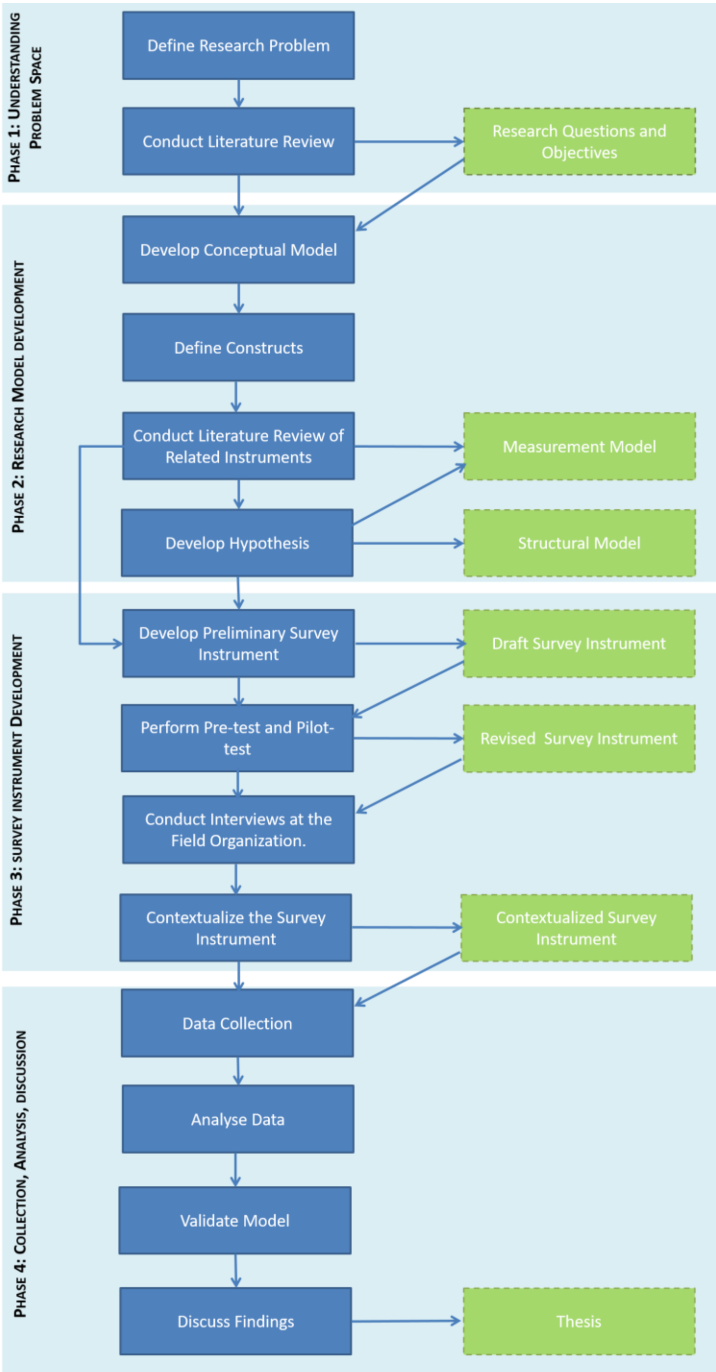


Figure 4: Research Design

1.6 Research Contributions

In agreement with the views of Rosemann and Vessey (2008), this research seeks to be rigorous in its formulation and relevant to both theory and practice. The subsequent paragraphs outline the theoretical and practical contributions of this research.

As previously discussed an IS is both a social and technological solution, that users need to effectively use in order to drive business value (Burton-Jones & Grange, 2013). Yet, remarkably there is a paucity of literature that critically analyses the complexity inherent in the characteristics of individual users specifically in the context of IS Success. Whilst studies have added an abundant amount of value to the IS field through examining user attributes; these studies have predominantly investigated these attributes in a unidimensional manner. However, examining these factors in a unidimensional manner fails to account for the complex nuances in an individual's behaviour. Therefore this research seeks to fulfil this gap in the literature by defining and conceptualizing User Capital (UC) as a multidimensional construct.

In formulating UC as a multidimensional construct, this research utilises a theory-driven approach and draws upon human capital (cf. Becker, 1962), attitude behaviour (cf. Venkatesh et al., 2003) literature, the Theory of Performance (cf. Campbell, McCloy, Oppler, & Sager, 1992; Mccloy, Campbell, & Cudeck, 1994) and the Learning Outcome Model (cf. Kraiger et al., 1993). Consequently, this research conceptualizes UC to consist of skills, cognitions, motivation, and affective attitude. In doing so, this research investigates constructs of user competence, metacognitive self-regulation, mastery motivational disposition, and attitude towards using IS. Therefore this research adds to the growing body of knowledge in the IS discipline pertaining to user competence and attitude towards IS usage. Furthermore, concepts of motivational disposition, and metacognitive self-regulation have been scarcely explored in the IS field. Consequently this research extends the notions of motivational disposition and metacognitive self-regulation to the IS domain. Therefore not only will this research derive a new construct, which is fit for the contemporary organizational environment; it also uses a multidisciplinary perspective, which results in a greater understanding of motivational disposition and metacognitive self-regulation in the IS discipline.

This research seeks to examine UC in the context of effective use and IS success, which represents a significant contribution to both research and practice. Organizations continue to make substantial investments in IS that are to a large extent underutilised (Bagayogo et al., 2014). Furthermore literature pertaining to the drivers of effective use is still in its infancy (Burton-Jones & Grange, 2013). This research postulates that UC is a key driver of effective use and benefit realisation as encapsulated by IS success (e.g. individual impact) (refer to Figure 5). Thus it will benefit the field as it will determine the nature of the relationships between UC, effective use, and IS success. In addition the relationship between UC, effective use, and IS success will also be performed in the presence of the technical characteristics (e.g. system quality and information quality).

Furthermore, this will benefit practice as it will examine how the attributes of users influence effective use. Equipped with this knowledge, organizations will be able to tailor their training programs to fulfil the needs of specific users. Additionally, it has the potential to facilitate organizations in recruiting operational users. In addition, with effective use proffered as a driver of benefit realization, increasing effective use should increase the benefits derived from the IS.

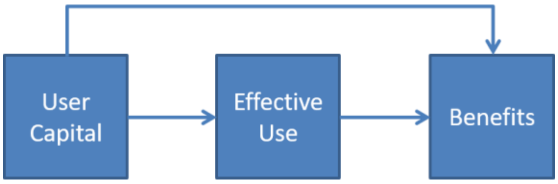


Figure 5: High Level Conceptual Model

To summarize, this research will benefit research and practice in numerous ways: (i) this research will define and conceptualize UC; (ii) it will contribute to literature pertinent to user competence, and attitude towards use; (iii) the notions of motivational disposition, and meta-cognitive self-regulation will be extended to the IS discipline; (iv) this research will examine UC as a driver of effective use, therefore enabling organizations to tailor training strategies and improve recruitment practices; and (v) will investigate UC as a dimension of the DeLone and McLean (1992) IS success model, therefore facilitating organizations to determine whether they need to improve their user base or the technical aspects of the IS to maximise business value.

1.7 Thesis Structure

As evident in Figure 6 (p. 26) the research design consists of four high level phases, which inform the development of the eight thesis chapters.

The objective of ***chapter 1*** is to outline the motivations behind this research. In doing so the research problem is defined and clearly scoped. Furthermore, the overarching research questions and objectives are specified. Subsequently, the theoretical and practical contributions of this research are discussed.

The next phase of the research design involves conducting a literature review which informs ***Chapter 2*** of the thesis. Chapter 2 will review the literature pertinent to IS users, usage, and success, with the aim of identifying the areas that have been examined and the gaps that exist. The gaps that are present in the literature review will be used to further refine the research problem.

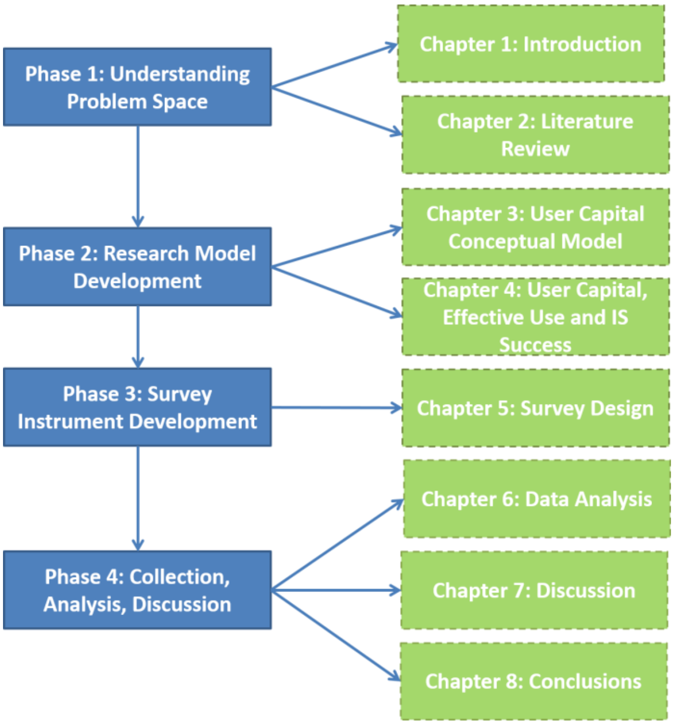


Figure 6: Thesis Structure

In ***Chapter*** 3 User Capital (UC) will be defined, conceptualized and operationalised. The conceptualization will be informed by human-capital, attitude-behaviour, and the theory of performance. Insights from the learning outcomes model will inform the operationalization of UC.

Chapter 4 will involve the creation of structural models. A structural model of the relationship that exists between UC and effective use will be presented and rationalized using the nomological net of Social Cognitive Theory. In addition Chapter 4 will also involve extending the DeLone and McLean (1992) IS success model to incorporate UC and effective use.

Chapter 5 will then illustrate the survey design. In this chapter, the measurement model of UC will be created following the guidelines of MacKenzie et al. (2011). Adhering to these guidelines will provide rigor to the research. In this chapter the details of the pre-test and pilot study will be presented.

Subsequent to data collection, data analysis will be performed, which informs ***Chapter 6*** of the thesis. Therefore, Chapter 6 will include validity and reliability assessments, as well as the outcomes of the hypothesised relationships developed in Chapter 4.

Chapter 7 seeks to interpret and discuss the findings present in chapter 6. Unlike Chapter 6, Chapter 7 will not be constrained purely to the statistical testing of relationships, rather it will show how this research informs literature. The interpretation and discussion of findings will also inform Chapter 8.

The thesis concludes with ***Chapter 8*** by summarising the outcomes, as well as the limitations and future directions of this research.

1.8 Chapter Summary

To conclude, there are three key motivations behind this research. Firstly, limited research has been conducted that seeks to comprehensively understand users. Secondly, IS must be effectively used to drive business value (Burton-Jones & Grange, 2013). Thirdly, users can improve their performance in numerous ways, therefore individuals are not solely limited to the effective use of IS (Burton-Jones & Grange, 2013). Consequently, this research seeks to answer the following research questions:

> ***RQ1:*** *What constitutes Information System User Capital in a contemporary enterprise system's environment?*
>
> ***RQ2:*** *What is the relationship between User Capital and effective use?*

RQ3: *What is the relationship between User Capital, effective use, and, Information Systems' success?*

In answering the aforementioned research questions, this research considers the changing nature of operational users in the contemporary organizational environment. Therefore this research defines UC as *the attributes possessed by an individual which enables them to use an IS to perform tasks.* By drawing upon human capital, attitude-behaviour literature and the theory of performance, this research conceptualizes UC as a multidimensional construct consisting of the cognitive characteristics, skills, motivation, and affective attitude possessed by IS users. It is operationalised by drawing on the Learning Outcomes Model (Kraiger et al., 1993) to specifically include metacognitive self-regulation, user competence, mastery motivational disposition, and attitude towards using IS. Furthermore the construct of UC will be investigated in a nomological network with effective use, followed by an investigation into its influence on the DeLone and McLean (1992) IS success model

Therefore this research will benefit both research and practice by: (i) conceptualizing UC; (ii) Adding to the cumulative body of knowledge pertaining to user competence and attitude towards IS use; (iii) Extending the notions of motivational disposition and metacognitive self-regulation to the IS discipline; (iv) Examining UC as a determinant of effective use; and (v) extending the DeLone and McLean (1992) IS success model to incorporate UC. It is important to note that this research is scoped to the UC of operational level users, who knowingly interact with an ES in the post go-live phase of the IS lifecycle. Whilst, this may be considered a limitation, future research could be devoted to understanding different types of users across varying types of IS.

Chapter 2: Literature Review

As highlighted in the introductory chapter, the overarching objective of this research is to conceptualize User Capital (UC) as a multidimensional construct. Once conceptualized, UC will be assessed in a nomological network with effective use, and in the broader context of IS success. Therefore this chapter seeks to critically analyse the literature related to UC, effective use, and IS success.

Specifically, this literature review explores the following topics: Firstly, (i) a high level overview of Information Systems (IS) will be presented with emphasis placed on Enterprise Systems (ES), which is in alignment with scoping considerations. Secondly, (ii) as this research is constrained to understanding the influence of UC on the use and benefits of ES, a discussion of the different types of IS use will be presented. Furthermore an objective of this thesis was to analyse UC in a nomological network with effective use, consequently the seminal work of Burton-Jones and Grange (2013) in which effective use was conceptualized will be examined. Thirdly, (iii) the literature related to IS success will be investigated with emphasis placed on the cumulative efforts that stemmed from the DeLone and McLean (1992) IS Success model. Thereafter, (iv) the different types IS users will be discussed focusing largely on operational users. Then (v) a systematic review of user characteristics will be performed to understand how users have been examined in the IS discipline. Table 4 outlines the key objectives of each section of the literature review. This chapter will conclude by highlighting the current gaps in the literature pertaining to UC, effective use and IS success.

The insights from this literature review will assist with the conceptualization of UC (Chapter 3) and the formulation of the structural model investigating UC, effective use and IS Success (Chapter 4).

Table 4: Objectives of Literature Review

Theme	Objective
2.1 An Overview of Information Systems	▪ Define an IS. ▪ Provide an overview of ES. ▪ Identify the benefits of ES.
2.2 Information System Usage	▪ Identify how IS use has been previously examined. ▪ Critically examine effective use.
2.3 Information Systems Success	▪ Define IS success. ▪ Introduce the constructs apparent in the DeLone and McLean (1992) IS Success model. ▪ Discuss the strengths and weaknesses of the DeLone and McLean (1992) IS Success model.
2.4 Information Systems Users	▪ Identify the different types of IS users. ▪ Illustrate the requirements of operational level users. ▪ Discuss the importance of users.
2.5 User Characteristics	▪ Multidisciplinary review of literature exploring individual characteristics and performance. ▪ Present the results of the archival analysis of user characteristics. ▪ Highlight the gaps in the literature pertinent to IS users.

2.1 An Overview of Information Systems

The Information Systems (IS) discipline is often criticized for lacking an identity with a universal definition of IS evading the literature (e.g. Baskerville & Myers, 2002; Benbasat & Zmud, 2003; Polites & Watson, 2009; Weber, 2003). As this research investigates the influence of User Capital (UC) on effective use and IS success, it is necessary to specify the definition of an IS that this research prescribes to. Therefore this section reviews the literature to reach a definition. Subsequently the different types of IS are explored with emphasis placed on Enterprise Systems (ES).

2.1.1 Information Systems: Towards a Definition

Several prominent scholars have contributed potential definitions for Information Systems (IS) (e.g. Alter, 2008; Davis, 2000; Hevner, March, Park, & Ram, 2004; Laudon & Laudon, 2012). These definitions lay on a continuum between two opposing viewpoints. The first perspective considers an IS as only a technological artefact, in which "*an information system is a data table, whose columns are labelled by attributes, rows are labelled by objects of interest and entries of the table are attribute values"* (Pawlak, 2002, p. 182). Whereas the alternate viewpoint treats an IS as a purely social system "*which assembles, stores, processes and delivers information relevant to an organization (or to society) in such a way that the information is accessible and useful to those who wish to use it including managers, staff, clients and citizens. An information system is a human activity (social system) which may or may not involve a computer system"* (Buckingham, Hirschheim, Land, & Tully, 1987, p. 18).

Whilst the aforementioned perspectives of IS are apparent in the discipline, most scholars view IS as a social and technical system (Laudon & Laudon, 2012), consisting of human interactions and the technological artefact (Huber et al., 2007). Kroenke (2008) further supports this view and considers an IS to consist of five components: hardware, software, data, procedures, and people. This is in alignment with Davis (2000, p. 67) who states that IS '*consists of the information technology infrastructure, application systems, and personnel that employ information technology to deliver information and communication services for transaction processing/operations and administration/management of an organisation*'.

Wand and Weber (1995) formulated the structure of an IS by applying the Representation Theory lens. In doing so, Wand and Weber (1990; 1995) theorised that the IT artefact consisted of three structures: physical, surface, and deep structures (refer to Figure 7). The physical structure refers to the fundamental hardware and infrastructure that supports both the deep structure and surface structure (Strong & Volkoff, 2010). Alternatively the surface structure pertains to user interfaces and report formats that enable users to access deep structures (Strong & Volkoff, 2010). Whereas, the deep structures are representative of the real-world and provide the functionality of the IT artefact (Strong & Volkoff, 2010).

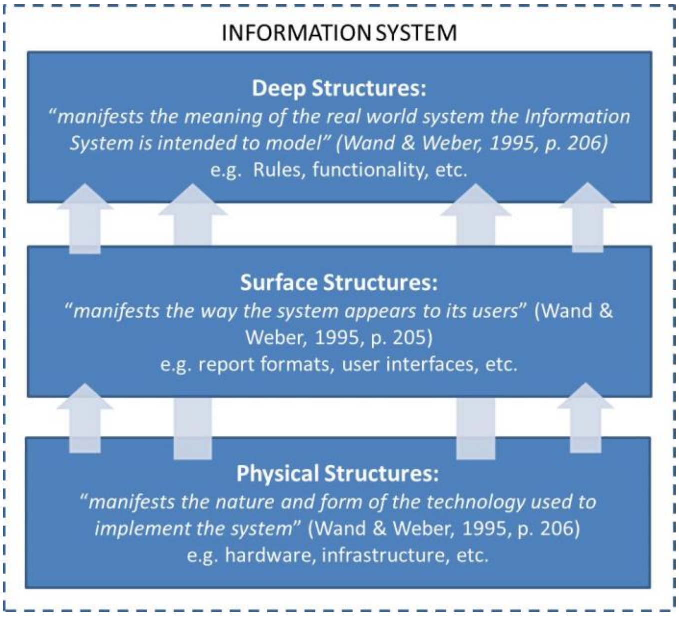


Figure 7: Structure of an Information System: Representation Theory Perspective

In conceptualizing the IT artefact, Wand and Weber (1990, pp. 62-63) stated that an IS is "*not concerned with the way it is managed in organisations, the characteristics of its users, the way it is implemented, the way it is used, the impact it has on such factors as quality of working life or the distribution of power in organisations or the type of hardware or software used to make it operational*." This perspective aligns with the technical/mathematical viewpoint at the oversight of users. It also disregards a substantial body of literature dedicated to investigating user attributes (e.g. Ballantine et al., 1996; Sabherwal, Jeyaraj, & Chowa, 2006); cultural and political issues (e.g. Watson & Brancheau, 1991), change management (e.g. Zabjec, Kovacic, & Stemberger, 2009), and knowledge management strategies (e.g. Sedera & Gable, 2010). However prominent scholars have extended the Wand and Weber (1990; 1995) conceptualization to account for the interactions that occur during IS use (e.g. Burton-Jones & Grange, 2013; Strong & Volkoff, 2010).

Akin to the purpose of this study, which is to determine the components that constitute user capital and the resultant influence on IS success, both user attributes and their interactions with the technological artefact need to be considered. Consequently, this research prescribes to the definition proposed by Huber et al. (2007, p. 21), whereby an IS is defined as: "*an organized collection of people, information, business processes, and information technology designed to transform inputs into outputs in order to achieve a goal.*"

2.1.2 Types of Information Systems

Information Systems (IS) have been utilised by organizations for a myriad of purposes since the 1950s (Piccoli & Lui, 2013). Originally IS were largely limited to data processing activities that demanded highly skilled individuals (Petter et al., 2012). However technological advancement and improvements in network capabilities, resulted in the advent of enterprise-wide systems used to support the entire organization in completing their day-to-day activities (Petter et al., 2012).

One of the most widely recognized classifications of IS, segmented technological artefacts into three categories: Functional (FIT), Network (NIT), and Enterprise IT (EIT) (McAfee, 2006). When creating this classification McAfee (2006) analysed the purpose, voluntariness, and complements of each technology type. There are typically considered to be four complements that optimize the value received from technology, which are: skilled employees; teamwork; business process reengineering; and decision making responsibilities (McAfee, 2006).

The purpose of FIT is to facilitate the completion of discrete tasks, with the objective of improving efficiency (McAfee, 2006). Typical examples of FIT include word processing software, and spreadsheet applications (McAfee, 2006). Comparative to other technology types, FIT is not mandatory to use and complements are not imposed on the user (McAfee, 2006). For instance, a user could use FIT to improve their efficiency; however they are not required to change their underlying processes, team structures, or decision making hierarchy.

Alternatively, NIT is used to facilitate communication and collaboration between individuals internal and external to the adopting organization. Arguably, email is the most common example of NIT, other examples include wiki spaces and blogs (McAfee, 2006). Since its conception NIT has been continuously evolving and also includes enterprise social networks, and intranets. The use of NIT whilst encouraged by top management, is not typically mandated (McAfee, 2006). Whilst complements are not imposed, they usually naturally arise overtime with use (McAfee, 2006). For instance increased usage of NIT can result in team formations.

EIT fundamentally differs to FIT and NIT. EIT dictates the sequence of activities that occur within business processes, and therefore imposes complements (McAfee, 2006). The use of EIT is mandated by top management and is usually associated with changes in organizational hierarchy (McAfee, 2006). Common examples of EIT include Customer Relationship Management (CRM) Systems, Supply Chain Management (SCM) Systems, and Enterprise Systems (ES) (McAfee, 2006). As previously outlined this research is scoped to focus on ES.

2.1.2.1 Enterprise Systems

In accordance with Klaus et al. (2000, p. 141), ES are "*comprehensive, package software solutions that seek to integrate the complete range of a business's processes and functions in order to present a holistic view of the business from a single information and IT architecture".* ES are not solely constrained to the adopting organization, rather they cross organizational boundaries, facilitating inter-organizational communication and collaboration. In an attempt to illustrate the complex, integrated nature of an ES, Davenport (1998) illustrated the anatomy of an ES as consisting of one common database that supports finance, manufacturing, inventory, human resources, services and sales related activities between employees, customers and suppliers.

ES are packaged software solutions, developed by software vendors as a largely one size fits all approach. However, industry tailored solutions are available. ES require extensive configuration efforts and organizations can opt to customise the ES to better suit their requirements by changing the underlying source code (Light &

Wagner, 2006). However, customisation can result in cost and schedule overruns and are associated with heavy maintenance efforts (Finney & Corbett, 2007). SAP, Oracle, and Microsoft, are the most common ES vendors, and together hold a 53% market share (Panorama Consulting Solutions, 2012). Regardless of the vendor, each ES is built upon best practice business processes. In accordance with Ekman and Thilenius (2011, p. 64) best practices refers to "*simply the best way to perform a process"* as specified by the software vendor. Best practices are designed to standardized business processes across industries with the goal of increasing efficiency and improving productivity (Soh, Sia, & Tay-Yap, 2000). Therefore adopting an ES is typically associated with business process reengineering.

A substantial body of literature has been devoted to examining the benefits that result from ES use. Cottleleer and Bendoly (2006) performed a case study and identified that ES result in ongoing operational performance improvements. Hendricks, Singhal, and Stratman (2007) also evidenced that ES use is associated with profitability improvements. Furthermore at the individual level, Chang (2006) utilised a multi-method approach and found that the perceived benefits of ES include: (i) reduction in the uncertainties apparent within business processes; (ii) improved synergies between operations and technologies, and (iii) enhanced decision making. Whilst the benefits of ES are seemingly tantalizing, immediately after go-live organizations typically experience a dip in performance, which is commonly referred to as stabilization (Markus & Tanis, 2000). This dip in performance occurs as a result of users being resistant, and requiring more training and experience with the ES (McLean, Sedera, & Tan, 2011). Some organizations struggle to start accruing benefits after stabilization and suffer significant financial losses (Songini, 2000), whilst others become obsolete (Scott, 1999).

In an attempt to improve the benefits derived from ES use, several scholars have analysed the antecedents of benefit formation. Using the quantitative research methodology, Kositanurit, Ngwenyama, and Osei-Bryson (2006) identified that quality, ease of use, and actual use of the ES, positively influenced the performance of individual users. Motivated by use being necessary for benefit realization, Liu, Feng, Hu, and Huang (2011) performed multiple case studies in which they derived a series of propositions outlining that supervisors, performance evaluations, intrinsic motivation, and perceived usefulness were drivers of ES use. Furthermore, others investigated how user characteristics influenced the technology acceptance as opposed to directly examining use and benefit attainment (Eden, Sedera, & Tan, 2014). For example, Scott and Walczak (2009) statistically evidenced a positive relationship between computer self-efficacy, perceived ease of use and perceived usefulness. In a similar vein, Klaus and Blanton (2010) identified that individual, system, organizational, and process related issues were determinants of user resistance. Yet despite these cumulative efforts, 49% of organizations still receive less than half of their projected benefits (Panorama Consulting Solutions, 2013).

One of the central underlying issues affecting benefit realization involves 'best practices'. Best practices have the potential to generate substantial value, however they can also create employee resistance through imposing processes and hierarchies (Kim & Kankanhalli, 2009). Furthermore best practices do not suit all organizations, nor do they facilitate all the processes that take place within an organization; rather they are designed for the common core of business processes (Wagner & Newell, 2007). This sentiment is substantiated by Olsen (2009) who highlights that niche organizations can receive greater competitive advantage through in-house development as opposed to adopting an ES. Similarly Chou and Chang (2008) statistically evidenced that customizing the ES to fit the adopting organization is necessary to derive business value. However, others (e.g. Finney & Corbett, 2007) have highlighted the necessity of performing minimal customization to avoid substantive project delays and cost overruns, and stress that change management practices should be implemented so individuals appropriately use the ES.

The detrimental effect that results from the use of best practices is the concept of misfits, which are "*the gaps between the functionality offered by the package and that required by the adopting organization*" (Soh et al., 2000, p. 47). It is imperative to minimise misfits to obtain greater benefits from the ES (Seddon, Calvert, & Yang, 2010; Wei, Wang, & Ju, 2005). Misfits can result from the ES lacking required features (deficiencies) or due to the inherent characteristics of the ES (impositions) (Strong & Volkoff, 2010). In analysing misfits using grounded theory, Strong and Volkoff (2010) identified that misfits arise from six areas: functionality; data; usability; roles of individuals; controls; and organizational culture. In addition, Strong and Volkoff (2010) extended the representation theory perspective of the IT artefact (e.g. Wand & Weber, 1995) and identified that surface structures, physical structures, and deep structures interact to form latent structures. Unlike the traditional conceptualization of the IT artefact (e.g. Wand & Weber, 1995) which was void of the social aspect, Strong and Volkoff (2010) identified that organizational culture, roles, and control misfits were all apparent in the latent structures. When describing latent structures, Strong and Volkoff (2010) provided the following example of the bill of materials. The bill of materials includes the materials and subassemblies required to manufacture a product, enables functionality, and embeds controls for other related activities. Due to the integrated nature of ES, the bill of material can impact many aspects of the business and potential negative impositions can result.

The bill of materials can be completed in different ways at the users; discretion, some of these methods are more optimal than others (Strong & Volkoff, 2010). Therefore to minimise the resultant negative impact in other areas of the business, users need to have the necessary capabilities to create the bill of material in the optimum manner.

In accordance with Orlikowski (2000) to obtain benefits from an IS, the IS must be used. Whilst top management dictates that ES are mandatory, not all ES drive business value. One rationale for this is that users can use ES in different ways (Hsieh & Wang, 2007). Drawing upon human agency, Boudreau and Robey (2005) identified that some individuals intentionally 'avoid' using ES, whilst others formulated workaround measures. In addition, ES are typically considered to be unintuitive for users (Wailgum, 2008). Consequently, due to misfits, unintuitive user interface, and human agency, it is imperative that users are knowledgeable, skilled, and motivated to use an ES. Yet, only limited research has investigated the intrinsic user characteristics that affects ES use and benefits (Sedera & Dey, 2013).

2.2 Information System Usage

There has been a long standing tradition in the Information Systems (IS) discipline to research phenomenon related to IS use. Based on the scoping considerations outlined in the introductory chapter, this section pertains largely to individual-level use of IS, within organizational settings. IS use has been investigated in a myriad of ways (Burton-Jones & Straub, 2006) including: (i) as a proxy for implementation success (Sharma & Yetton, 2003); (ii) an antecedent to deriving organizational and individual benefits (DeLone & McLean, 2003); and (iii) as a facilitating influence of decision making (Hou, 2012). In addition, scholars have also investigated the antecedents of IS use, with a preponderance of literature drawing upon the Technology Acceptance Model (TAM) to analyse the relationship between 'intention-to-use' and actual IS usage (Davis, 1989; Venkatesh & Davis, 2000). The use of IS can be mandated on users or can be at their own volition (Karahanna, Straub, & Chervany, 1999). However TAM literature has predominantly focussed on volitional use (Boss, Kirsch, Angermeier, Shingler, & Boss, 2009) potentially to the detriment of understanding the factors that influence mandatory use. A plethora of different measures have been utilised to determine actual IS use behaviour (refer to Appendix B), including: extent, duration, frequency and proportion of use. However, scholars have criticized these simple use measures in the context of mandatory IS (Weber, Gewald, & Weeger, 2015).

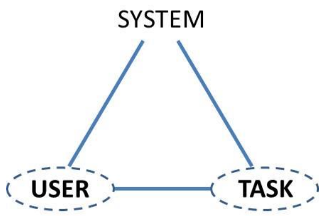
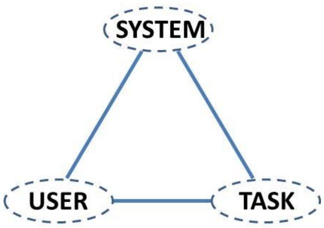
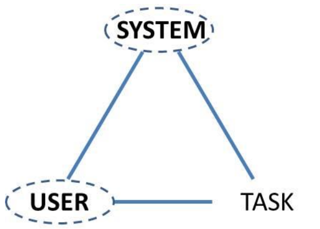
In an attempt to resolve the ambiguities surrounding IS use measures; Burton-Jones and Straub (2006, p. 231) formulated a comprehensive definition of IS use, and defined it as "*an individual user's employment of one or more features of a system to perform a task*". Burton-Jones and Straub (2006, p. 231) conceptualised IS use to consist of three components: the IS; the user; and the task. The IS is the technological artefact the user interacts with. Whereas the user is the individual who appropriates the IS to complete a task (Burton-Jones & Straub, 2006). The task pertains to "*a goal directed activity performed by a user"* (Burton-Jones & Straub, 2006, p. 231).

Depending on the nature of the research, scholars do not need to account for all IS use components. Rather, scholars need to consider the aspects of IS use that best fulfils the requirements of their study (Burton-Jones & Straub, 2006). Regardless, lean measures of IS use such as dichotomous variables representing use or non-use, or omnibus measures for extent of use; should be avoided as they do not adequately convey what is being measured (Burton-Jones & Straub, 2006). Consequently, all use measures should at a minimum reference the IS being used (Burton-Jones & Straub, 2006). Despite their efforts to conceptualize IS use; the results surrounding the impact of IS use on individuals and organizations are fairly mixed (Petter, Delone, & McLean, 2008). However, IS use in itself does not derive value (Seddon, 1997; Trieu, 2013), the use must be effective (Burton-Jones & Grange, 2013). Motivated by the necessary and sufficient condition of effective use for deriving business value, Burton-Jones and Grange (2013, p. 633) conceptualized effective use and defined it as "*using a system in such a way that helps attain the goals for using a system*".

In order to develop a conceptual model of effective use, Burton-Jones and Grange (2013) extended the representation theory (Wand & Weber, 1990). The representation theory asserts that the IT artefact consists of three structures: physical, surface, and deep structures (refer to *2.1.1 Information Systems: Towards a Definition*) (Wand & Weber, 1990; Wand & Weber, 1995). Central to deep structures is the concept of the fallibility of representations (Burton-Jones & Grange, 2013). Users can create representations, change the meaning of representations through performing manual work-arounds, and leverage representations to make strategic business decisions (Burton-Jones & Grange, 2013).

Consequently in order to effectively use an IS, users must be able to use the hardware (physical structures), interact unimpeded with the user interface (surface structure) and be able to determine the fallibility of the representations they leverage (deep structures). Thus drawing upon the physical structures, surface structures and fallibility of the representations embedded within the deep structures, Burton-Jones and Grange (2013) conceptualized effective use as an aggregate, formative construct, that is hierarchical in nature, consisting of transparent interaction, representational fidelity, and informed action (refer to Table 5). Consequently, users must be able to transparently interact with the IS prior to determining the fallibility of the representations in the deep structure. Subsequently informed decisions can only be enacted once faithful representations are ascertained.

Table 5: Description of Facets of Effective Use

Effective Use Dimension	Definition*	Link to System Usage**
Informed Action	"*The extent to which a user acts upon the faithful representations he or she obtains from the system to improve his or her state.*"	
Representational Fidelity	"*The extent to which a user is obtaining representations from the system that faithfully reflect the domain being represented.*"	
Transparent Interaction	"*The extent to which a user is accessing the system's representations unimpeded by its surface and physical structures.*"	

*Burton-Jones and Grange (2013, p. 642).
** The bolded terms in the ellipses denote the specific aspect of system use that is purportedly being investigated.

Research pertaining to effective use is still in its infancy and consequently the extent to which scholars have examined the Burton-Jones and Grange (2013) conceptualization is fairly limited. One exception is the research performed by Trieu (2013) who extended the conceptual model of effective use to the context of decision making using a business intelligence system. Conversely Stein, Lim, and Tan (2014) performed a case study to examine how Strong and Volkoff (2010) IS misfits impeded effective use. In a similar vein Weeger et al. (2014) also examined how misfits affected effective use, however they did not examine the dimensions of effective use. Overwhelmingly, research into effective use is still in its infancy and prominent scholars continue to emphasise its importance for attaining business value.

2.3 Information Systems Success

As previously discussed in the introduction, the meaning of success differs throughout the Information Systems (IS) lifecycle and different stakeholders can have varying perspectives of success (Laudon & Laudon, 2012). Akin to the purpose of this thesis, this section is scoped to the discussion of success in the post-implementation phase of the IS lifecycle.

Organisations are under increasing scrutiny and pressure to justify the value of their IS investments (Kanaracus, 2008; Markus et al., 2003). In the context of complex enterprise systems (ES), measuring the value of these investments is becoming increasingly difficult due to the substantial costs and risks associated with the implementation and the difficulty with quantifying tangible and intangible benefits (Sedera et al., 2013). In addition, when organizations attempt to evaluate their IS, *"their processes and measures are often idiosyncratic, lacking credibility, or comparability"* (Sedera et al., 2013, p. 2). Consequently IS success is a highly impactful research area in the IS discipline. As a result many renowned scholars have contributed to this domain through formulating success definitions and structural models to explain and predict the likelihood of success. Table 6 outlines several definitions of IS success and the related concept of IS impact.

Table 6: Information Systems Success Definitions

Concept	Definition	Reference
IS Success	Multidimensional and interdependent construct consisting of: system quality, information quality, use, user satisfaction, individual impact, and organisational impact.	DeLone and McLean (1992)

IS Success	*"The measure of the degree to which the person evaluating the system believes that the stakeholder is better off. Logically if net benefits could be measured with precision IS success would be equivalent to Net Benefits. However IS success also has political and emotive overtones of "we won" about it."*	Seddon (1997, p. 246)
IS Success	*"Assessment of satisfaction, as reported by key personnel, and the evaluation of the capabilities of the constructed system, described in various terms such as system performance, effectiveness, quality, use and user satisfaction."*	Bokhari (2005, p. 211)
IS Impacts	*"A measure at a point in time of the stream of net benefits from the IS to date and anticipated, as perceived by all key user groups"*	Gable, Sedera, and Chan (2008, p. 381)

Whilst a formal agreed upon definition of IS success evades the literature, overarching similarities are present within the definitions. Each definition in Table 6 highlights the complex nature of IS success and demonstrates that simple return on investment measurements do not suffice. Rather, they emphasise that success needs to consider both the benefits derived from the use of the IS and the perspectives of the users. Several approaches have been used by scholars to evaluate IS including: Kaplan and Norton's (1992) balanced scorecard (e.g. Kasiri, Sharda, & Hardgrave, 2012; Park, Lee, & Yoo, 2005), benchmarking (e.g. Seddon et al., 2010), and surrogate measures of use and satisfaction (e.g. Bokhari, 2005).

Arguably the most notable contribution in this domain is the IS success model developed by Delone and Mclean (1992:2003). This model has been cited over 9000 times and has been used to evaluate various IS including: e-government (e.g. Wang & Liao, 2008), e-commerce (e.g. Sharkey, Scott, & Acton, 2010), e-learning systems (e.g. Chang, Liu, & Hwang, 2011), and ES (e.g. Sedera et al., 2013). Recognising the complexity of IS success, DeLone and McLean (1992) treated success as an interdependent construct comprised of six units: information quality; system quality; use; user satisfaction; individual impact; and organizational impact (Figure 8).

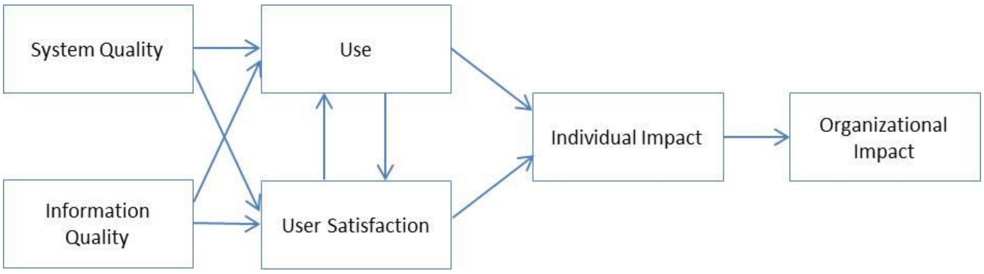


Figure 8: Information Systems Success. Adapted from DeLone and McLean (1992).

DeLone and McLean (1992) did not empirically test their model, alternatively they called for researchers to try, test and extend their model. Consequently, the IS Success model was updated in 2003 (DeLone & McLean, 2003) (Figure 9). The update recognised that IS have overarching impacts that extend beyond the adopting organization. Consequently, organisational and individual impact were condensed into one construct indicative of 'net benefits'. Furthermore, the service quality construct was added, to represent how well the IT department support the IS. In addition the 'use' construct was also further expanded to show the cyclical structure between user satisfaction, intention to use, and use (DeLone & McLean, 2003).

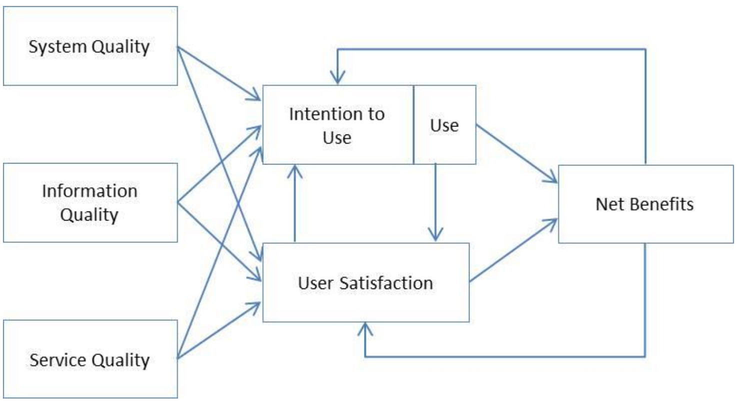


Figure 9: Updated Information Systems Success. Adapted from DeLone and McLean (2003)

Table 7 defines the constructs apparent in both the original (DeLone & McLean, 1992) and updated (DeLone & McLean, 2003) IS success models.

Table 7 Definitions for the Dimensions of IS Success

Construct	Definition
System Quality	The usefulness of the IS, including ease of use, response time, reliability, accessibility and flexibility.
Information Quality	The accuracy and precision of the information provided by the system, including the sufficiency, accuracy and relevance of reports.
Service Quality	The overall service/support provided by the IT department.
Use	The amount the system and its outputs (reports) are utilized.
User Satisfaction	The degree the system satisfies the requirements of the user.
Individual Impact	The impact the system has on an individual user including improvements in user's performance.
Organization Impact	The tangible and intangible benefits experienced by the organization as a result of the IS.
Net Benefits	The net benefits experienced by all relevant parties. This construct is a result of condensing individual impact and organizational impact. These constructs were condensed as IS have influenced additional parties other than just the individual users and the implementing organization.

DeLone and McLean (1992:2003); Petter et al. (2008)

However *"despite considerable empirical research, results on the relationships among constructs related to information systems success, as well as the determinants of IS success, are often inconsistent"* (Sabherwal et al., 2006). This lack of consistency in findings is partially attributed to the lack of (i) measurement level attributes (Gable et al., 2008), and (ii) theoretical clarity (Seddon, 1997).

In terms of measurement level attributes for IS success, perceptual measures as opposed to objective measures are typically utilised. However, in the formation of the IS Success model, largely due to its initial conceptual nature, the relevant stakeholder groups were not specified. This has the potential to be problematic as past literature has illustrated that different user groups have different perceptions of success (Murphy, 2014). For example Gable et al. (2008) identified that different groups place different levels of importance on the constructs within the IS Success model.

Strategic users place greater emphasis on organizational impact and information quality, in contrast to operational users who value system quality and individual impact (Gable et al., 2008). Furthermore depending on the expertise of the user the perception of the constructs present within IS Success differ (Sedera & Dey, 2013).

Asides from issues pertaining to who the participants should be when evaluating the IS Success model, another potential limitation was the lack of clarity in terms of when the measurement of the constructs should take place. The IS Success model was conceptualised based on the fundamental premise that IS must be used in order for benefits to be obtained. Therefore it is clear that IS Success as conceptualised by DeLone and McLean (1992) pertains to the success of IS in the post implementation phase of the lifecycle (Sedera et al., 2013). However, the post implementation phase is often considered to consist of two different phases, namely: shakedown, and onward and upwards (Markus & Tanis, 2000). The shakedown phase is typically associated with a dip in performance (Wong, Scarbrough, Chau, & Davison, 2005). Whereas, the onwards and upwards phase involves upgrading and integrating the IS with other IS to maximise benefits (Markus & Tanis, 2000). Therefore determining when to actually measure success is crucial as if not adequately addressed inconsistent results could be obtained.

The aspect of the IS Success model that arguably encountered the most criticism was the lack of theoretical clarity. In accordance with DeLone and McLean (1992), IS Success "*recognizes success as a process construct which must include both temporal and causal influences.*" Thus highlighting that IS success was developed using a combination of variance (i.e. causal influences) and process (i.e. temporal) theoretical approaches (Seddon, 1997). However the variance and process approach are fundamentally different. Furthermore combining theoretical approaches contributes to inconsistency in model interpretation, which leads to heightened instability and diminishes cumulative power (Mohr, 1982).

Using the process approach results in the formation of a process model, which is comprised of a series of events that occur in a specific order (Mohr, 1982). The process model highlights the sequence of events that need to occur for an outcome to be reached (Newman & Robey, 1992). If the sequencing of events is not followed then it would be unlikely for the outcome to be reached. Typically process models are examined using qualitative data analysis techniques such as the case study method (Beaundry & Pinsonneault, 2005; Crowston, 2000; Montealegre & Keil, 2000). Applying the principles of the process approach to the IS Success model would correspond to system quality, information quality, and service quality being attained prior to use, which occurs prior to benefit formation. Consequently all system quality dimensions would precede any impacts (i.e. individual, organizational, etc.) being obtained. However, Sedera et al. (2013) analysed case study data and identified that this time ordering of events does not hold true and that some system and information quality dimensions were not fully attained prior to the generation of benefits.

Conversely the variance approach results in a variance model which examines the causal relationships between variables. The variables in the variance model must be both necessary and sufficient (Mohr, 1982). Unlike the process model, which highlights the time ordering of events that are necessary for an outcome to be reached, variance models hypothesise relationships in which more/less of one variable leads to more/less of another variable. Quantitative data analysis techniques are traditionally applied to testing variance models using tools such as regression and structural equation modelling. Applying the principles of the variance approach, the IS success model would correspond to the greater the system quality/information quality, the greater the use, and the greater the benefits obtained. Sedera et al. (2013) provided preliminary supporting evidence for the variance perspective of IS Success.

2.4 Information Systems Users

An Information Systems (IS) user "*is an individual person who employs an Information System in a task"* (Burton-Jones & Straub, 2006, p. 231). As previously discussed IS can transcend organizational barriers and therefore individuals internal or external to the adopting organization can use the technology (Lukyanenko et al., 2014). This research is scoped to users internal to the adopting organizations, as such the following sections will only discuss internal IS users.

2.4.1 Internal Information Systems Users

In order to account for the differences between IS users, scholars have extended Anthony's (1988) levels of planning and control activities, to the IS discipline (e.g. Murphy, 2014; Wickramasinghe & Karunasekara, 2012). In accordance with Anthony (1988) there are considered to be three levels of planning and control activities, which are: (i) strategic planning, (ii) management control, and (iii) task control. Strategic Planning typically encompasses senior executives and top level management who are considered to be the "*thinkers*" of the organization and are responsible for setting organizational goals, objectives, and strategies (Anthony, 1988). The activities involved in strategic planning are non-routine, unsystematic and are associated with responding to perceived threats and opportunities in the marketplace (Anthony, 1988). The management control level consists of the management team and is characterised by decision making and allocation of tasks and personnel to ensure the goals defined at the strategic planning level are realized (Anthony, 1988). Alternatively, the task control level is comprised of the individuals who directly perform tasks (e.g. order entry). The activities in task control are generally routine and instructional based (Anthony, 1988). Unlike the strategic planning and management control levels, very few decisions are made within task control, however when non-routine errors/interruptions occur the individuals at the task control level need to respond adequately to the situation (Anthony, 1988). Individuals at the task control level are evaluated primarily on the efficiency with which they perform tasks; however the quality of their output is also of utmost importance (Anthony, 1988). Whilst distinct activities, roles and responsibilities are discernible at each level, the demarcation between these levels are somewhat blurred (Anthony, 1988; Gorry & Morton, 1989).

When adapting the planning and control activities (Anthony, 1988) to the IS discipline, three user groups are apparent (refer to Table 8): (i) Strategic users, who are indicative of the strategic planning category; (ii) management users, which corresponds to the management control level; and (iii) operational users, who are representative of the task control level (Wickramasinghe & Karunasekara, 2012). Some researchers (e.g. Sedera, Tan, & Dey, 2007) have identified a fourth user group which are the technical IT staff. However, the focus of this study pertains to individuals who perform operational tasks using the IS, as opposed to technical roles and responsibilities (see Bassellier and Benbasat (2004) analysis of IT professionals).

Table 8: Information Systems User Groups

User Group	Definition	Reference
Strategic users	The executive management team, whom consumes information to make strategic business decisions.	Murphy (2014)
Management	Individuals responsible for ensuring the strategic	Laudon and

Users	goal as specified by senior management are carried out.	Laudon (2012)
Operational Users	Individuals within the organization who are predominantly responsible for efficiently performing repetitive, narrow, defined tasks and routinely utilizing IS to facilitate the completion of said tasks.	Murphy (2014)

Strategic users typically perform non-repetitive activities that require creative applications. Consequently, strategic users make decisions based upon data present in both their IS and external environment (Gorry & Morton, 1989). Alternatively, operational users typically interact with an IS when performing their routine day-to-day tasks. Hence they are commonly referred to as data collectors as they regularly generate and input data into the IS (Murphy, 2014). The management user acts as a bridge between the strategic and operational levels and are responsible for the analysis and dissemination of data (Murphy, 2014). However, this traditional viewpoint of operational users as grounded in Anthony's (1988) taxonomy is starting to evolve with transformations in organizational structures. This evolution of operational users are further blurring the demarcations between strategic, management, and operational employees. As evident in the introduction this research is scoped to operational users and is discussed in the subsequent section.

2.4.2 Operational Users

Due to globalization and the pervasive nature of technology, the nature of operational users has transformed. The subsequent sections seek to explore how changes in organizational structures, policies, and procedures as well as the ubiquity of technology have influenced operational employees.

2.4.2.1 Transformation of Organizational Structures

Operational employees were traditionally considered to be low skilled workers (Belanger et al., 2013), who were required to complete highly fragmented, routinized tasks (Belanger et al., 2013; Berry & Mok, 2014), under strict supervision (Kashefi, 2011). However, in today's hypercompetitive marketplace, organizations will no longer remain competitive if they continue to operate in this manner. Consequently organizations have commenced shifting their operating principles to be in line with the High Performance Work Organization (HPWO) structure. In a HPWO, operational employees work autonomously (Kashefi, 2011), on multiple tasks (Chaykowski & Gunderson, 2013), with reduced supervision (Belanger et al., 2013). Furthermore, operational employees require increased cognitive ability in order to make increasingly difficult decisions (Belanger et al., 2013; Chaykowski & Gunderson, 2013).

Therefore instead of operational employees having very narrowly defined tasks which required a specific set of tightly defined skills, they now need to possess multiple skills to complete multiple tasks. Consequently efforts need to be devoted to improving the formal qualifications and cognitive abilities of operational employees (Belanger et al., 2013). The broadening of tasks and decrease in task specificity associated with HPWOs can result in employee disenchantment (Belanger et al., 2013) as employees are ultimately faced with increased pressure. Furthermore the increased autonomy coupled with the broadening of tasks ultimately blurs the demarcation between job roles (Kashefi, 2011). This blurring of boundaries, the emphasis on teamwork coupled with the increased autonomy at the operational level; makes incentivizing and rewarding employees a challenging and complex task, as the outcomes produced are generally part of a larger team project (Berry & Mok, 2014).

Therefore, in the absence of rewards and incentives it becomes increasingly important that employees can regulate their behaviour to ensure they remain on track.

The prevalence of multitasking in contemporary organizations increases the flexibility and amount of interactions individuals have with IS (Ragu-Nathan, Tarafdar, Ragu-Nathan, & Tu, 2008). Not only do operational employees need to possess the knowledge and skills to execute a narrowly defined task they now need to possess a broad range of skills to execute numerous functions potentially on multiple disparate IS and hardware devices.

2.4.2.2 Pervasiveness of Technology

Prior to the ubiquity of technology, the use of computers was predominantly constrained to the office environment (Yoo, 2010). However, improvements in computing, network, and mobile capabilities, as well as a reduction in computing and data storage costs have resulted in ubiquitous computing (Yoo, 2010). The ubiquity of digital technologies has resulted in an increase in the domestication of technology in the house-hold for non-work related purposes (Hynes & Richardson, 2009). Consequently individuals are more technologically savvy (Koffer, Junglas, Chiperi, & Niehaves, 2014) and more cognizant of different technologies than ever before (Ortbach, Bode, & Niehaves, 2013). Therefore individuals readily strive to leverage the potential capabilities of technological advancements (Ortbach et al., 2013) as opposed to being hesitant and fearful. Consequently, a growing amount of technological innovations are now being driven by users in a bottom up fashion as opposed to being dictated in a top down manner (Niehaves, Koffer, & Ortbach, 2013). Overwhelmingly this illustrates that not only are users more knowledgeable and competent but they are more autonomous and innovative at the operational level.

As a result of the increase in technological aptitude of individuals, users are now pressurizing their IT department to change organizational policies to allow them to use their personal devices (e.g. portable devices, laptops, mobiles) at work (in a trend referred to as commercialization) (Niehaves, Koffer, & Ortbach, 2012). When users partake in commercialization they are typically more competent and satisfied as they already possess experience with the device (Niehaves et al., 2013). Additionally, users have access to a plethora of support tools over the internet. Consequently, operational users with their increased knowledge and skills are becoming less reliant on their IT departments for technical support (Giddens & Tripp, 2014). Furthermore, due to the increased knowledge and skills individuals possess with technologies, organizations have started adopting self-service IS, which minimises resource requirements, as a new group of users are directly interacting with the IS (Saeed & Abdinnour, 2013).

The pervasive nature of digital technologies has also resulted in a new generation of "digital natives" who have grown up surrounded by technology and as a result "*are used to receiving information really fast. They like to parallel process and multi-task" (Prensky, 2001, p. 4).* Whereas, the previous generations of digital immigrants have had to adapt to using technology (Prensky, 2001). However, regardless of whether an individual is a digital immigrant or a digital native, the vast majority of individuals are digital users in both personal and organizational contexts.

However, the constant innovations, and updates associated with IS requires individuals to continuously improve their skills. This constant renewing of technology related skills is one of the factors that can contribute to technostress (Ayyagari, Grover, & Purvis, 2011; Wang, Shu, & Tu, 2008), which is the "*stress* *experienced by end users in organizations as a result of their use of ICTs"* (Ragu-Nathan et al., 2008). Technostress can have a detrimental influence on organizations as it adversely affects job satisfaction, organizational commitment (Ragu-Nathan et al., 2008), and employee productivity (Wang et al., 2008).

2.4.2.3 Summary of Operational Users

This research recognizes that operational users typically perform routine data entry tasks that vary in difficulty, in a largely autonomous environment, which requires problem solving to be performed (refer to Table 9). To summarize the nature of operational IS users have changed. While operational users are more technologically savvy and less reliant on their IT departments; they also have increasing demands and pressures placed on them. Therefore individuals need to be competent, regulate their own actions and motivate themselves as a result of the decreased supervision and increased autonomy.

Table 9: Considerations of Operational Users

Considerations	Description
Focus	The predominant focus of operational employees pertains to the completion of their designated tasks (Anthony, 1988). While their tasks were originally considered to be simple, operational employees are facing increasingly difficult tasks (Belanger et al., 2013)
Evaluation Criteria	Operational users are primarily assessed based on the efficiency with which they complete their tasks. However the quality of their work is also considered (Anthony, 1988).
Level of Control	While, in accordance with Anthony (1988) operational employees are tightly constrained by management, this research recognizes that in contemporary settings operational employees are encouraged to work autonomously (Belanger et al., 2013; Niehaves et al., 2013).

2.5 User Characteristics

This research is scoped to users internal to the organization who use an ES to complete their job tasks. In order to adequately understand user characteristics, a two-step approach will be followed. Firstly a multidisciplinary review of literature will be conducted to understand employee characteristics that are related to the effective execution of tasks. Followed by a comprehensive archival analysis of user characteristics in the IS discipline. This dual natured approach facilitated the identification of gaps pertinent to IS users.

2.5.1 Employee Attributes

The sheer importance of individual employees for creating business value is a well-established notion across a myriad of disciplines (Wright & McMahan, 2011) including economics (e.g. Becker, 1962; Schultz, 1961), human resource management (e.g. Lepak & Snell, 1999), and social psychology (e.g. Ployhart & Moliterno, 2011). This has resulted in an entire research stream devoted to examining human capital, which is the attributes of individuals that when enacted have the potential to drive business value.

Human capital was founded in the economics discipline in an attempt to quantify the value that an individual brings to an organization (Becker, 1962). The seminal work of Schultz (1961, p. 8) formally defined human capital as the "*skills, knowledge, and similar attributes that affect particular human capabilities to do productive work.*" When discussing human capital, Schultz (1961) also highlighted that to an employee's health was also a component of human capital. This was further substantiated by Becker (1964) in which human capital was defined as "*the knowledge, information, ideas, skills, and health of individuals*" (as cited in Wright

& McMahan, 2011, p. 94). Since the conception of human capital, variations to the definition pervade the literature (refer to Table 10).

Table 10: Definitions of Human Capital

Definition	Reference
"*Knowledge, skills, capacity, etc. owned by an employee.*"	Bae and Patterson (2013, p. 56)
"*The knowledge, information, ideas, skills, and health of individuals*"	Becker (1964) as cited in Wright and McMahan (2011, p. 94)
"*The knowledge, skills and abilities (KSA) residing with and utilized by individuals*"	Cabello-Medina, Lopez-Cabrales, and Valle-Cabrera (2011, p. 809); Subramaniam and Youndt (2005, p. 451)
"The value-creating skills, competencies, talents and abilities of its workforce"	Elias and Scarbrough (2004, p. 21)
"The knowledge skills and abilities of individual employees"	Hansen and Alewell (2013, p. 2133)
"Knowledge, skills and experience of employees"	Lakshman (2014, p. 1351)
"Consists of the collective knowledge, skills, abilities, expertise, experiences, competency or capability of employees within a firm that are valuable and unique"	Ling and Jaw (2006, p. 381)
"A unit-level resource that is created from the emergence of individuals' knowledge, skills, abilities, or other characteristics"	Ployhart and Moliterno (2011, p. 127)
"People possess skills experience and knowledge that have economic value to firms"	Snell and Dean (1992, p. 468)
"Skills, knowledge, and similar attributes that affect particular human capabilities to do productive work."	Schultz (1961, p. 8)
"The unique set of knowledge, skills and abilities of workers acquired from education and experience"	Winne and Sels (2010, p. 1867)
"The characteristics possessed by an individual that can yield positive outcomes for that individual"	Wright and McMahan (2011, p. 95)

The definitions present in Table 10 differ in terms of their generality and specificity. Furthermore some definitions emphasise the need for individual attributes to be unique, valuable and immutable by competitors (e.g. Winne & Sels, 2010);

whilst others stress that human capital is a property of the individual rather than the organization the employee resides in (e.g. Bae & Patterson, 2013). There has also been a departure from the initial definitions of human capital whereby recent research overlooks employee health. Most scholars highlight that both knowledge and skills are important facets of human capital. In addition the concept of abilities is also common. The concept of knowledge, skills and abilities has received substantial research attention, and are inherent attributes of individuals that when enacted can result in organizations gaining a competitive advantage (Hargis & Bradley, 2011).

In accordance with Phillips and Gully (2009, p. 103) knowledge is referred to as an "*organized body of factual or procedural information that can be applied to a task*." There are many different types of knowledge discussed in literature, including: declarative, procedural, and tacit knowledge. Declarative knowledge pertains to the recollection of "*facts, rules, principles, or procedures that are prerequisites for successful task performance*" (Mccloy et al., 1994, p. 494). Furthermore declarative knowledge relates to the possession of factual information (Glynn, 1996; Roberts & Ashton, 2003) and is regularly associated with the colloquial term of "know-what" (e.g. Wierenga, 2002). Declarative knowledge is fundamental and necessary prior to accumulating other knowledge types (Kraiger et al., 1993). Alternatively, procedural knowledge is often used in conjunction with skill development and involves the individual knowing how (know-how) to execute tasks (Mccloy et al., 1994). Whereas tacit knowledge is practical, informal and acquired through experience (Wagner, 1985) and is "*information about which, when, why*" (Kraiger et al., 1993, p. 313)

Unlike knowledge which pertains to having the required information to complete tasks, skills are the actual capabilities that are necessary to execute tasks

(Phillips & Gully, 2009). The terms ability and skills are often used synonymously, however abilities are typically considered to be broader than skills (Lubinski & Dawis, 1992). This is further substantiated by Fleishman (1975, p. 1131) who highlighted that ability differs from skills as ability is a "*more general capacity of the individual.*" In addition, abilities are enduring and refer to natural capabilities which can be categorized as cognitive, psychomotor, sensory, and physical (Phillips & Gully, 2009). However, whilst the aforementioned scholars have attempted to distinguish between the terms, other scholars have treated skills as a form of ability. Spencer and Spencer's (1993) widely recognised iceberg model defined skills as "*a learned ability to perform a task.*" Furthermore Burke and Shah (2010, p. 320) specified that a "*skill is an ability to perform a productive task at a certain level of competence.*" The primary purpose of the evaluation of skills or abilities is to assess the current behaviour of an individual (Lubinski & Dawis, 1992). Therefore due to the lack of clarity in the distinction between skills and abilities, this research views human capital as the knowledge and skills of individuals.

Whilst human capital is overwhelmingly considered essential for organizations to attain a competitive advantage (Elias & Scarbrough, 2004; Lakshman, 2014), human capital is an "*inherent, personal property"* (Zhao, 2008, p. 805) and therefore is possessed by the individual (Wright & McMahan, 2011). However individuals are inherently complex and they may possess the required knowledge and skills, yet lack the effort to perform the required behaviour (Zhao, 2008). As eloquently stated in Wright and McMahan (2011, p. 99) "*characteristics do not, in of themselves result in productivity. Productivity stems most directly from the behaviour of employees, and many highly skilled employees can exhibit mediocre or even inferior performance.*"

Therefore it is pertinent that individuals are motivated to use their knowledge and skills to perform the desired behaviour (Hansen & Alewell, 2013).

Motivation encompasses an individual's decision to expend varying degrees of effort (Mccloy et al., 1994). In the IS discipline motivation is typically categorized as hedonic, intrinsic, and extrinsic (e.g. Lowry, Gaskin, & Moody, 2015). Hedonic motivation is a type of internal motivation that individuals experience based on feelings of arousal and pleasure (Lowry et al., 2015). Intrinsic motivators are when individuals are performing a task for the purposes of accomplishment, learning, and socialization (Lowry et al., 2015). Whereas extrinsic motivators pertain to receiving external incentives, rewards, or avoiding negative consequences (Lowry et al., 2015). However, individuals can also be motivated to perform a task based upon internal attributes such as their self-efficacy, motivational disposition (Kraiger et al., 1993). Furthermore external forces such as social influences, and facilitating conditions can also prove to be a motivational factor (Venkatesh et al., 2003).

In accordance with Aguinis and Kraiger (2009) whilst motivation is an affective outcome that is important for task performance, an individual's attitude is also pertinent. Alternate to motivation, attitude is the feeling an individual has towards a targeted object or behaviour (Fishbein & Ajzen, 1975). Attitude has been consistently found, in a myriad of disciplines, to influence the behaviour (Kraus, 1991) and performance of individuals (Riketta, 2008). In the context of IS, an individual's attitude towards using an IS, has been central to the understanding of individual's acceptance of volitional technologies (Venkatesh et al., 2003).

Consequently in order for individuals to optimally perform and contribute to the competitive advantage of the firm they need to not only possess human capital in the form of knowledge and skills they also need to be motivated and possess the appropriate attitude. In addition human capital is a dynamic property. Therefore organizations can devote resources to improve the knowledge, skills and motivation of employees

2.5.2 Archival Analysis of User Attributes

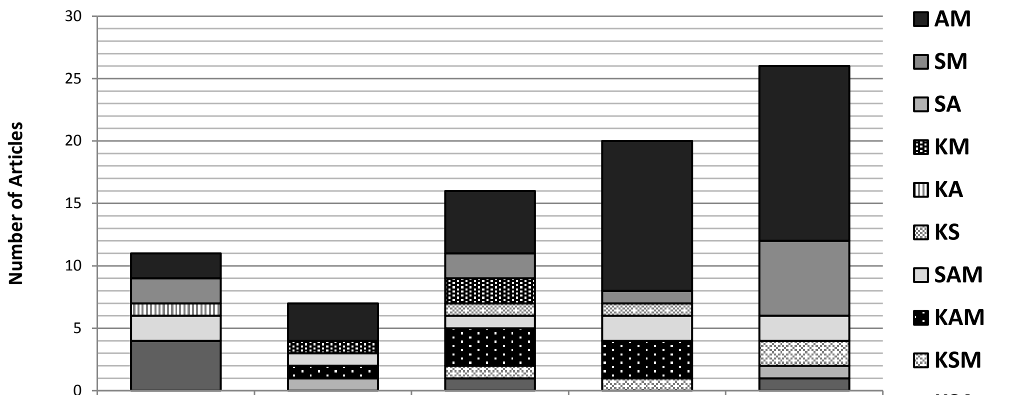
To comprehensively understand how users have been explored in the IS discipline a systematic archival analysis of user attributes was conducted. The justification behind performing the archival analysis, the scoping considerations, and classification framework are discussed in Appendix C.

The search resulted in the retrieval of 190 articles. Each of the retrieved articles were read in full and the relevancy was determined based upon the previously discussed scoping considerations. This resulted in 80 articles being deemed relevant to this archival analysis (Table 11). The articles that were determined to be relevant where then classified into the classification framework, which consisted of four high level themes: knowledge, skills, attitude, motivation (refer to Appendix C).

Table 11: Number of Articles Reviewed from Each Journal

Journal	Total Retrieved	Total Eliminated	Total Relevant
EJIS	27	15	12
ISJ	14	7	7
ISR	23	11	12
JAIS	10	9	1
JIT	10	7	3
JMIS	37	20	17
JSIS	17	14	3
MISQ	52	27	25
Total	190	110	80

The periodic analysis (Figure 10) identified several research trends. Firstly (i) research related to user characteristics has been increasing over time with 13.75% of articles published between 1992 and 1995 compared to 2011 to 2015, which accounted for 32.5%. Secondly (ii) the articles pertaining to attitude and motivation has experienced substantial growth overtime accounting for 45% of the sample, whilst all other categories appeared to stagnate. This increase in attitude-motivation articles coincides with the popularity of technology acceptance models (TAM). This trend provides support for Benbasat and Barki’s (2007) assertion that cumulative research related to TAM may have been detrimental to other research areas. However, preliminary analysis suggests that skills and motivation have received increased attention in the 2011-2015 period. Thirdly (iii) no articles in the sample pertained to users’ skills and attitude.



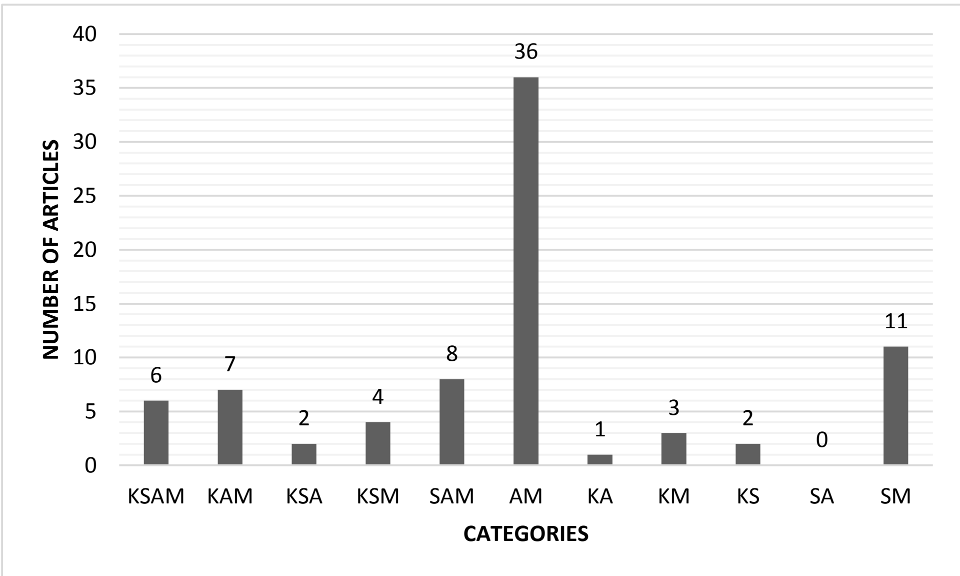
	1992-1995	1996-2000	2001-2005	2006-2010	2011-2015
AM	2	3	5	12	14
SM	2	0	2	1	6
SA	0	0	0	0	0
KM	0	1	2	0	0
KA	1	0	0	0	0
KS	0	0	1	1	0
SAM	2	1	1	2	2
KAM	0	1	3	3	0
KSM	0	0	1	1	2
KSA	0	1	0	0	1
KSAM	4	0	1	0	1

Time Period

K: Knowledge, S: Skills, A: Attitude, M: Motivation

Figure 10: Periodic Analysis of User Characteristics

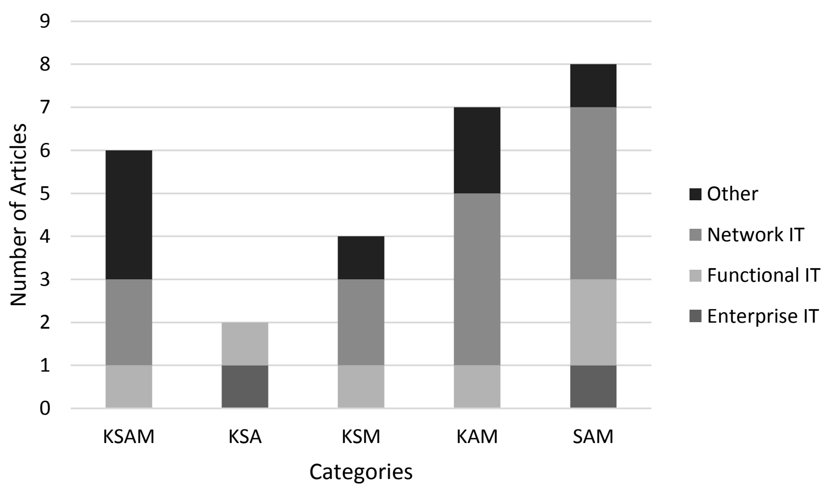
The categorical analysis identified that only 6 articles (7.5%) examined all four themes (**KSAM**: knowledge, skills, attitude, motivation) and 21 articles (26.25%) investigated a combination of three themes (**KSA**: knowledge, skills, attitude; **KSM**: knowledge, skills, motivation; **KAM**: knowledge, attitude, motivation; **SAM**: skills, attitude, motivation) (figure 3). Overall 33.75% of articles included three or more types of characteristics with 66.25% examining only two types of characteristics. In terms of the articles which pertained to only two user characteristics the combination of attitude and motivation (**AM**) was by far the most explored accounting for 36 of the articles (45%), followed by skills and motivation (**SM**) at 13.75%, knowledge and motivation (**KM**) with 3.75%, knowledge and skills (**KS**) with 2.5%, and knowledge and attitude (**KA**) at 1.25%. There were no articles in the sample that solely investigated the combination of skills and attitude (refer to Figure 11).



K: Knowledge, S: Skills, A: Attitude, M: Motivation

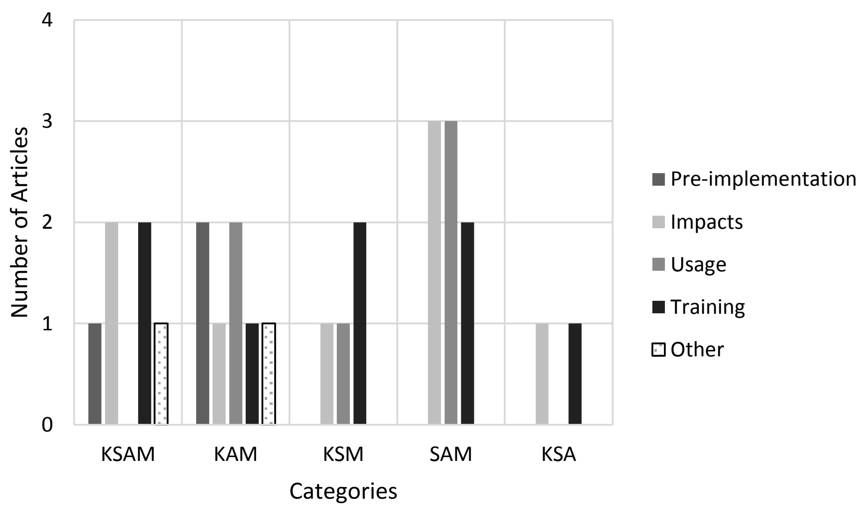
Figure 11: Categorization of Articles

To greater understand the way in which users have been examined the articles which provided a more holistic understanding of the user (KSAM, KAM, KSA, KSM, SAM) were further examined. The analysis revealed that overwhelmingly the user was examined in terms of Network IT (NIT) (44.44%), followed by general IT (Other IT) (25.93%), functional IT (FIT) (22.22%), and enterprise IT (EIT) (7.41%) (refer to Figure 12). These findings are extremely interesting as it highlights that whilst users have been investigated in a more holistic manner, in more than 25% of cases the key characteristics of the IS are overlooked. Furthermore EIT which are notoriously difficult to use and present a number of challenges for users have scarcely been explored. In addition the characteristics of users were examined in a number of contexts (refer to Figure 13)



K: Knowledge, S: Skills, A: Attitude, M: Motivation

Figure 12: Categorization of Articles with Respect to Technology Type



K: Knowledge, S: Skills, A: Attitude, M: Motivation

Figure 13: Categorization of Articles with Respect to Context Examined

Interestingly a substantial portion of research relating to KSAM examined personal computers as opposed to a specific type of IS with no research being conducted with respect to EIT users. Therefore these studies to a large extent overlooked the nature of the applications that were being used. However, this could be attributed to the majority of articles classified as KSAM being published between 1992 and 1995. The articles that were classified as KSAM explored a broad range of contexts including both pre-implementation and post-implementation phases of the lifecycle. Specifically, one article examined an individual's intention to purchase a personal computer drawing upon the construct of computer alienation (e.g. Abdul-Gader & Kozar, 1995). In the post-implementation phase the contexts of computer skill acquisition (e.g. Harrison & Rainer, 1992), learning outcomes (e.g. Sharda et al., 2004; Webster & Martocchio, 1992), and success/impacts (e.g. Wang & Haggerty, 2011; Yoon, Guimaraes, & O'Neal, 1995) were examined. In relation to the context of this thesis which was to understand user capital in the context of effective use and IS success two studies categorized as KSAM were extremely relevant, which were the studies by Yoon et al. (1995) and Wang and Haggerty (2011).

Yoon et al. (1995) provided evidence to support that knowledge, skills, motivation, and attitude of various stakeholder groups influenced the success of expert systems. Whilst Yoon et al. (1995) provided a holistic account of different stakeholder groups, there were some limitations present including: (i) the absence of construct definitions, potentially hindering cumulative research efforts (e.g. Mohr, 1982); (ii) measures appeared to be formative, yet reflective analyses were performed (e.g. Petter, Straub, & Rai, 2007); (iii) satisfaction was used as a proxy of success, whereas contemporary success models advocate the analysis of multiple dimensions of success (e.g. DeLone & McLean, 2003). Alternatively, Wang and Haggerty (2011) adapted the theory of competence and social cognitive theory and conceptualised individual's virtual competence as a multidimensional construct consisting of knowledge, skill, and motivation, which in turn influenced their individual performance and satisfaction. In their model, skill was assessed by an individual's virtual media skills, knowledge and skills were both encapsulated by virtual social skills and motivation was an individual's computer and remote work self-efficacy.

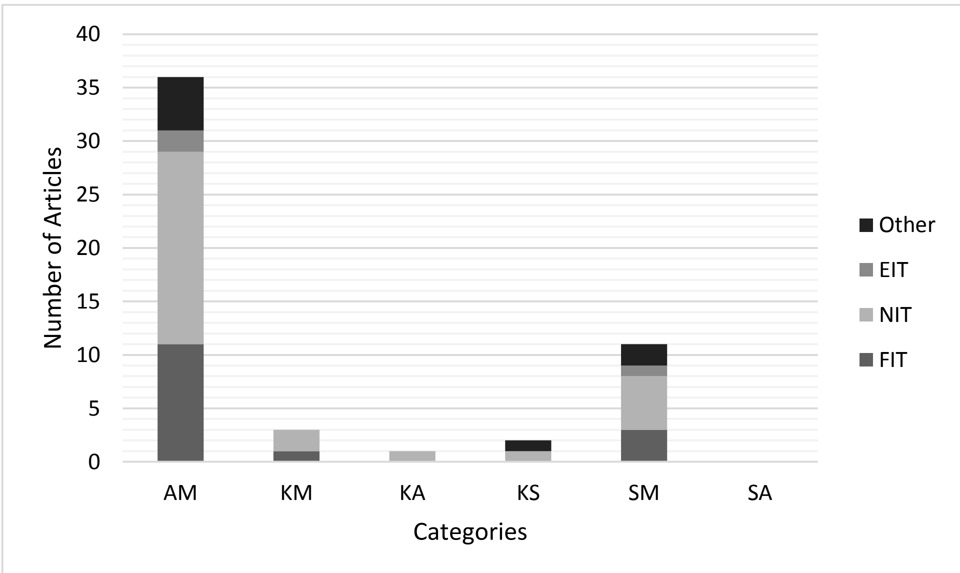
The multidimensional treatment of competence related phenomenon is further explored in the KAM category by Bassellier, Reich, and Benbasat (2001), who defined business manager IT competence as consisting of tacit knowledge and explicit knowledge. The multidimensional construct of IT competence only considered capability components. The authors identified that business manager IT competence influenced an individual's attitude and motivation, which in turn influenced the business manager's decision to proactively adopt IT. However the IT competence of business managers was largely constrained to pre-implementation and did not examine contexts of success or effective use. Overall the articles published within the KAM category examined both pre-implementation and post-implementation phases: two studies investigated pre-implementation (e.g. Bassellier et al., 2001; Te'eni, 2001), one examined the impacts of technology on knowledge transfer and interorganizational learning (Scott, 2000), two investigated the use of e-commerce (Romano, Donovan, Chen, & Nunamaker, 2003) and internet communication technology (i.e. chat rooms) (McElroy, Hendrickson, Townsend, & Demarie, 2007), one investigated the usage of NIT in a training environment (Lam & Lee, 2006), and the remaining article investigated an individual's intention to comply with an organizations information security policy (Bulgurcu, Cavusoglu, & Benbasat, 2010). McElroy et al. (2007) evidenced that personality traits (agreeableness, conscientiousness, extraversion, neuroticism, and openness) explained an individual's internet use. Lam and Lee (2006) focused on digital immigrants and identified the environmental motivators of encouragement and support positively influenced self-efficacy and outcome expectations respectively. In addition self-efficacy negatively influenced anxiety and positively influenced a user's knowledge and usage intention, the latter of which was positively influenced by outcome expectations (Lam & Lee, 2006). Similar to the articles categorised as KSAM no articles examined the context of EIT.

The articles classified as SAM related solely to post implementation and explored contexts surrounding use (e.g. Thomas & Bostrom, 2010b; Thompson, Higgins, & Howell, 1994; Tsai & Bagozzi, 2014), training (e.g. Johnson & Marakas, 2000; Piccoli, Ahmad, & Ives, 2001), and impacts (e.g. Tarafdar, Pullins, & Ragu-Nathan, 2015; Udo & Guimaraes, 1994; Urquhart, Liyanage, & Kah, 2008). In terms of investigating SAM in the context of IS use, Thompson et al. (1994) applied Triandis's (1980) Theory of Behaviour and examined the influence that experience had on use. Thompson et al.'s (1994) study clearly highlighted the direct, indirect and moderating influence that experience had on the use of personal computers. However, the study was limited as it only examined personal computers as opposed to recognising the characteristics of specific software applications. On the other hand, Thomas and Bostrom (2010b) examined managers interventions for the adaptation of technology to support virtual teams, whereas Tsai and Bagozzi (2014) explored an individual's contribution behaviour in virtual communities to satisfy group goals. Both Thomas and Bostrom (2010b) and Tsai and Bagozzi (2014) recognised a more comprehensive understanding of the use construct and highlighted the need for adaptations and quality usage respectively. The research that investigated the impacts of SAM examined decision support systems, EIT, and IT in general and looked at the impacts on society and organizations. Urquhart et al. (2008) examined the dimensions of social capital with information technology to reduce poverty in developing countries. Whereas Udo and Guimaraes (1994) identified that benefits of decision support systems are determined by industry, organizational, system and user factors. Alternatively in examining the influence of SAM on performance, Tarafdar et al. (2015, p. 103) investigated and defined the pertinent construct of technostress as "*the stress that users experience as a result of their use of IS in the organizational context"*. Tarafdar et al. (2015) evidenced that competence and technostress inhibitors positively influenced innovation whereas technostress creators exhibited a negative influence on innovation and performance.

Limited research has been performed into understanding the KSA of individuals. The articles categorized as KSA pertained to post implementation and focused on impacts (Hsieh, Rai, Petter, & Zhang, 2012) and training (Simon, Grover, Teng, & Whitcomb, 1996). Hsieh et al. (2012) examined KSA in the context of employee service quality when using a mandated CRM system. This study was one of only two in the archival analysis sample that pertained to EIT. Specifically the study identified that user satisfaction positively affected employee service quality and the impact was stronger for employees with lower levels of embodied service knowledge (Hsieh et al., 2012). Alternatively Simon et al. (1996) examined cognitive ability, satisfaction, and skill acquisition in a training environment.

The KSM research pertained to post implementation and investigated individual performance (Hwang, Kettinger, & Yi, 2015), training (Wei, Teo, Chan, & Tan, 2011; Yi & Davis, 2003), and IS use (Wang & Haggerty, 2009). The investigation of KSM in the context of IS use and individual performance centred around the transfer of knowledge through employing technology. Wang and Haggerty (2009) created a multidimensional conceptual model of an individual's virtual competency, which was extended by Wang and Haggerty (2011). Similarly Hwang et al. (2015) developed a multidimensional construct for personal information management effectiveness which consisted of motivational and skill based components, and was found to positively influence an individual's job performance.

The preceding discussion analysed the studies that provided a holistic understanding of users through the examination of three or more characteristics. Next, the articles that pertain to only two user characteristics are analysed (n=53). The articles pertaining to attitude and motivation (AM) are by far the most explored (n=36), followed by skills and motivation (SM) (n=11), knowledge and motivation (KM) (n=3) knowledge and skills (KS) (n=2), and knowledge and attitude (KA) (n=1). Interestingly no articles pertained solely to skills and attitude (SA) (Figure 14)



K: Knowledge, S: Skills, A: Attitude, M: Motivation

Figure 14: Categorization of Articles with Respect to Technology Type

The AM category focused on the willingness of individuals without recognising the capabilities that individual's possessed. All technology types were explored within the AM category, with attention placed predominantly on FIT and NIT, however two articles investigated EIT. Likewise SM also examined all technology types, with limited research devoted to EIT. KM was explored with FIT and NIT, whereas KS was investigated with NIT and IT in general. The only article categorised as KA examined NIT. In total 15 articles examined FIT, 27 examined NIT, 8 investigated IT in general, and only 3 articles explored the EIT.

Overwhelmingly the articles pertaining to AM examined the usage context including: intention to use (e.g. Benlian, Titah, & Hess, 2012; Bhattacherjee & Premkumar, 2004; Hwang, 2005; Lee & Rao, 2012; Lee & Chen, 2011; Lee, Chen, & Ilie, 2012; Lin & Bhattacherjee, 2010), actual usage (e.g. Compeau, Higgins, & Huff, 1999; Devaraj, Easley, & Crant, 2008; Ke, Tan, Sia, & Wei, 2012; Pavlou & Fygenson, 2006), and discontinuance (e.g. Turel, 2015). A substantial body of literature was also performed into the examination of AM in an IS security compliance context (e.g. Boss, Galletta, Lowry, Moody, & Polak, 2015; Guo, Yuan, Archer, & Connolly, 2011; Herath & Rao, 2009; Kwan, So, & Tam, 2010; Liang & Xue, 2009). An individual's usage intention was found to be positively influenced by attitude (Benlian et al., 2012; Bhattacherjee & Premkumar, 2004; Compeau et al., 1999; Lee & Rao, 2012; Pavlou & Fygenson, 2006), perceived behavioural control (Lee & Rao, 2012; Pavlou & Fygenson, 2006), perceived usefulness (Benlian et al., 2012; Bhattacherjee & Premkumar, 2004; Hwang, 2005), perceived ease of use (Benlian et al., 2012; Hwang, 2005), self-efficacy (Compeau et al., 1999), outcome expectations (Compeau et al., 1999), and hedonic motivation (Ke et al., 2012).

Skills and motivation were the next most studied category, however four articles did not report a theoretical lens. Knowledge management (e.g. Huysman & Wulf, 2006; Kettinger, Li, Davis, & Kettinger, 2015; Lindgren, Stenmark, & Ljungberg, 2003; Wasko & Faraj, 2005) and usage (e.g. Compeau & Higgins, 1995a; Liu et al., 2011) were the key themes explored. Examining usage of FIT and NIT in a learning environment, Compeau and Higgins (1995a) analysed the effect of prior experience, computer self-efficacy, outcome expectations on an individual's performance. Liu et al. (2011) examined the usage of EIT and identified three types of users: VIP, power users and transactional users. This was one of few studies in the archival analysis that critically examined the types of users and the context of EIT.

There was a scarcity of articles pertaining to KM, KS, and KA. One of the most notable articles categorized as KM was a methodological assessment of user competence which focused on knowledge and self-efficacy with the omission of skill based assessments (e.g. Marcolin, Compeau, Munro, & Huff, 2000). Alternatively in the KA category, Alavi, Wheeler, and Vvalacish (1995) analyzed knowledge acquisition and learning effectiveness in virtual learning environments. Whereas articles categorized as KS recognized the importance of the ability of users. Bassellier, Benbasat, and Reich (2003) extended the research of Bassellier et al. (2001), which examined the KSAM of business managers. Whereas Thomas and Bostrom (2010a) examined KS in the context of collaborative technology.

2.5.2.1 Summary of Archival Analysis Findings

Overwhelmingly limited research has been devoted to investigating the knowledge, skills, motivation, and attitude of users. However, analysis of the relevant articles highlighted that knowledge, skills, motivation and attitude can be measured in a myriad of ways and their impacts can be assessed at various levels including individual, organizational, and societal. Regardless of whether the articles examined the knowledge, skills, motivation and attitude of users in a multidimensional or unidimensional manner they were found to influence the use and impacts of IS.

Both actual (e.g. Devaraj et al., 2008) and perceptual measures for IS use were apparent in the archival analysis. Drawing upon Burton-Jones and Straub (2006) conceptualisation of use, the perceptual use measures that were used in vast majority of the studies ranged from lean to rich and included duration, frequency, and variety of use measures (e.g. Compeau et al., 1999; McElroy et al., 2007; Thompson et al., 1994). Recognizing the complexity of IS use Tsai and Bagozzi (2014) investigated both the quality and the quantity of an individual's use in an online virtual community. However, overall the concept of effective use was largely absent.

A number of studies investigated the impact that knowledge, skills, motivation, and attitude had on the IS. The impacts that were explored included: job performance (Hwang et al., 2015; Wang & Haggerty, 2011), employee service quality (Hsieh et al., 2012), employee satisfaction with IS (Yoon et al., 1995), customer satisfaction (Hsieh et al., 2012), job satisfaction (Wang & Haggerty, 2011), sales performance (Tarafdar et al., 2015), technology enabled performance (Tarafdar et al., 2015), and poverty reduction (Urquhart et al., 2008). Interestingly, none of the aforementioned studies investigating the impact through the lens of the IS Success model. This highlights that there is a gap in the literature pertaining to the examination of user characteristics in the context of IS Success.

The knowledge, skills, motivation and attitude of users and their influence on use and impacts were explored under different systems types (i.e. FIT, NIT, EIT, and general IT). Whilst most articles examined FIT and NIT, there was a dearth of studies pertaining to EIT. In the entire sample analysed only five articles explored EIT, two of which examined KSA and SAM, and the remainder investigated AM and SM. A potential rationale for the limited investigation of users within the context of EIT post implementation is that the agency of users is often overlooked in mandatory use contexts. However, recent research has clearly highlighted that users still have agency when presented with mandated and constraining IS (Boudreau & Robey, 2005; Strong & Volkoff, 2010). As previously discussed, Hsieh et al. (2012) investigated the impact that knowledge, skills, and attitude had on the quality of service and customer satisfaction in a customer relationship management (CRM) system. Similarly, Tarafdar et al. (2015) examined how the skills, attitude and motivation of individuals influenced the impacts of CRM systems. Whilst both Hsieh et al. (2012) and Tarafdar et al. (2015) investigated the impacts of CRM systems they did not account for how variations in the use of EIT influenced the impacts obtained.

Both Hwang (2005) and Ke et al. (2012) investigated how attitude and motivation influenced enterprise systems (ES). Hwang (2005) drew upon the technology acceptance model to examine how attitudinal and motivational factors influence an individual’s intention to use an ES. Whereas Ke et al. (2012) recognized the mandatory use setting and identified how attitudinal and motivational factors influenced exploratory use of ES. With the exception of the research performed by Liu et al. (2011), the articles which investigated the knowledge, skills, attitude, and motivation of individuals with EIT overlooked the different types of users.

It was identified in the analysis that limited research was devoted to the multidimensional treatment of individuals, some notable exceptions include: (i) business manager information technology competence (Bassellier et al., 2001). (ii) personal information management effectiveness (Hwang et al., 2015); and individual virtual competence (Wang & Haggerty, 2009, 2011).

The business manager information technology competence construct was formed from two dimensions which were explicit knowledge and tacit IT knowledge which represent knowledge and skills respectively (Bassellier et al., 2001). This construct whilst clearly highlighting the ability component of an individual failed to account for their willingness to perform actions based on psychological variables. Whilst Bassellier et al. (2001) created a structural variance model based upon the theory of planned behaviour, it was substantiated by qualitative inferences as opposed to quantitative statistical analysis which is typically used as the approach to analysing variance models (e.g. Mohr, 1982). Moreover, whilst this research is extremely applicable and insightful for managerial and strategic users, it does not explore the operational users. Furthermore, business manager IT competence was created to explain pre-implementation contexts such as influencing IT projects and partnering with IT stakeholders (Bassellier et al., 2001), therefore it does not investigate post-implementation themes of use and success.

Alternatively Hwang (2005) explained personal information management effectiveness and recognised the importance of both motivational and ability based components. Personal information management effectiveness was largely constrained to the context of knowledge management and found to positively influence job performance (Hwang, 2005). Similar to Hwang (2005), Wang and Haggerty (2009, 2011) also created a multidimensional construct termed individual virtual competency to explain effective knowledge transferring behaviour. Whilst the aforementioned multidimensional constructs have proved to be insightful, they are constrained to either pre-implementation or knowledge transfer contexts as opposed to investigating the use or success of IS post implementations.

2.6 Chapter Summary and Implications

The review of the results from the archival analysis indicated that the following gaps are present in the literature pertaining to IS users:

- The examination of the influence of user characteristics has largely been constrained to the context of lean use measures. Greater research should be devoted to understanding the influence of users and their attributes on more sophisticated operationalisations of use. For instance there was no study in the sample that critically analysed how user characteristics influenced the effective usage of IS.
- Whilst a substantial proportion of the studies investigated the impact of user characteristics such as enhanced performance, the studies did not draw upon the IS Success model and its notions of individual impacts, organizational impacts, and net benefits.
- The influence of user characteristics were generally constrained to voluntary use contexts as opposed to investigating complex, mandatory use settings such as ES. Given the substantial investments firms make in adopting ES and their proffered underutilisation it is clear that more research needs to be done in this area.
- Limited research has been performed into understanding the different types of users that are present within organizations. Whilst it is recognised that operational, management, and strategic users exist it is unclear which user

characteristics are more important for different users. Additionally, Liu et al. (2011) identified a different categorization of users, further research needs to be dedicated to understanding these users and their characteristics.

- In the sample only three multidimensional constructs were identified. Therefore the majority of articles did not consider the complex nature of individuals. Further research needs to be performed into understanding the combination of unidimensional constructs and their resultant effects.
- Whilst human capital theory is extremely pertinent to organizational psychology, human resource management disciplines, there was no study in the sample that investigated human capital at an individual level.

To summarise, this chapter reviewed the literature pertinent to IS, users, use and success. This review identified that operational users are changing and are facing increased demands, under less supervision, thus requiring them to be knowledgeable, skilled and motivated. Whilst Enterprise Systems (ES) are mandatory to use, individuals still have control over their actions and therefore users can influence the use and success of ES. However the archival analysis identified that limited research had investigated how user characteristics influenced the effective use and resultant benefits of ES. Furthermore the studies that did examine user characteristics often examined the constructs in a unidimensional manner, thus failing to account for complex nuances in user's behaviour. This highlights a pertinent gap of practical significance in the literature. The following chapters attempt to fulfil these gaps in the literature by drawing on human capital to conceptualize user capital and investigate it in the context of effective use and IS Success.

Chapter 3: Conceptualizing User Capital

As articulated in the first chapter of this thesis, Information Systems (IS) must be effectively used in order to derive business value (e.g. Burton-Jones & Grange, 2013). Yet the systematic literature review presented in chapter two, revealed that there is a paucity of research devoted to understanding the complex intricacies inherent within the users and the resultant influence on effective use. In an attempt to fulfil this research gap the dissertation's first research question is "*what constitutes User Capital in a contemporary enterprise system environment?*" This chapter seeks to define, develop, and formulate a conceptual model of the multidimensional construct of User Capital (UC), which has not been explored in previous literature. This chapter will define UC as *the attributes possessed by an individual which enables them to use an IS to perform tasks*. It is conceptualized as a multidimensional construct consisting of the cognitive characteristics, skills, motivation, and affective attitude possessed by IS users and is specifically operationalised using metacognitive self-regulation, user competence, mastery motivational disposition, and attitude towards using IS.

The review of the literature (chapter 2) clearly illustrated that there is a dearth of research in the IS domain that critically analyses the attributes of users in a multidimensional fashion. However, a broader, multi-domain analysis of literature highlighted the notion of human capital, which emphasises the necessity of an organization's employees possessing knowledge, skills, and motivation for attaining a competitive advantage (Wright, Dunford, & Snell, 2001). This is further substantiated by the Theory of Performance, which recognises the multidimensional nature of individual characteristics as a performance determinant (e.g. Campbell et al., 1992; Mccloy et al., 1994). In addition, a substantial body of literature has indicated that individuals' attitudes towards an object or behaviour influences their decision to execute the behaviour (Kraiger et al., 1993; Kraus, 1991) and resultant job performance (Riketta, 2008). Consequently when conceptualizing UC, this research draws upon human capital and attitude-behaviour literature as their related dimensions assist individuals to perform behaviours. In addition, the four predominant dimensions apparent within human capital and attitude-behaviour literature (i.e. knowledge, skills, attitude, motivation) are all considered to enhance an individual's performance (Aguinis & Kraiger, 2009). Therefore in this chapter UC is conceptualized as a formative multidimensional construct.

Table 12 elaborates on the key themes discussed in this chapter. This chapter concludes with a summary of the construct definitions pertinent to UC. The subsequent chapter extends upon the conceptual model of UC presented in this chapter by exploring UC in a nomological network with effective use and in the context of IS success.

Table 12: Objectives of Chapter 3

Theme	Objective
3.1 User Capital Conceptual Model	▪ Define and derive a conceptual model of UC that is informed by human capital and attitude-behaviour literature. ▪ Explain the utility of UC through the examination of the Learning Outcomes Model.
3.2 Dimensions within User Capital	▪ Provide a rationale for each dimension present within UC
3.3 Comparison of User Capital with Related Constructs	▪ Examine constructs that have been previously examined in the IS discipline and their similarity to UC.

3.1 User Capital Conceptual Model

IS scholars have continuously highlighted the necessity for IS to be effectively used to derive business value (e.g. Burton-Jones & Grange, 2013). Consequently, rigorous research attention has been devoted to examining the notion of IS use (e.g. Burton-Jones & Straub, 2006). Comprehensive research has also been performed into understanding how a plethora of user characteristics unidimensionally influence an individual's intention to use an IS (e.g.Venkatesh & Davis, 2000; Venkatesh et al., 2003). Yet, the systematic review of the literature (chapter 2), identified that critically analysing the characteristics of users in a parsimonious, theoretically grounded, multidimensional manner; which recognises the complex nuances in users' behaviour, has to a large extent been neglected by the IS field. Consequently, in order to define and conceptualize User Capital (UC) organizational psychology, human resources, and training literature were critically examined to identify how user characteristics influence the behaviour and performance of individuals. This resulted in the selection of human capital, attitude-behaviour, and the learning outcomes model (LOM) as appropriate theoretical lenses. The subsequent section seeks to (i) conceptualize UC and justify the appropriateness of the theoretical lenses utilised; and (ii) rationalise the dimensions of UC.

In accordance with MacKenzie et al. (2011) a fundamental research step is to define the focal construct. Failure to define the focal construct can lead to inconsistency in interpretation and hinder future cumulative research efforts (Mohr, 1982). In accordance with Burton-Jones and Straub (2006, p. 231) a user "*is an individual person who employs an Information System in a task*". Specifically in this research the focus pertains to operational users who perform transactional operations, within an enterprise system (ES), as opposed to strategic and management users who consume the output generated from the ES. The term ‘capital’ stems from human capital literature, which is founded in economics, and organizational psychology disciplines. Whereby human capital can be defined as “*skill, knowledge, and similar attributes that affect particular human capabilities to do productive work” (Schultz, 1961, p. 8)* and is “*the sum of all value creating behaviour and qualities of the employees”* (Welpe, Lutz, & Barthel, 2007, p. 275).

Consistent with human capital literature, the traits that influence an individual’s ability to perform tasks, and therefore contribute to the competitive advantage of the firm are the knowledge and skills possessed by individual employees (Wright & McMahan, 2011). This body of literature highlights that whilst individuals’ knowledge and skills are important to the organization, they are ultimately possessed by the individual (Wright & McMahan, 2011). Furthermore, an individual’s knowledge and skills are embedded in contexts, which are guided by organizational policies, practices, and IS, which can ultimately constrain or enable behaviour (Jones & Karsten, 2008). Yet whilst these constraints/enablers are present, it is ultimately at the discretion of the individual to perform the behaviour (Jones & Karsten, 2008). Furthermore in accordance with Wright and McMahan (2011, p. 99) it is the motivation of the individual that “*bridges the divide between human capital and behaviour*”. This acknowledges that individuals are complex entities (Zhao, 2008), whereby “*highly skilled employees can exhibit mediocre or even inferior performance*” (Wright & McMahan, 2011, p. 99). Consequently, organizations need their employees to utilise their knowledge and skills and be motivated to devote the required effort to perform tasks (Hansen & Alewell, 2013).

The notion that skills, knowledge, and motivation are enablers of performance is further substantiated by the Theory of Performance (ToP) (Mccloy et al., 1994), which has been examined in a variety of contexts (e.g. Griffin & Neal, 2000; Huang, Blume, Ford, & Baldwin, 2015). ToP asserts that the combination of declarative knowledge, procedural knowledge and skills, and motivation are determinants of performance (Mccloy et al., 1994). This body of knowledge clearly emphasises the necessity of the multidimensional treatment of individual characteristics and recognizes the complex nuances inherent in individuals.

The ToP specifies the multidimensional combination of motivation, skills, and knowledge, the theory in itself does not include an individual’s attitude. A preponderance of scholars have evidenced that attitude is also a key determinant of an individual performing a behaviour (Kraus, 1991) and resultant job performance (Riketta, 2008). Both attitude and motivation represent theoretically distinct affective states that influence an individual’s behaviour (Kraiger et al., 1993) An individual’s attitude refers to feelings (like/dislike, favour/antipathy) associated with a targeted object or behaviour (Wilson et al., 2009) whereas motivation pertains to an individual’s decision to exert varying degrees of effort to complete a task (Mccloy et al., 1994). As evident in the systematic literature review, a substantial amount of research has been devoted to examining both attitude and motivation (e.g. Anderson & Agarwal, 2010; Jiang & Benbasat, 2007; Lee et al., 2012).

The relevancy of knowledge, skills, motivation, and attitude derived from human capital and attitude-behaviour literature is further substantiated by the Learning Outcomes Model (LOM), which highlights the need to consider the multidimensional nature of an individual’s cognition, skills, and affect (Kraiger et al., 1993), as a pertinent enabler of an individual's performance (Aguinis & Kraiger, 2009). Therefore drawing upon the human capital, attitude-behaviour literature, ToP and the LOM; the traits that are inherent within UC are cognitive characteristics, skills, motivation and affective attitude. Therefore in this research UC is defined as *the attributes possessed by an individual which enables them to use an IS to perform tasks*. It is conceptualized as a multidimensional construct consisting of the cognitive characteristics, skills, motivation, and affective attitude possessed by IS users. Figure 15 illustrates the high level conceptual a-priori model.

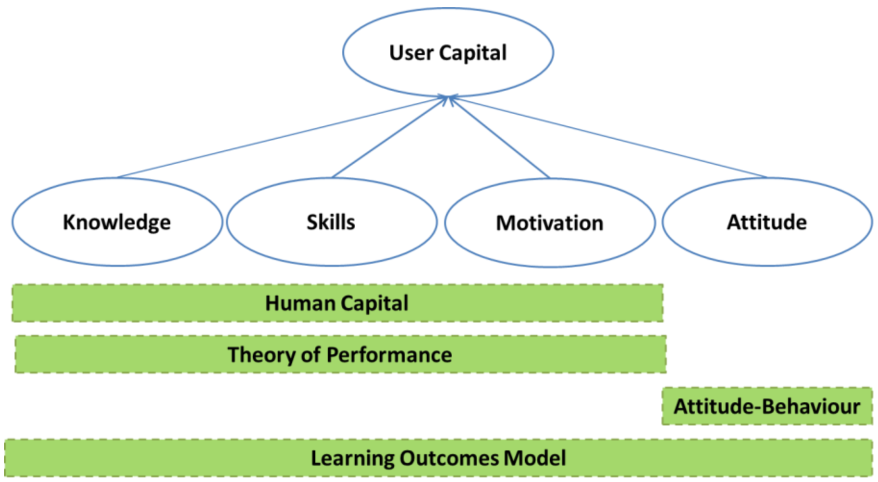


Figure 15 High Level Conceptual Model of User Capital

Whilst the human capital, attitude-behaviour literature, and the ToP was useful in formulating the high level a-priori conceptual model, in terms of identifying the high level themes of knowledge, skills, motivation, and attitude; the LOM further extends this research by specifying pertinent constructs that can be used to operationalise the aforementioned themes. Bemoaning the unidimensional analysis of learning outcomes, Kraiger et al. (1993) developed the LOM as a theoretically driven, multifaceted classification scheme consisting of cognitive, skill-based, and affective outcomes (e.g. attitudinal and motivational dimensions) (refer to Figure 16). The LOM has been widely cited (~1400 times) and adapted and applied across multiple disciplines resulting in cumulative research pertaining to learning effectiveness (Garris, Ahlers, & Driskell, 2002; Wilson et al., 2009), and adaptive performance of individuals (Kozlowski et al., 2001).

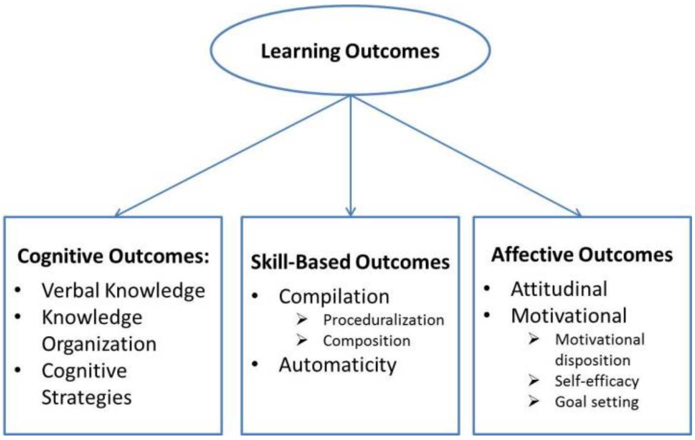


Figure 16: Learning Outcome Model (LOM) Adapted from Kraiger et al. (1993, p. 312)

Cognitive outcomes closely align with the knowledge component in human capital and pertains to (i) verbal knowledge, (ii) knowledge organization, and (iii) metacognitive strategies (Kraiger et al., 1993). Verbal knowledge is also referred to as declarative knowledge and pertains to either a verbal or written recollection of relevant facts, either produced verbatim or reconstructed in a manner in which the meaning is retained (Gagne, 1984). In a process sense verbal knowledge is an initial stage (Kraiger et al., 1993) and foundational to developing cognitive skills (Wilson et al., 2009). Declarative knowledge has been examined in the IS discipline and has been found to be a key determinant of an individual's task performance (Yi & Davis, 2003). Alternatively knowledge organization pertains to in-memory knowledge structures, whereby experts typically store knowledge in a hierarchical fashion (Kraiger et al., 1993). In the IS discipline, knowledge organization is typically explored using the concept of the mental models of IS developers (Shaft & Vessey, 1995). The final type of cognitive outcomes are cognitive strategies (henceforth referred to as metacognitive self-regulation), which are the methods individuals apply to acquire, use and regulate knowledge (Gagne, 1984; Kraiger et al., 1993). Comparative to knowledge organization and verbal knowledge, research has evidenced that the analysis of metacognitive self-regulation is more important for advanced individuals, as individuals who are ineffective at applying metacognitive self-regulation techniques typically possess production deficiencies, which hinder task performance (Kraiger et al., 1993). Given the pertinence of self-regulation, it is surprising that only limited research has been performed into investigating the self-regulation of users in the IS discipline (e.g. Gravill & Compeau, 2008).

Alternatively, skill-based outcomes refers to compilation and automaticity of knowledge, which in a procedural sense occurs subsequent to initial skill acquisition (Kraiger et al., 1993). Compilation and automaticity are typically treated along a continuum of skills development (Kraiger et al., 1993). Compilation refers to the skills that an individual has acquired from performing routine tasks subsequent to initial skills acquisition (Wilson et al., 2009) and is regularly associated with improved task performance. However compilation is not solely limited to routinely used skills, rather it also encompasses an individual’s ability to use skills in new settings and modify skills to solve different problems (respectively termed generalization and discrimination) (Kraiger et al., 1993). Alternatively automaticity refers to the automatic processing of tasks (Wilson et al., 2009) as opposed to controlled processing that is evident with compilation (Kraiger et al., 1993). Similar to compilation, automaticity is also associated with the application of generalized and discriminatory skills (Kraiger et al., 1993). There are several constructs that are indicative of skills in the IS discipline which have been analysed as an antecedent to use (e.g. Tsai & Bagozzi, 2014) and impacts (e.g. Tarafdar et al., 2015).

Conversely affective outcomes are internal states that affect behaviour (Kraiger et al., 1993, p. 318) and consist of both attitudinal and motivational outcomes. Attitudinal outcomes pertain to an individual's attitude, which is "*the worth or value attached to a targeted object, phenomenon, or behaviour"* (Wilson et al., 2009, p. 225) and is recognised as a key determinant of performance (Riketta, 2008). A key example in the IS discipline, is attitude towards using IS, which has been identified as a key factor in individuals accepting technology (Venkatesh et al., 2003).

Motivational outcomes pertain to the internal aspects that influence the effort an individual devotes to a task and consists of an individual's: motivational disposition, self-efficacy, and goal-setting behaviour (Kraiger et al., 1993). Motivational disposition pertains to the extent to which individuals are motivated to perform behaviour based upon (i) mastering skills (mastery); receiving positive appraisals (performance-prove); and avoiding negative criticisms (performance-avoid) (cf. Button, Mathieu, & Zajac, 1996; Dweck & Leggett, 1988; Vandewalle, 1997). While receiving substantial attention in the organizational psychology disciplines, less research attention has been devoted in the IS domain. One exception is the research by Chatzoglou, Sarigiannidis, Vraimaki, and Diamantidis (2009) who identified that mastery motivational disposition influenced an individual's perception of the IS. Similar to motivational disposition, self-efficacy has its foundations in Social Cognitive Theory (Bandura, 1986). Self-efficacy is defined as "*people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986, p. 391).* In the IS discipline self-efficacy has been identified as being particularly relevant for novice users (e.g. Marakas, Johnson, & Clay, 2007; Savolainen, 2002). Finally, goal setting refers to individuals who set goals for completing tasks whereby individuals who are devoted to attaining their goals are more likely to expend the required effort (Kraiger et al., 1993). In the IS discipline, goal setting has been identified as being positively related to end-user performance (e.g. Jawahar & Elango, 2001).

The LOM clearly highlights the complex nuances in individuals' behaviour through clearly discussing that whilst skill development is a necessary component of performing tasks, in itself it is not sufficient, rather cognitive and affective outcomes also need to be considered (Kraiger et al., 1993). Evidently the LOM provides an operational focus to this research. Consequently the LOM, human capital, and attitude behaviour literature provided an effective theoretical base to conceptualize UC. The conceptual model of UC is presented in Figure 17 and the rationale behind the selection of each constructs is explained in the subsequent sections. As evident in Figure 17 user competence is treated primarily as a skill-based outcome. An individual's attitude towards using an IS is examined as an attitudinal outcome, and an individual's mastery orientation as a motivational outcome. Meta-cognitive self-regulation was selected as the cognitive based outcome.

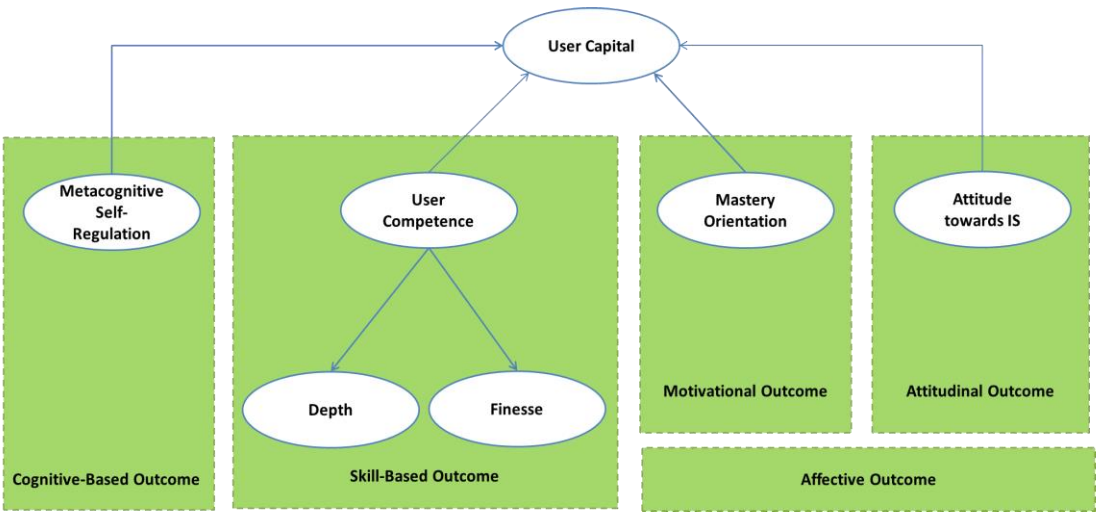


Figure 17: User Capital Conceptual Model

A key distinction between the LOM and UC, is the LOM was presented as a reflective multidimensional model (refer to Figure 16), whereas UC is considered formative in nature, as affective, skill-based, and cognitive-based outcomes are all defining characteristics of UC (refer to chapter *5.3.2.1.2 Directionality and Dimensionality)*. Thus the removal of one partition will alter the underlying meaning of the construct, therefore alluding to the formative nature of the construct. Therefore this research defines *as the attributes possessed by an individual which enables them to use an IS to perform tasks.* It is conceptualized as a multidimensional construct consisting of the cognitive characteristics, skills, motivation, and affective attitude possessed by IS users and is specifically operationalised using metacognitive self-regulation, user competence, mastery motivational disposition, and attitude towards using IS.

Overwhelmingly the formulation UC involved a multi-theoretical approach drawing on insights from multiple disciplines. Table 13 identifies how each component of UC is aligned with the aforementioned theoretical frameworks and supporting literature. The subsequent subsections provide in depth rationales into the incorporation of each dimension of UC.

Table 13: Theory and Literature Supporting the Formulation of User Capital

UC Dimensions	Attitude-Behaviour	Human Capital	LOM	ToP	Others
Attitude towards IS	X (attitude)	-	X (attitude)	-	-
Mastery Orientation	-	X (motivation)	X (motivation)	X (motivation)	Vandewalle (1997)
Metacognitive self-regulation	-	X (knowledge)	X (cognitive)	X (knowledge)	Bandura (1986)
User Competence	-	X (skills)	X (skills)	X (skills)	Munro, Huff, Marcolin, and Compeau (1997)

3.2 Dimensions within User Capital

The following subsections discuss the appropriateness for the selection of each construct within user capital.

3.2.1 Dimension of User Capital: Metacognitive Self-Regulation

In accordance with Kraiger et al. (1993) individuals can possess the required knowledge and skills to complete the tasks, yet may be unable to execute the task due to a lack of metacognitive self-regulation. Furthermore, metacognitive self-regulation is a pertinent construct related to higher order knowledge development, whereby experts possess more effective regulation strategies in comparison to novices (Kraiger et al., 1993). Therefore in this research the cognitive outcome of meta-cognitive self-regulation was selected. In accordance with Bembenutty (2011, p. 59) metacognitive self-regulation "*is a cognitive process in which learners become aware of the knowledge they have, control that knowledge, and monitor it by planning and regulating their learning outcomes".* Therefore metacognitive self-regulation pertains to "*an awareness or knowledge of one's thinking as well as the regulation of one's cognition"* (Bartels & Magun-Jackson, 2009, p. 459). In addition metacognitive self-regulation is generally considered to consist of three key activities, which are: the planning, monitoring, and altering of one's behaviour (Kraiger et al., 1993; Slife & Weaver, 1992). Therefore this research defines metacognitive self-regulation as an *individual's knowledge of their skills coupled with their ability to monitor and modify their cognitions* (Bartels & Magun-Jackson, 2009; Slife & Weaver, 1992).

Self-regulation has its foundations in Social Cognitive Theory whereby individuals continuously regulate their behaviours so they can attain their goal

(Bandura, 1991). It is hypothesised that all individuals regulate their behaviour, however the extent to which one regulates their behaviour can vastly differ (Zimmerman, 2000). Individuals typically either regulate their behaviours proactively through goal setting and goal monitoring (Bandura, 1991), or reactively (Zimmerman, 2000). Individuals with poor self-regulatory skills often utilise reactive self-regulatory methods which are typically ineffective (Zimmerman, 2000).

According to Sun and Rueda (2012) *"students with higher levels of self-regulation demonstrated higher levels of engagement"*. Additionally Kraiger et al. (1993) highlighted that metacognitive self-regulation positively correlates to skill development and task performance. This is further corroborated by Bartels and Magun-Jackson (2009) who emphasises that metacognitive strategies improve academic performance and limits procrastination behaviour. Furthermore Schmidt and Ford (2003) identified that metacognitive self-regulation positively influences self-efficacy. In addition effective metacognitive self-regulation is necessary for individuals to be able to effectively problem solve (Slife & Weaver, 1992), whereby individuals who possess poor metacognitive self-regulation strategies are unlikely to discontinue ineffective problem solving behaviour (Kraiger et al., 1993).

Zimmerman (2008) also acknowledges that poor self-regulation can result in unfavourable behaviour and debilitating effects (Zimmerman, 2008) which are regularly cited in the health, psychology, and education disciplines. Furthermore in accordance with Kraiger et al. (1993) individuals who are ineffective at regulating their cognitions typically possess production deficiencies as regardless of their skills and knowledge they are still limited in their ability to execute tasks. Yet as evidenced by the literature review (chapter 2), there is a paucity of literature pertaining to metacognitive self-regulation An exception is the study performed by Gravill and Compeau (2008) who examined the impact of self-regulated learning in an online training environment which was designed to train individuals to use an enterprise system. Gravill and Compeau (2008) identified that self-regulated learning positively impacted declarative knowledge, procedural knowledge, and self-efficacy. However, the scholars did not assess the direct/indirect impact that self-regulation has on the performance of individuals.

Given the pertinence of effective metacognitive self-regulation strategies for both task performance and the application of skills, coupled with the production deficiencies associated with poor regulatory behaviour; it is imperative to assess metacognitive self-regulation as a component of UC.

3.2.2 Dimensions of User Capital: User Competence

User competence is central to the notion of User Capital (UC) as a plethora of prominent scholars have identified a relationship existing between competence and the effective and efficient execution of tasks. For instance Marcolin et al. (2000) partially attributed the productivity paradox to users lacking competence. Shih (2006) attested that performance is reliant on competence. This corroborates prior research performed by Bassellier et al. (2001) who articulated that "*competence is an enabler of performance*". Savolainen (2002) also emphasised that an individual's competence is a necessary precondition for goal attainment. Furthermore Munro et al. (1997) highlighted that "*user competence is an important determinant of individual performance in computer use.*" In addition Yoon et al. (1995) statistically evidenced a positive relationship between user competence and task performance.

In the IS literature the skills an individual possesses have been examined in a myriad of ways. For instance Ho and Frampton (2010) utilised an iceberg model to illustrate the types of competencies IT architects require. Alternatively Davis (2013) analysed the knowledge and experience individuals possessed related to technologies and the organization. Arguably the most notable contribution in this domain is the user competence construct developed by Munro et al. (1997) and validated by Marcolin et al. (2000). The user competence construct considers both the skills acquired through routinely performing tasks and the ability of individuals to use skills in new settings and adapt skills to solve problems. User competence is considered to be multidimensional in nature consisting of breadth and depth of knowledge and skills as well as finesse (Munro et al., 1997).

Breadth refers to the extent of knowledge and skills an individual possesses over a broad variety of domains including hardware, software and practices (Munro et al., 1997). Whereas, depth pertains to the extent to which an individual has deep domain specific insights and skills (Munro et al., 1997). Alternatively, finesse encompasses an individual's ability to creatively apply skills to solve a range of non-routine business problems, which typically requires users to simultaneously apply both their depth and breadth of knowledge and skills (Munro et al., 1997). Due to the commoditization of digital technology (Hynes & Richardson, 2009) and the heightened familiarity users now possess with digital technologies (Vodanovich, Sundaram, & Myers, 2010; Waycott, Bennett, Kennedy, Dalgarno, & Gray, 2010), only the depth and finesse components were examined in the formulation of UC.

3.2.3 Dimension of User Capital: Mastery Oriented Motivational Disposition

Motivation is an affective state that influences an individual's decision to exert effort to perform a behaviour (Kraiger et al., 1993; Mccloy et al., 1994) and is defined as "*a desire, need, or process that influences an individual's goal-directed behaviour*" (Guo, Li, & Stevens, 2012, p. 200). Motivation is imperative to User Capital (UC) such that an individual may possess the necessary competence to effectively execute tasks yet without motivation they still may choose not to perform the task (Savolainen, 2002). Individuals can either be motivated internally or by external inducements (Bandura & Schunk, 1981). However, whilst external incentives are important in encouraging individuals at the commencement of an activity they typically do not suffice for prolonged behaviour and individuals must be able to internally motivate themselves (Bandura & Schunk, 1981). In today's hypercompetitive environment, operational employees typically perform multiple, routine, broadly defined tasks (Chaykowski & Gunderson, 2013), autonomously (Belanger et al., 2013), and potentially in a team environment (Kashefi, 2011), which makes incentivizing employees a challenging task (Berry & Mok, 2014). Therefore in the formulation of UC it is imperative to acknowledge that users need to be self-motivated to perform tasks using an IS.

In this research, an individual's motivational disposition was investigated to determine how individuals are internally motivated based on their desire to master skills, prove themselves, and avoid the disproval of their competence (Vandewalle, 1997; Vandewalle, Cron, & Slocum, 2001). However other constructs also pertain to an individual's self motivation including self-efficacy and goal setting (e.g. Kraiger et al., 1993). In the formulation of UC, self-efficacy and goal-setting were omitted from the study, based upon the: (i) need for parsimonious models; (ii) pertinence of self-efficacy is more applicable at the novice level (Savolainen, 2002) as opposed to the varying levels of expertise possessed by operational employees; (iii) cited overlaps between self-efficacy and competence related measures (Hughes, Galbraith, & White, 2011; Marcolin et al., 2000); (iv) largely equivocal statistical relationships between self-efficacy and its potential antecedents and consequences (Marakas et al., 2007); and (v) measures of metacognitive self-regulation which is considered a cognitive outcome includes notions of goal settings.

Early research identified two types of motivational disposition: (i) mastery orientation, and (ii) performance orientation (cf. Button et al., 1996; Dweck & Leggett, 1988). However further exploration of motivational disposition yielded a three factor solution which included (iii) avoidance orientation (cf. Vandewalle, 1997).

Mastery motivational disposition (also termed learning/mastery orientation) is defined as an individual's "*desire to develop the self by acquiring new skills, mastering new situations and improving one's competence"* (Vandewalle, 1997, p. 1000). Individuals possessing a mastery orientation strive to improve their ability to perfect tasks (Fisher & Ford, 1998). In addition, individuals possessing a mastery orientation believe that ability is malleable and can be improved upon by devoting effort (Vandewalle, 1997), gaining experience (Brett & Vandewalle, 1999), and purposefully acquiring knowledge (Yi & Hwang, 2003). Consequently, mastery oriented individuals enjoy performing challenging tasks and persevere when presented with obstacles (Brett & Vandewalle, 1999).

Conversely, performance motivational disposition (also termed performance/prove orientation) is an individual's "*desire to prove one's competence and to gain favourable judgements about it" (Vandewalle, 1997, p. 1000)*. Therefore performance oriented individuals are primarily concerned with proving their abilities to others (Fisher & Ford, 1998). Individuals who are performance oriented believe that ability is static and cannot by improved upon by devoting effort (Yi & Hwang, 2003). Consequently, they tend to associate high effort expenditure with low ability (Brett & Vandewalle, 1999).

Alternatively, avoidance motivational disposition (also termed avoidance orientation) is defined as an individual's "*desire to avoid the disproving of one's competence and to avoid negative judgments about it"* (Vandewalle, 1997, p. 1000). Therefore individuals with an avoidance orientation tend to avoid performing certain tasks so they do not receive a negative appraisal. Consequently, avoidance orientation is typically associated with the concept of fear of failure (Porath, Spreitzer, Gibson, & Garnett, 2011), whereby an individual attempts to "*avoid failure in achievement settings because one feels shame on failure"* (Bartels & Magun-Jackson, 2009, p. 459). Furthermore avoidance oriented individuals regularly abstain from trying new things (Porath et al., 2011). Whilst some scholars highlight the overlaps in the underpinning of performance and avoidance orientation Murayama, Elliot, and Yamagata (2011) empirically validated that they represent distinct factors.

The key distinction between individuals with a mastery orientation and those who possess either a performance or avoidance orientation is their attitude to learning. Performance and avoidance orientations are regarded as the "*antithesis of learning*" (Porath et al., 2011) whereas mastery orientation is positively related to motivation to learn (Klein, Noe, & Wang, 2006). It is regularly hypothesized that when faced with a difficult task individuals with a performance orientation tend not to persevere and can experience long lasting debilitating effects resulting in a loss of efficacy and withdrawal from tasks (Dweck & Leggett, 1988). Alternatively, individuals with a mastery orientation are more likely to persevere (Hirst, Van Knippenberg, & Zhou, 2009). Furthermore Yi and Hwang (2003) evidenced that mastery orientation positively effects computer self-efficacy. Similar findings of a positive relationship existing between mastery orientation and self-efficacy were also reported by Chen, Gully, Whiteman, and Kilcullen (2000), Lauzier and Haccoun (2014), and Vandewalle et al. (2001).

Research performed by Porath et al. (2011) found a positive relationship between mastery oriented individuals and their ability to thrive in the workplace. Furthermore they also evidenced that no significant relationship existed between performance or avoidance orientations and thriving. In addition Vandewalle et al. (2001) performed a longitudinal analysis to identify the impact that feedback had on the performance of mastery, performance, and avoidance oriented individuals. Their findings illustrated that prior to receiving feedback a mastery orientation and performance orientation was positively related to performance, and avoidance orientation was negatively related to performance. However, after feedback was obtained mastery orientation still retained a positive impact on performance, and avoidance orientation still possessed a negative impact. Conversely performance orientation had a non-significant effect on performance. In an educational context, Dupeyrat and Marine (2005) studied how an individual's motivational disposition influenced their academic achievement. They found that individuals with a mastery disposition were more likely to form deeper strategies than individuals with a performance orientation. Further those individuals with a mastery orientation were more likely to achieve, however this relationship was mediated by effort expenditure. Table 14 summarizes the motivational dispositions.

Table 14: Summary of Motivational Disposition

Motivational Disposition	Definition*	Summary of Characteristics
Mastery Orientation	"*desire to develop the self by acquiring new skills, mastering new situations and improving one's competence*"	• Strive to improve ability to perfect tasks (Fisher & Ford, 1998). • Perceive ability as malleable, and can be improved by devoting effort, (Vandewalle, 1997) gaining experience (Brett & Vandewalle, 1999), and acquiring knowledge (Yi & Hwang, 2003). • Persevere when performing challenging tasks (Brett & Vandewalle, 1999).
Performance Orientation	"*desire to prove one's competence and to gain favourable judgements about it*"	• Concerned with proving their ability to others (Fisher & Ford, 1998) • Believe that ability is static (Yi & Hwang, 2003) • Associate high effort expenditure with low ability (Brett & Vandewalle, 1999)
Avoidance Orientation	"*desire to avoid the disproving of one's competence and to avoid negative judgments about it"*	• Avoid performing tasks where they expect to receive a negative appraisal (Vandewalle, 1997) • Abstain from trying new things (Porath et al., 2011)

* Definitions of motivational dispositions extracted from Vandewalle (1997, p. 1000)

Motivational disposition is pertinent to the discussion of UC in the contemporary enterprise systems (ES) environment. Whilst operational employees were generally treated as low skilled labour who completed simple narrowly defined tasks, today operational employees need to complete broad tasks and require formal qualifications (Belanger et al., 2013). Consequently when operational employees are presented with new or different tasks or faced with obstacles it is important that they persevere, which is a key trait of mastery orientation, as opposed to performance or avoidance orientation. In addition UC recognizes the agency of operational employees in terms of their choice to perform tasks within an IS. The notion of motivational disposition is extremely relevant even in the context of ES use as individuals can still opt to perform manual work arounds (Strong & Volkoff, 2010). Therefore akin to the purpose of this study, a user's mastery orientation is considered to be a dimension UC due to its positive influence on behaviour and performance in varying task situations. In contrast performance and avoidance orientation are not considered a component of UC as in alignment with the findings Vandewalle (1997) it was anticipated that performance would be a negative non-significant dimension of UC, and avoidance orientation would be a negative dimensions of UC[3].

3.2.4 Dimension of User Capital: Attitude Towards Using IS

Attitude is defined as "*the worth or value attached to a targeted object, phenomenon, or behaviour"* (Wilson et al., 2009, p. 225) and is typically associated with "*dispositions to respond with some degree of favourableness or unfavourableness to a psychological object*" (Ajzen & Gilbert Cote, 2010, p. 305).

The antecedents and consequences of an individual's attitude have been widely studied in the social sciences literature and have regularly been hypothesized to be a key determinant of an individual's behaviour (Kraiger et al., 1993). In a meta-analysis of attitude-behaviour studies, Kraus (1991) in his seminal work, identified that whilst attitude is a significant determinant of an individual's behaviour it should not be considered the sole determinant, nor should it be used as a proxy for behaviour as they represent two theoretically distinct constructs. Furthermore research has evidenced a statistical relationship between an individual's attitude and their job performance (Riketta, 2008).

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[3]In this research survey data pertaining to all motivational dispositions will be collected as analysis of performance and avoidance orientation could assist in the determination of the validity of UC.

In the IS field the construct of an individual's attitude towards computers has also been rigorously studied. Erdogan (2009) defined 'attitude towards computers' as a *"person's general evaluation or feeling of favour or antipathy towards computer technologies and specific computer related activities"*. Several scales have been rigorously developed to measure 'attitude towards computers' including the computer attitude scale (CAS), the computer attitude measure (CAM) and the computer attitudes and confidence questionnaire (CACQ) (Garland & Noyes, 2008). An individual's 'attitude towards computers' has been found to positively influence an individual's satisfaction with an IS (Aladwani, 2002), as well as to positively influence an individual's perception of the usefulness of the IS (Chau, 2001). Furthermore an individual's attitude towards using information systems has been found to positively influence their intention to use computers (Huang, 2015; Karaali, Gumussoy, & Calisir, 2011). Therefore attitude is considered to be a key component of User Capital (UC) due to the pertinence of attitude in facilitating an individual's behaviour and resultant performance.

3.3 Comparison of User Capital with Related Constructs

In the IS discipline, there are several constructs that have been conceptualized with a similar intent to User Capital (UC). Arguably the most pervasive being computer self-efficacy (CSE) developed by Compeau and Higgins (1995b). Whilst Kraiger et al. (1993) recognizes self-efficacy as an internal motivator, CSE has typically been utilised as a proxy for skills (Havelka, 2003; He & Adams, 2008; Marcolin et al., 2000). Yet in accordance with SCT in which self-efficacy was developed; self-efficacy is defined as "*people's judgments of their capabilities to organize and execute courses of action required to attain designated types of* *performance*" rather than the actual skills possessed by the individual (Bandura, 1986, p. 391). Notwithstanding CSE has been found to influence an individual's (i) intention to study IS (He & Freeman, 2010); (ii) intention to use an IS (Abushanab, Pearson, & Setterstrom, 2010; Bock, Kankanhalli, & Sharma, 2006); (iii) intention to pursue a career related to IS (Joshi & Kuhn, 2011); (iv) intention to avoid security threats and follow compliance procedures (Herath & Rao, 2009; Liang & Xue, 2010); (v) satisfaction with the IS (Chan et al., 2010; Shih, 2006); and (vi) intent to adopt an IS (Lee & Laren, 2009). In the context of UC, CSE alone cannot account for the complex nuances in individual's behaviour that UC attempts to explain; rather CSE could potentially be examined as a motivational construct. However, the statistical relationships between CSE and its potential antecedents and consequences are largely equivocal (Marakas et al., 2007). Furthermore potential overlaps between CSE and user competence measures have also been cited (Hughes et al., 2011; Marcolin et al., 2000).

Another study that is partially related to the construct of UC is end user computing competence, which seeks to investigate the knowledge, skills, and attitude of users who perform tasks in a computing environment (Yoon, 2009). However, rather than examining knowledge, skills, and attitude in a multidimensional manner in which the additive of multiplicative combination of dimensions could be examined, Yoon (2009) examined the unidimensional treatment of computing mindset (attitude), knowledge, skills (current and potential) had on end-user computing competency and end user task performance. Asides from the unidimensional analysis, and omission of motivation another key distinguishing difference was the definition of the user, which was defined as "*a person who directly operates and manages computer application software and computing* *systems in a computing environment*" (Yoon, 2009, p. 1208) which could refer to both users and technical professionals, whereas UC does not encompass technical professionals.

Business manager IT competence and an individual's virtual competence both represent multidimensional constructs that are similar to UC. Business manager IT competence, examines the multidimensional nature of technical knowledge and skills possessed by business managers (Bassellier et al., 2001), however overlooks both motivational and attitudinal concepts and is also constrained data consumers as opposed to operational users. Alternatively the virtual competence construct includes the motivation, knowledge, and skills that are required by individuals to exchange information within virtual environments (Wang & Haggerty, 2009, 2011). However, this study omits attitude and is constrained to virtual environments rather than complex enterprise systems.

Another multidimensional construct that examines knowledge, skills, and motivation is user expertise, which seeks to distinguish between novices and experts (Sedera & Dey, 2013). Whilst initial similarities can be observed between user expertise and UC in that they both examine users of enterprise systems, critical analysis of the respective dimensions identified fundamental differences other than the exclusion of attitude. In user expertise, the dimension that was used to operationalise skill pertained to the behaviours involved in proactively learning about the enterprise system, organizational policies, and processes; rather than the actual skills and finesse components of user competence that are apparent in the UC construct. Furthermore motivation pertained to an individual's ability and willingness to adapt to the enterprise system (Sedera & Dey, 2013), however whilst willingness to adapt may be pertinent when the enterprise system is initially adopted, after prolonged exposure to the system the willingness to adapt may take on less importance as the routines and structures are already well established. Building on the distinction between novices and experts, Sedera and Dey (2013) also incorporated an individual's experience as a dimension of user competence, however this measure pertained to the years of experience an individual had within the industry and the organization, rather the experience with the enterprise system. In a similar manner the criterion items pertinent to user expertise did not pertain to the enterprise system, rather they pertained to an individual's expertise in general.

The aforementioned studies all highlighted the pertinence of individuals within an organization and provided insights into the formulation of the dimensions inherent within the UC construct.

3.4 Chapter Summary

This chapter defined User Capital (UC) *as the attributes possessed by an individual which enables them to use an IS to perform tasks.* It is conceptualized as a multidimensional construct consisting of the cognitive characteristics, skills, motivation, and affective attitude possessed by IS users and is specifically operationalised using metacognitive self-regulation, user competence, mastery motivational disposition, and attitude towards using IS. In addition the a-priori high level conceptual model of UC was formulated, followed by the finalised conceptual model which consisted of the key constructs that would be used in the operationalization of UC. The constructs that are pertinent to UC are defined in Table 15.

Table 15: Summary of Construct Definitions

Construct	Definition	Reference
Attitude towards IS	*An individual's positive or negative feelings about using an information system.*	Venkatesh et al. (2003); Fishbein and Ajzen (1975)
Mastery Orientation	An individual's "*desire to develop the self by acquiring new skills, mastering new situations, and improving one's competence.*"	Vandewalle (1997, p. 1000)
Metacognitive Self-regulation	*An individual's knowledge of their skills coupled with their ability to monitor and modify their cognitions.*	Bartels and Magun-Jackson (2009); Slife and Weaver (1992)
User Capital	*The attributes possessed by an individual which enables them to use an IS to perform tasks. It is conceptualized as a multidimensional construct consisting of the cognitive characteristics, skills, motivation, and affective attitude possessed by IS users and is specifically operationalised using metacognitive self-regulation, user competence, mastery motivational disposition, and attitude towards using IS.*	
User Competence	"*The user's potential to apply technology to its fullest possible extent so as to maximize performance of specific job tasks.*"	Marcolin et al. (2000, p. 38)

Chapter 4: User Capital, Effective Use, and Information Systems Success

As highlighted in the introductory chapter, continual improvements in technology has transformed the operating environment of organizations into a hypercompetitive, globalized marketplace (Berry & Mok, 2014). In an attempt to improve productivity and gain a competitive advantage; organizations make substantial investments in Information Systems (IS) (Kanaracus, 2008; Markus et al., 2003). Yet despite technology advancements, as many as 80% of organizations fail to attain benefits from their IS investments (Abugabah & Sanzogni, 2010). Therefore, it is extremely pertinent to understand the factors that contribute to IS Success.

Chapter 2 illustrated that leading IS Success models predominantly focus on how technical characteristics (i.e. system and information quality), influence the success of IS, to the detriment of understanding the influence of users. This is clearly a pertinent gap as in accordance with Petter, DeLone, and McLean (2013, p. 20) *"while IS are critical resources for an organization, it is the people using these systems and the information derived from them that can influence the resulting success of the system."* In addition, in alignment with Social Cognitive Theory (SCT), users have conscious control over their actions even in the context of mandatory settings. Consequently, in Chapter 3 User Capital (UC) was conceptualized as a multidimensional formative construct using a theoretically driven approach that critically examined the complex nuances of users.

Due to the formative nature of UC, it must be validated within a nomological network (cf. Cenfetelli & Bassellier, 2009). The nomological network of SCT was determined to be applicable as it examines the relationship between the personal/cognitive characteristics inherent in UC and behaviour, in this case effective use. Analysing UC as an antecedent of effective use within the nomological network of SCT, provides the conceptual foundation to inform the second research question, which is "*what is the relationship between User Capital and Effective Use?*"

This chapter also seeks to inform the third research question, which is "*what is the relationship between user capital, effective use and IS success?*" In answering this research question, this chapter extends the DeLone and McLean (1992) IS Success model to incorporate UC and effective use. In addition, hypotheses will also be developed to predict how the combination of technical characteristics and UC influence the benefits obtained. Table 16 outlines the key themes discussed in this chapter. This chapter concludes with a summary of the hypotheses and key definitions relevant to UC and IS success.

Table 16: Key Themes of Chapter 4

Theme	Objective
4.1 User Capital and Effective Use: A Nomological Network	▪ Justify the appropriateness of SCT as a nomological network. ▪ Illustrate and derive hypotheses for the relationship between effective use and UC.
4.2 IS Users and IS Success	▪ Examine how users have been investigated in the context of IS success. ▪ Explain the pertinence of investigating users with the technical attributes of IS for determining success.
4.3 Extending IS Success	▪ Justify the suitability for using the DeLone and McLean (1992) IS Success model. ▪ Explain the necessity of system usage being examined as effective use. ▪ Develop hypotheses linking UC and effective use to IS Success
4.4 Nuanced Understanding of the Relationships Inherent in IS Success	▪ Hypothesise the influence of the combination of UC, system quality and information quality on individual impact and effective use.

4.1 User Capital and Effective Use: A Nomological Network

The overarching objective of this research is to conceptualize and empirically validate the User Capital (UC) construct. In this study UC is assessed in a nomological net with effective use[4] (Figure 18). When formulating and validating a formative construct it is imperative that it is analysed within a nomological network[5] (Cenfetelli & Bassellier, 2009), which provides nomological validity that the "*construct and measures are accurate"* (Straub, Limayem, & Karahanna-Evaristo, 1995, p. 1331). A prominent nomological network used in the IS discipline was developed by Benbasat and Zmud (2003) which emphasises the centrality of an IT artefact. However, nomological validity can be assessed using the nomological network of any well-established, relevant theory (Straub et al., 1995).

Figure 18: High Level Model of User Capital with Effective Use

Venkatesh et al. (2003) provided a comprehensive list of theories that have been used to examine an individual's intention to use IS. These theories include: Theory of Reasoned Action (Fishbein & Ajzen, 1975), Theory of Planned Behaviour (Ajzen, 1991), Technology Acceptance Model (Davis, Bagozzi, & Warshaw, 1989), Innovation Diffusion Theory (Rogers, 1962), and Social Cognitive Theory (Bandura, 1986). Whilst UC was not conceptualized to examine the acceptance of technology, the Social Cognitive Theory (SCT) is still an applicable nomological net as it seeks

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[4] Effective use is a multidimensional formative construct consisting of informed action representational fidelity and transparent interaction (refer to section *2.2 Information System Usage)*

[5] A nomological network is defined as a "*theoretical framework that represents the basic features of a construct, their observable manifestations, and the interrelationships among them"* (Peterson & Zimmerman, 2004, p. 130)

to understand how an individual's personal cognitive factors, as encapsulated by UC, influences behaviour.

SCT prescribes to the human agency perspective, whereby individuals can make choices and have conscious control over their actions (Bandura, 1989, 2001). SCT specifies that human behaviour is part of a triadic, reciprocal relationship in which an individual's behaviour shapes and is shaped by personal/cognitive factors and environmental stimuli (refer to Table 17, Figure 19) (Bandura, 1986). Thus SCT recognizes that at a single point in time a personal/cognitive factor can be both an antecedent and a consequence (Compeau et al., 1999). However, when hypothesizing relationships, the proposed unidirectional relationship rather than reciprocal nature is assessed (e.g. Ambrose & Chiravuri, 2010; Compeau et al., 1999; Wang et al., 2010). SCT has been applied to understand how personal/cognitive factors of computer self-efficacy, outcome expectations, attitude, anxiety influences the use (Compeau et al., 1999), intention to use (Lam & Lee, 2006), and performance of individuals (Compeau & Higgins, 1995a; Johnson & Marakas, 2000; Yi & Davis, 2003).

Table 17: Definition of the Facets of SCT

Facet of SCT	Definition*
Behaviour	The actions an individual performs.
Environment	The factors external to the individual such as social influences, situational influences, and external stimuli.
Personal/ Cognitive	An individual's internal dispositions, affect, motivation, beliefs, cognitive competencies, and instincts.

*Bandura (1986), Bandura (2011)

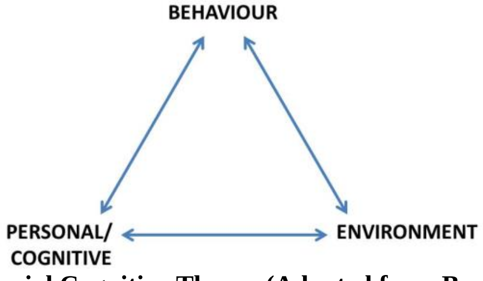


Figure 19: Social Cognitive Theory (Adapted from Bandura (1986))

SCT is extremely relevant to UC as UC consists of user competence, attitude towards using IS, motivational disposition and metacognitive self-regulation of an individual who employ an IS to perform tasks. All of the dimensions inherent within UC are examples of personal/cognitive factors and the dimensions of effective use (e.g. informed action, representational fidelity, and transparent interaction. Refer to: 2.2 Information System Usage) are a behaviour[6]. The subsequent paragraphs provide clarity into why the components of UC are considered as personal/cognitive factors.

The personal/cognitive aspect of SCT encompasses the "*dispositional sources in the form of instincts, drives, traits and other motivational forces within the individual*" (Bandura, 1986, p. 22). Furthermore Bandura (2001) also asserts that personal factors also incorporate affect. Therefore both mastery oriented motivational disposition which is founded in SCT (Dweck & Leggett, 1988) and attitude towards IS use (affect) are considered personal/cognitive factors.

Similar to motivational disposition, self-regulation was also founded in SCT (Bandura, 1991). Self-regulation can ultimately be treated as a motivational, cognitive/metacognitive or behavioural construct (Zimmerman, 2008). A common instrument designed to examine metacognitive self-regulation which this research utilises is the MSLQ (Motivated Strategies for Learning Questionnaire) instrument developed by Pintrich, Smith, Garcia, and McKeachie (1991). The instrument is comprised of three distinct sections (i) motivation, (ii) cognition/metacognition, and (iii) resource management. In this widely employed instrument metacognitive self-regulation is considered to be an element of cognition/metacognition (Zimmerman,

[6] When performing the statistical analysis, the environmental influence of task complexity will be controlled for.

2008), thus alluding to its treatment as a personal/cognitive factor within SCT. This is further substantiated by Kraiger et al. (1993) who classifies metacognitive self-regulation as a cognitive learning outcome. In addition Winne and Perry (2000) specify that the MSLQ consists of aptitude measures. Hence metacognitive self-regulation is considered a "*relatively enduring attribute of a person that predicts future behaviour*" (Zimmerman, 2008, p. 169).

Whilst user competence is not clearly explained as solely a cognitive factor or a behavioural factor, in this research the assumption is made that the skills an individual currently possess is a personal/cognitive factor, whereas the actual behaviour that an individual performs is the effective use of the IS. Put differently, an individual can possess competence but it must be enacted for it to be classified as a behaviour (Compeau et al., 1999).[7] Therefore this research posits that UC is a personal/cognitive factor and effective use is a behaviour (refer to Figure 20). Thus drawing on the causal relationship present between personal/cognitive factors and behaviour in SCT this research hypothesises that:

H1: User Capital positively impacts effective use

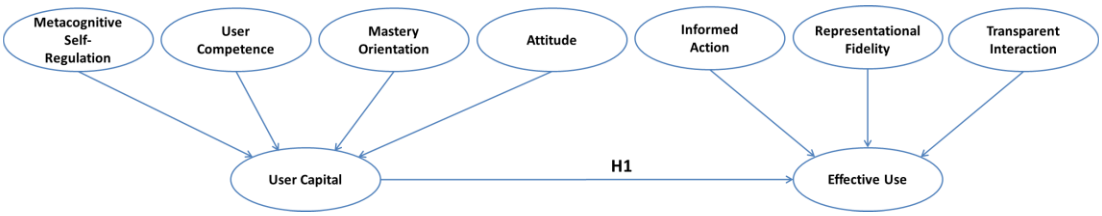


Figure 20: User Capital and Effective Use Conceptual Model

This relationship between UC and is further substantiated by Burton-Jones and Grange (2013) who highlight that both the competence and motivation of users are

[7] It is important to note that whilst environmental events are likely to possess a reciprocal causal relationship on both personal/cognitive factors and behaviour of an individual it is considered to be outside the scope of this research

drivers of effective use. Furthermore, Burton-Jones and Grange (2013) also emphasise that individuals who are more knowledgeable and motivated achieve higher levels of effective use. This is in agreement with the recent work of Serrano and Karahanna (2015), which stresses the importance of users in deriving business benefits. In addition Bagayogo et al. (2014) highlights that deriving business value is largely incumbent on users.

Whilst a plethora of scholars have actually alluded to the dispositions, traits and attitudes as being determinants of effective use, the relationship is yet to be empirically validated. Effective use is continually proffered as being a key determinant of deriving business value as well as improving the effectiveness and efficiency of individuals (Burton-Jones & Grange, 2013; Trieu, 2013). Yet organizations continue to devote substantial resources in IS that are overwhelmingly underutilised (Bagayogo et al., 2014). Consequently, it is imperative that both scholars and practitioners understand the personal/cognitive factors of an individual that impacts the effective use of an IS. Therefore this research seeks to examine and empirically verify the relationship between UC and effective use by drawing on the nomological network of SCT.

4.2 IS Users and IS Success

A substantial body of literature in the IS domain has been devoted to understanding the benefits that result from IS investments (Urbach et al., 2009). Overwhelmingly, the DeLone and McLean (1992, 2003) IS success models were foundational to this body of knowledge (refer to 2.3 Information Systems Success). This cumulative research predominantly focused on how the technical aspects of the IS, influenced the usage of the IS, which in turn impacted the realization of the benefits (e.g. Chang et al., 2011; Sharkey et al., 2010; Wang & Liao, 2008). However, to a large extent the influence of the characteristics of users has been mostly overlooked (Abugabah, Sanzogni, & Poropat, 2009; Ballantine et al., 1996; Monem, Hussin, Sharifian, & Afrasiabi, 2013). User characteristics have been readily investigated in IS acceptance literature, however acceptance is not equivalent to success (Ballantine et al., 1996; Petter et al., 2008).

Notwithstanding the above, in a qualitative review of IS success literature, Petter et al. (2013) highlighted that some user characteristics have been explored as antecedents of the dimensions within the DeLone and McLean (1992, 2003) IS Success models. Examples of such user characteristics are: (i) attitude-toward-technology, (ii) attitude-toward-change, (iii) enjoyment, (iv) trust, (v) computer anxiety, (vi) self-efficacy, (vii) user expectations, (viii) technology experience, (ix) gender, and (x) organizational tenure (Petter et al., 2013). Interestingly, the aforementioned user characteristics were primarily attitudinal, motivational and demographical constructs; thus overlooking the knowledge and skills possessed by individual users. Furthermore, the results obtained from the investigation of these user characteristics in the context of IS success have been largely mixed (Petter et al., 2013). In addition, user characteristics have been explored as *unidimensional* antecedents of IS success dimensions, as opposed to a *multidimensional*, higher order construct that recognises the combination of user characteristics as a key dimension of IS success. Therefore, as a whole, the body of literature pertinent to IS success, fails to account for the complex intricacies in users' behaviour. Whilst IS scholars have not critically examined the multidimensional effect of users' knowledge, skills, motivation, and attitude (i.e. UC dimensions) on the success of an IS; scholars have acknowledged that users can influence the success of an IS (Petter et al., 2013).

Burton-Jones and Grange (2013, p. 641) highlighted that user characteristics can influence the effective use of the IS and resultant benefits emphasising that "*users can take several actions to improve their performance; they are not limited to improving it only through the effective use of the system*".

In the context of IS success, there is limited research devoted to understanding the value of individual users; in other disciplines, the potentially significant role of employees is well understood (Wright et al., 2001). In accordance with Elias and Scarbrough (2004) it is becoming increasingly recognised that non-physical assets, specifically human capital (e.g. knowledge, skills, motivation), largely contribute to an organization's value and competitive advantage as opposed to physical assets. Furthermore a plethora of scholars recognize the pertinence of human capital for attaining a competitive advantage for the firm (Lakshman, 2014). Therefore it is becoming increasingly important for organizations to recruit the right individuals and invest in intangible assets such as human capital (Brynjolfsson & McAfee, 2014). Therefore given that users can be considered a central component of an IS and its use, coupled with the notion that individual employees contribute to the competitive advantage of an organization; it is imperative that UC is examined as a dimension of IS success.

4.3 Extending IS Success

The objective of this section of the thesis is to extend the DeLone and McLean (1992) IS Success model to incorporate User Capital (UC). As such a rationale is provided into the appropriateness of the DeLone and McLean (1992) IS Success model for this research. Subsequently, the formation of the hypotheses are presented with emphasis placed on the relationships that investigate UC.

4.3.1 Rationale for DeLone and McLean IS Success Perspective

As discussed in chapter 2, DeLone and McLean (1992) developed a taxonomy of IS success, which consisted of six interdependent constructs: (i) system quality, (ii) information quality, (iii) use, (iv) user satisfaction, (v) individual impact, and (vi) organizational impact. The model was subsequently revised, which resulted in: (i) the addition of the service quality construct; and (ii) the expansion of the bidirectional relationship between use and user satisfaction to account for the cyclical relationship between intention to use, use, and user satisfaction (DeLone & McLean, 2003). In addition, (iii) individual impact and organizational impact were combined into a single construct representing net benefits (DeLone & McLean, 2003). Furthermore, (iv) a cyclical relationship between net benefits with use, and user satisfaction was also added (DeLone & McLean, 2003) (refer to Figure 8, Figure 9, page 45). Both the original and updated IS Success models were theorised using both a variance and process perspective (Seddon, 1997, p. 243; Sedera et al., 2013). However, Sedera et al. (2013) using quantitative and qualitative data statistically evidenced that the IS success models should be considered as a variance theory and highlighted concerns pertaining to the process-oriented interpretation. As such in this research the IS Success models are treated as variance theories. Three key factors informed the selection of the DeLone and McLean (1992) IS Success model over the revised model, which are detailed in the subsequent paragraphs.

While the updated IS Success model was formulated based on insights gained from cumulative research that stemmed from the original IS Success model (DeLone & McLean, 2003); renowned scholars have highlighted several key issues with the addition of the service quality construct (e.g. Tate, Sedera, Mclean, & Burton-Jones, 2014). These issues include (i) whether service quality is a dimension of an IS or indicative of the IT department; and (ii) whether service quality provides additional meaning separate to that encapsulated by system quality and information quality (Tate et al., 2014). Therefore, this research did not examine service quality due to service quality being indicative of the IT department as opposed to the IS and the potential overlaps existing between service quality, system quality, and information quality.

Net benefits was incorporated into the DeLone and McLean (2003) IS Success model to account for the impacts that result from IS use, which extend past users and the adopting organization. Whilst the addition of net benefits was able to account for "*the extent to which IS are contributing to the success of individuals, groups, organizations, industries, and nations*" (Petter et al., 2013, p. 11); a level of granularity was ultimately removed (DeLone & McLean, 2003). In accordance with Petter et al. (2013) net benefit measures include improved productivity, cost reductions, improved profits, creation of jobs, and economic development. However, not all employee cohorts can adequately provide information on these measures and operational users are less concerned with benefits obtained at the organizational level (Gable et al., 2008). In accordance with Murphy, Hyland, and Kivits (2012), operational employees are primarily concerned with IS facilitating the attainment of their goals. Consequently, in this research the decomposed level of net benefits into individual impact and organizational impact was adhered to.

Another addition present in the DeLone and McLean (2003) IS Success model was the incorporation of the intention-to-use construct. Intention-to-use was hypothesised to behave in a cyclical manner, and positively influence an individual's use, which influenced their user satisfaction, which in turn influenced their intention to use the IS (DeLone & McLean, 2003). The theoretical grounding of intention-to-use is well recognised in the IS discipline, and is built upon the Theory of Planned Behaviour whereby users form initial intentions prior to executing the behaviour (Venkatesh et al., 2003). However, in a meta-analysis performed by Petter and McLean (2009), statistical support was provided for the direct relationship between system quality, information quality and use. Therefore in the interest of parsimony intention to use was omitted from this research.

The above rationale serves to justify why the DeLone and McLean (1992) IS Success model is more appropriate for this research than the revised model. However there is a key aspect in the IS Success models that demands further consideration, which is the conceptualization of the use construct. Seddon (1997) highlights inconsistencies in the interpretation of the 'use' construct present in the IS success models. In doing so, Seddon (1997) specified three ways in which use could be operationalized: Firstly, (i) as a proxy for the benefits that derive from IS use. This viewpoint is built on the underlying assumption that heavily used IS are successful, whereas IS that are never used are failures (Seddon, 1997). Whilst the latter assumption is widely accepted, issues with the former exist, in which not all usage derives benefits (Seddon, 1997). Secondly, (ii) use could be indicative of future use as opposed to actual use (Seddon, 1997). However, this interpretation faces criticism as IS Success recognises causal influences between use and other dimensions present within the model (Seddon, 1997). Thirdly, (iii) use can be operationalized "*as an event in a process leading to individual or organizational impact*" which stemmed from the IS Success models being considered from both a variance and process perspective (Seddon, 1997, p. 243; Sedera et al., 2013). However, as this research uses the variance perspective of the DeLone and McLean (1992) IS Success model, the third interpretation of use is not applicable to this study.

In a response to the critique performed by Seddon (1997), DeLone and McLean (2003) justified that whilst use is a behaviour and precursor of impacts; depending on the nature of use, it can also *cause* impacts. Whilst it was initially conceived that IS must be used to derive benefits (Orlikowski, 2000), use in itself (e.g. frequency, duration) is not sufficient to derive business value (Trieu, 2013). Furthermore existing quantity of use measures do not adequately capture the relationship between use and benefits, rather the use should be informed effective (Burton-Jones & Grange, 2013; DeLone & McLean, 2003). Effective use (refer to Chapter 2.3) refers to "*using a system in such a way that helps attain the goals for using a system"* and consists of informed action, representational fidelity, and transparent interaction (Burton-Jones & Grange, 2013, p. 633) (refer to Chapter 2.3). Drawing upon the conceptualization of effective use by Burton-Jones and Grange (2013) this research operationalizes use in the DeLone and McLean (1992) IS success model as effective use (refer to Figure 21).

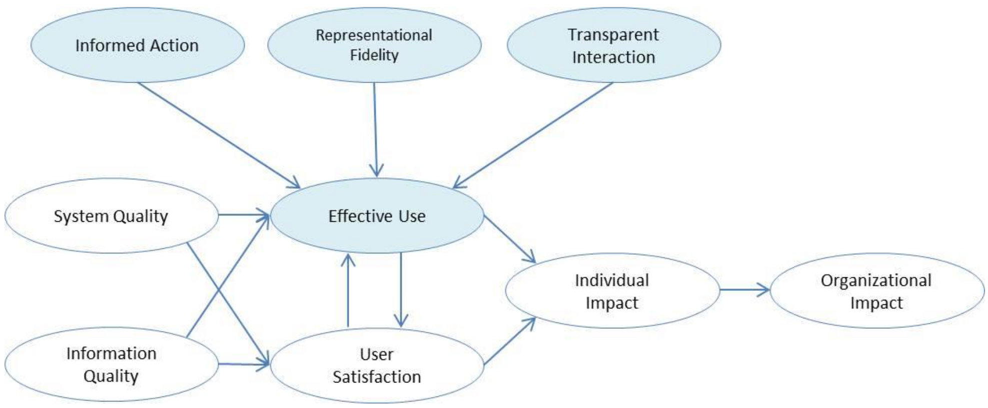


Figure 21: Incorporation of effective use into the DeLone and McLean (1992) IS Success model

To summarise, this research examines UC in the context of IS success. Specifically:

- The DeLone and McLean (1992) IS success model is determined to be the most applicable conceptualization of IS success for this research.
- The variance perspective of the DeLone and McLean (1992) IS success model is adhered to as opposed to the process-oriented perspective.
- IS use within the DeLone and McLean (1992) IS success model is operationalized as effective use.

4.3.2 Hypothesis Development

This section of the dissertation seeks to develop a structural model that extends the DeLone and McLean (1992) IS success model to incorporate User Capital (UC) in the context of enterprise systems (ES). Figure 22 illustrates the hypothesized structural model between UC, and the dimensions of IS Success in which use is operationalised as effective use. In Figure 22 the completely shaded constructs reflect UC, whereas the diagonally shaded construct represent effective use.

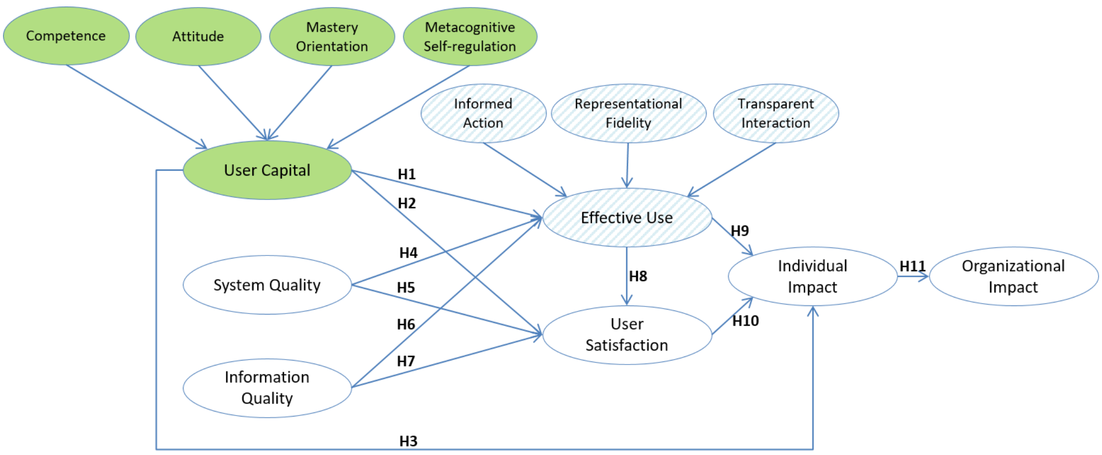


Figure 22: Structural Model of User Capital, Effective Use, and IS Success

As evident in Figure 22, UC and effective use are multidimensional constructs. UC consists of metacognitive self-regulation, competence, mastery orientation, and attitude, whereas effective use consists of informed action, representational fidelity, and transparent interaction. The formulation of the relationships between UC and effective use was discussed in previously in this chapter (refer to: *4.1 User Capital and Effective Use: A Nomological Network*) and therefore will not be further elaborated in this section.

The second and third hypotheses (H2, H3) pertain to the incorporation of UC into the DeLone and McLean (1992) IS success model. The remainder of the hypotheses encompass the pre-existing relationships present within the DeLone and McLean (1992) IS success model with the difference of use being operationalised as effective use. For clarity, the structural models present in the subsequent sections omit the formative dimensions.

4.3.2.1 Incorporation of User Capital into IS Success

Utilising a theory-driven approach, User Capital (UC) was conceptualized in chapter three and defined as *the attributes possessed by an individual which enables them to use an IS to perform tasks.* It was conceptualized as a multidimensional construct consisting of the cognitive characteristics, skills, motivation, and affective attitude possessed by IS users and was specifically operationalised using metacognitive self-regulation, user competence, mastery motivational disposition, and attitude towards using IS. One of the key contributions of this research is the examination of UC in the context of IS success. Figure 23 illustrates the focus of this section, with the bolded relational arrows depicting the hypotheses discussed in this section. Therefore this section pertains solely to the hypotheses within the structural model that pertain to UC (e.g. H1, H2, and H3).

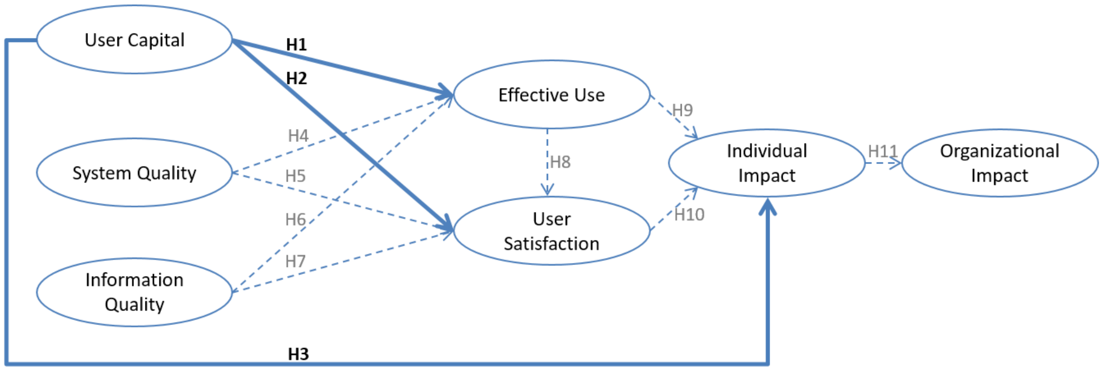


Figure 23: Extension of the IS Success model with emphasis on UC relationships

Numerous scholars have highlighted the inaccuracy of the assumption that all IS use, regardless of its nature, contributes positively to the realisation of benefits (e.g. DeLone & McLean, 2003; Seddon, 1997). In an attempt to resolve this, Burton-Jones and Grange (2013, p. 633) conceptualized effective use and defined it as "*using a system in a way that helps attain the goals for using a system.*" Consequently, effective use is a necessary and sufficient condition for benefit attainment. The research on effective use is still in its infancy with a limited array of empirical research being performed. Furthermore there is a dearth of literature which examines the influence of user' characteristics on the effective use of the IS. However, Burton-Jones and Grange (2013) highlight that both competence and motivation are determinants of effective use, and emphasise that the more knowledgeable and motivated an individual is, the greater the level of effective use attained.

The rationale behind the first hypothesis is presented in *4.1 User Capital and Effective Use: A Nomological Network* and hypothesises:

H1: User capital positively influences effective use

User satisfaction is a pertinent dimension within the DeLone and McLean (1992) IS Success model, and has regularly been appropriated as a standalone proxy for IS success (e.g. Kumar, 2009; Osei-Bryson & Ngwenyama, 2011; Wang, Li, Li,

& Wang, 2014; Wang & Liao, 2007). User satisfaction is the "*users' level of satisfaction with the IS*" (Petter et al., 2013, p. 11) and is arguably one of the most investigated constructs in the IS discipline. Whilst prior research has not explored user satisfaction in conjunction with UC, there is empirical evidence to suggest that a relationship exists between the constructs.

A meta-analysis performed by Mahmood, Burn, Gemoets, and Jacquez (2000) evidenced that a user's IS skills and their attitude towards IS positively correlates with their satisfaction of IS. This is further substantiated by Petter et al. (2013) who performed a qualitative review of the literature, which identified that attitude towards IS positively influenced an individual's satisfaction with the IS. Petter et al. (2013) also found that intrinsic motivation factors, such as enjoyment and trust positively influenced user satisfaction. Therefore due to the positive relationships exhibited between attitude towards IS, motivation, and skills with user satisfaction, this research hypothesises:

H2: User capital positively influences user satisfaction

Individual impact is the degree to which an IS contributes to the success of individual users, including productivity improvements, increased effectiveness and enhanced awareness (Gable et al., 2008). While literature has yet to empirically investigate the influence that UC has on individual impact, some supporting assertions have been articulated by prominent scholars.

Burton-Jones and Grange (2013, p. 641), when conceptualizing effective use, highlighted that "*users can take several actions to improve their performance, they are not limited to improving it only through the effective use of a system*". This assertion suggests that whilst users can improve their productivity and job effectiveness through effectively using an IS, they can also improve it directly through other means. In a qualitative review of the literature, Petter et al. (2013) identified that both an individual's attitude towards technology and their intrinsic motivation (as operationalised as enjoyment) positively influenced individual impact. Considering UC consists of affective dimensions (e.g. attitude and motivation) the findings of Petter et al. (2013) suggest the potential for a direct relationship between UC and individual impact.

In addition, research pertaining to human capital, asserts that an individual's knowledge, skills, and motivation, which are all components of UC, positively impacts the competitive advantage of organizations, through improving the productivity of workers (Blundell, Dearden, Meghir, & Sianesi, 1999). A plethora of scholars also emphasised that investing in human capital improves an individual's productivity (e.g. Finegold, Levenson, & Buren, 2005; Teo, Cerc, & Galang, 2011; Youndt, Snell, Dean, & Lepak, 1996). Furthermore, Chang and Chen (2011) evidenced that human capital is positively related to an individual's job performance. Therefore, based on the literature pertinent to human capital, effective use, and IS success; this research hypothesises:

H3: User capital positively influences individual impact

4.3.2.2 Traditional IS Success Hypotheses

The previous section justified the hypotheses pertinent to the extension of the DeLone and McLean (1992) IS Success model, which involved the incorporation of User Capital (UC). Alternatively, this section provides a rationale for the remainder of the hypotheses present within the structural model (refer to Figure 24). As these relationships were originally hypothesized in the DeLone and McLean (1992) IS

Success model and largely validated in qualitative literature reviews and empirical meta analyses (e.g. Petter et al., 2008; Petter & McLean, 2009) they will only be briefly examined. However, a key distinction in this research is the operationalization of use as effective use, which is therefore taken into account when explaining the hypotheses.

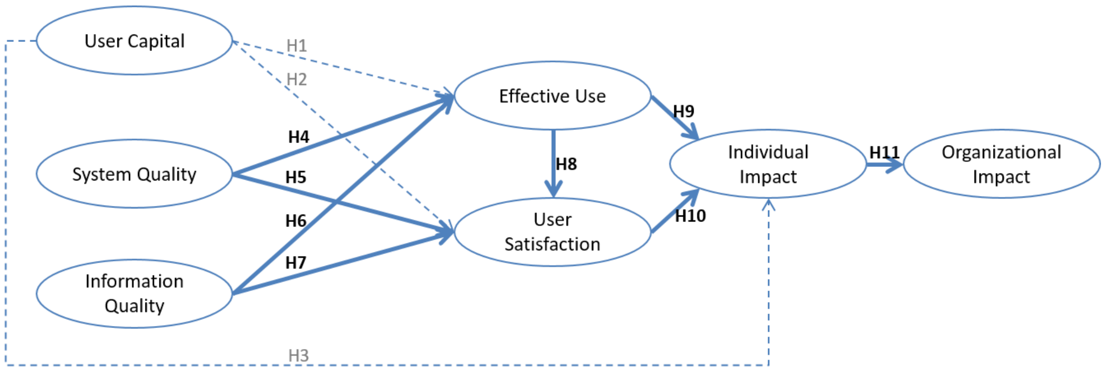


Figure 24: Extension of the IS Success model with emphasis on existing relationships

System quality is a "*measure of the performance of the IS from a technical and design perspective*" (Gable et al., 2008, p. 390) and is a manifestation of the hardware and software components within an IS (Bharati & Chaudhury, 2004). Recognising the complexity of the system quality construct, Gable et al. (2008) identified and validated nine key elements of system quality (e.g. ease of use, ease to learn, fulfils user requirements, necessary features and functions, accuracy, flexible interfaces, sophistication/minimal form fields, integrated, and modifiable). The hypothesized relationship between system quality and use in the DeLone and McLean (1992) IS Success model has been widely researched (e.g. Balaban, Mu, & Divjak, 2013; Bharati & Chaundhury, 2006; Igbaria, Zinatelli, Cragg, & Cavaye, 1997; Iivari, 2005). However, in accordance with Petter et al. (2008) the relationship was relatively mixed. Yet in a subsequent meta-analysis, Petter and McLean (2009) found statistical support for the relationship. In the context of ES, Kositanurit et al. (2006), Lin, Hsu, and Ting (2006) and Fan and Fang (2006) all evidenced a statistically significant positive relationship between system quality and use.

In this dissertation, use is operationalised as effective use. The literature pertinent to system quality and effective use is still in its infancy and to-date no empirical research has explored the relationship. However, Keating, Zou, Campbell, and Yang (2014) developed a conceptual model in which system quality was proposed to be a key driver of effective use. Furthermore, the relationship between system quality and effective use was partially supported by an analysis of their respective definitions and measures. A key dimension of effective use is transparent interaction, which is "*the extent to which a user is accessing the system's representations unimpeded by its surface and physical structures*" (Burton-Jones & Grange, 2013, p. 642). Surface and physical structures in part pertain to the user interface and hardware components of the IS respectively (Burton-Jones & Grange, 2013). The easier the IS is to use, the extent of modifiability of the interface, and minimal form fields (i.e. measures of system quality); may potentially lessen the extent to which users perceive that they are impeded by surface and physical structures. Therefore taking into account the underlying meanings and measures of both system quality and effective use coupled with the extensive empirical support for the relationship between system quality and use, this research hypothesizes:

H4: System quality positively influences effective use

The relationship between system quality and user satisfaction has been widely tested in the context of IS success across a number of different IS, including: e-commerce (e.g. Wang, 2008), knowledge management (e.g. Halawi, McCarthy, & Aronson, 2008), and ES (e.g. Lin, 2010). In both a qualitative literature review and meta-analysis, Petter et al. (2008) and Petter and McLean (2009) respectively, found strong support for the positive relationship between system quality and user satisfaction. In a mandatory IS use setting, Iivari (2005) statistically evidenced a positive relationship between system quality and user satisfaction. In the context of ES, Lin et al. (2006), Lin (2010), Kerimoglu, Basoglu, and Daim (2008) all evidenced that system quality and its related dimensions (e.g. ease of use) positively influence user satisfaction. Therefore drawing upon these findings, this research hypothesizes:

H5: System quality positively influences user satisfaction

Information quality is a "*measure of the quality of the IS outputs: namely the quality of the information the system produces in reports and on-screen*" (Gable et al., 2008, p. 389). Gable et al. (2008) developed and validated a formative measurement instrument of information quality, which consisted of six items: availability, usability, understandability, relevance, format and conciseness of information. In a qualitative review of the literature, Petter et al. (2008) identified that limited research had been devoted to examining the relationship between information quality and use. However, a subsequent meta-analysis highlighted that there was statistical support for the positive relationships (Petter & McLean, 2009). Both Rai, Lang, and Welker (2002) and Halawi et al. (2008) identified a positive, statistically significant relationship between information quality and use (operationalised as system dependence and intention-to-use respectively). However, in the context of mandatory use IS, Iivari (2005) identified that no-significant relationship existed between information quality and use. Yet, both Lin et al. (2006)

and Sedera et al. (2013) identified a positive relationship between information quality and use in an ES environment.

Due to the nascent state of effective use literature, there is a dearth of research that critically investigates the relationship between information quality and effective use. However examination of the definitions and measure of information quality and effective use suggests a potential relationship. A key dimension of effective use is representational fidelity, which is "*the extent to which a user is obtaining representations from the system that faithfully reflect the domain being represented*" (Burton-Jones & Grange, 2013, p. 642). While information quality is a manifestation of the information contained within the IS, representational fidelity is a property of use (Burton-Jones & Grange, 2013). Therefore information quality is the extent to which the information contained is well formatted, available, concise and easy to understand (Gable et al., 2008); whereas representational fidelity is the user's perception that when using the IS the information they acquire is complete, clear, correct, and meaningful (Burton-Jones & Grange, 2013). Hence, this suggests the greater the information quality, the greater the representational fidelity. Therefore this research hypothesizes

H6: Information quality positively influences effective use

The positive relationship between information quality and user satisfaction has consistently received empirical support (Petter et al., 2008; Petter & McLean, 2009). Both Wang (2008) and Seddon and Kiew (1996) statistically evidenced a positive relationship between information quality and user satisfaction. In an ES context, Lin et al. (2006) and Fan and Fang (2006) identified a positive relationship between information quality and user satisfaction. This finding was also substantiated by Iivari (2005) in a mandatory use context. Therefore, this research hypothesizes:

H7: Information quality positively influences user satisfaction

The DeLone and McLean (1992) IS success model hypothesized a bi-directional relationship between use and user satisfaction, in which the greater the use of the IS the higher an individual's satisfaction with the IS and vice versa. Some scholars have examined the bi-directional relationship (e.g. Chiu, Chiu, & Chang, 2007; Halawi et al., 2008; Iivari, 2005), whilst others have focused on a unidirectional analysis.

In terms of the influence of use on user satisfaction, Petter et al. (2008) in a qualitative review of the literature, identified that only a limited amount of articles investigated the relationship. However in a subsequent meta-analysis, Petter and McLean (2009) found support for the relationship. Bokhari (2005) also reported similar findings. In a mandatory use setting, Iivari (2005) evidenced a positive relationship between use and user satisfaction. Similarly in an ES context Lin et al. (2006) and Makokha and Ochieng (2014) found a positive statistically significant relationship between use and user satisfaction.

As previously stated, in this research use is operationalised as effective use. Due to the infancy of effective use research, no empirical studies have been published pertaining to the relationship between effective use and user satisfaction. However one dimension of effective use is informed action, which is defined as "*the extent to which a user acts upon the faithful representations he or she obtains from the system to improve his or her state*" (Burton-Jones & Grange, 2013, p. 642). This would suggest that the more the user acts upon the faithful representations within the

IS the better their state, which may potentially influence their overall satisfaction with the IS. As a result this thesis only investigates the unidirectional relationship between effective use and user satisfaction. Therefore this research hypothesizes:

H8: Effective use positively influences user satisfaction

The positive relationship between use and individual impact has been widely supported (Petter & McLean, 2009) and statistically evidenced (e.g. Almutairi & Subramanian, 2005; Igbaria & Tan, 1997; Petter & Fruhling, 2011). Individual impact is a "*measure of the extent to which the IS has influenced the capabilities and effectiveness, on behalf of the organization, of key users*" (Gable et al., 2008, p. 389). Whilst Iivari (2005) reported a non-significant relationship between use and individual impact in a mandatory use setting; in the ES context, Sedera et al. (2013), Lin et al. (2006) and Fan and Fang (2006) reported a statistically significant relationship.

To date, there is no empirical research pertaining to the relationship between effective use and individual impact. However, in accordance with Burton-Jones and Grange (2013) effective use is a necessary and sufficient condition of benefit realisation, whereas simple use measures (e.g. frequency, duration) are necessary but not sufficient conditions. Therefore this research hypothesizes:

H9: Effective use positively influences individual impact

The relationship between user satisfaction and individual impact has been well studied in a variety of contexts, including: web systems (e.g. Leonard & Riemenschneider, 2008), medical IS (e.g. Petter & Fruhling, 2011), and generalised contexts (e.g. Igbaria & Tan, 1997). In regards to ES and mandatory use settings a positive statistically significant relationship has been consistently reported (e.g. Fan & Fang, 2006; Iivari, 2005; Lin et al., 2006). Therefore this research hypothesizes:

H10: User satisfaction positively influences individual impact

In the revised IS Success model, DeLone and McLean (2003) acknowledged that IS have the potential to impact more than just the individual users and the adopting organization. Consequently the relationship between individual impact and organizational impact has seldom been explored (Santhanam, Guimaraes, & George, 2000). However only examining net benefits as opposed to individual impacts and organizational impacts reduces the granularity of research findings (DeLone & McLean, 2003). Organizational impact "*is a measure of the extent to which the IS has promoted improvement in organizational results and capabilities*" (Gable et al., 2008, p. 389).

In an attempt to maintain granularity of findings, some scholars have attempted to investigate the relationship between individual impact and organizational impact and reported a statistically significant positive relationship (e.g. Petter & Fruhling, 2011; Teo & Wong, 1998). Furthermore in the context of ES, Ifinedo, Rapp, Ifinedo, and Sundberg (2010) and Fan and Fang (2006) found a positive relationship between individual impact and organizational impact. Therefore this research hypothesizes:

H11: Individual impact positively influences organizational impact

4.4 Nuanced Understanding of the Relationships Inherent in IS Success

In order to provide a more nuanced understanding of the behaviour of the relationships within the extended model of IS success, presented in this research, it is imperative to understand how the combination of multiple variables influence the outcome variable (e.g. Shanock, Baran, Gentry, Pattison, & Heggestad, 2010). In this section of the thesis, several relationships are hypothesized to provide a more nuanced understanding of User Capital (UC), effective use, and individual impact.

4.4.1 A Deeper Understanding of User Capital

User Capital (UC) was partially informed by the Theory of Performance (ToP) The ToP, is a taxonomy of performance components, that are determined by the combination of declarative knowledge, procedural knowledge and skills, and motivation (Mccloy et al., 1994). The theory highlights the necessity for all three components to be present in order to determine performance. This theory defines performance as "*behaviours or actions that are relevant to the goals of the organization in question*" (Mccloy et al., 1994, p. 493). Therefore, an individual's performance is not the outcome of the behaviour, rather it is the actual behaviour (Mccloy et al., 1994). Consequently, ToP outlines that when any of the dimensions of declarative knowledge, procedural knowledge and skills, or motivation are low then the performance of individuals will also be low (Mccloy et al., 1994). This notion is further substantiated by a plethora of research highlighting that individuals must be both willing and able to perform a behaviour (e.g. Pimpakorn & Patterson, 2010).

In the context of this study, effective use is considered to be a behaviour (i.e. performance in the case of ToP), whereas UC is considered to consist of the performance determinants. Further exploration of the UC construct, illustrates that two high level themes are apparent, which are capability and affective (i.e. able and willing respectively) components. The capabilities are metacognitive self-regulation and user competence, whereas the affective components are mastery motivational disposition and affective attitude (refer to Figure 25).

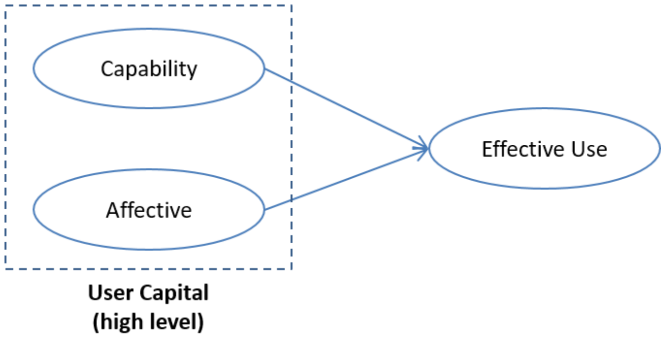


Figure 25: The Relationship between the High Level Dimensions of User Capital and Effective Use

Therefore applying ToP, and literature surrounding the necessity of being both willing and able; it is anticipated that users need to possess both high level of capability and affective components. Whereby the absence of one will be detrimental to the effective use of the IS. Therefore this research hypothesises:

H12a: The higher (lower) the levels of the capabilities and affective components of User Capital, the higher (lower) the level of effective use.

H12b: High levels of capabilities coupled with low levels of the affective components of User Capital, will result in low levels of effective use.

H12c: Low levels of capabilities coupled with high levels of the affective components of User Capital, will result in high levels of effective use.

Human capital literature was also central to the conceptualization of UC. Human capital literature continually asserts that human capital influences the performance of an individual (i.e. output) (Chang & Chen, 2011; Wright & McMahan, 2011). Human capital clearly outlines that the knowledge and skills (i.e. capability dimensions of UC) is a property that is owned by individuals and not the organization (Bae & Patterson, 2013). Literature pertinent to human capital recognises that individuals are complex entities and can choose to be lazy or industrious (Zhao, 2008) and ultimately have free will over the actions they perform

(Wright et al., 2001). Furthermore "*productivity stems most directly from the behaviour of employees, and many highly skilled employees can exhibit mediocre or even inferior performance*" (Wright & McMahan, 2011, p. 99). Thus highlighting the pertinence of an individual to be motivated (e.g. Wright et al., 2001) (i.e. affective dimensions of UC). The necessity of individuals to be moth motivated and able has been a long standing research tradition and Anderson and Butzin (1974) clearly highlights that performance (i.e. outcome) is the product of motivation and ability, with the omission of either being detrimental to performance. In the context of IS Success an individual's performance is represented by individual impact (refer to Figure 26). Drawing on literature related to human capital, this research asserts that high levels of capability and affective components of UC are required as users can determine whether to enact behaviour. Therefore this research, hypothesizes:

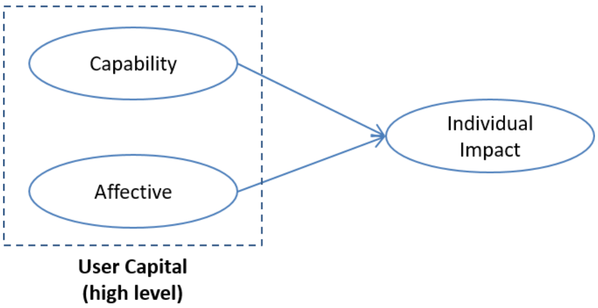


Figure 26: The Relationship between the High Level Dimensions of User Capital and Individual Impact

H13a: The higher (lower) the levels of the capabilities and affective components of User Capital, the higher (lower) the level of individual impact.

H13b: High levels of capabilities coupled with low levels of the affective components of User Capital, will result in low levels of individual impact.

H13c: Low levels of capabilities coupled with high levels of the affective components of User Capital, will result in low levels of individual impact.

4.4.2 Understanding the influence of User Capital and Technical Capital

In accordance with Serrano and Karahanna (2015, p. 598) "*technology and people have inherent limitations, a worthwhile research pursuit is to discover how one might compensate for the limitations of the other in order to achieve successful system use outcomes*". In the context of IS Success, effective use is considered to be a necessary and sufficient condition for benefit attainment (Burton-Jones & Grange, 2013). In accordance with Burton-Jones and Grange (2013) effective use relates to the users, the IS, and the task. In this research the user, in terms of UC and the characteristics of the IS are examined. In order to hypothesise how the combination of UC and IS characteristics influenced the effective use of the IS, the concept of technical capital was formulated. Technical capital refers to the combination of information quality and system quality (refer to Figure 27).

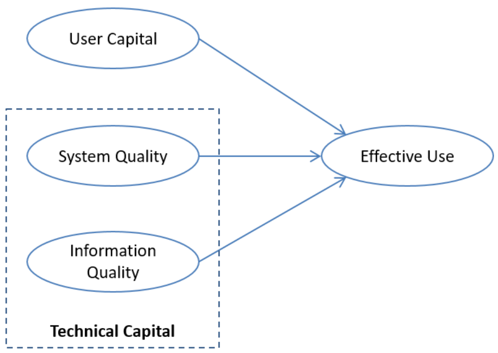


Figure 27: The Relationship between User Capital, Technical Capital, and Effective Use

Technical capital is anticipated to positively influence transparent interaction and representational fidelity of the IS, which enables IS users who are knowledgeable, skilled, motivated and possess the required attitude to make informed actions based on the output present within the IS. As transparent interaction, representational fidelity and informed action are all dimensions of effective use (Burton-Jones & Grange, 2013).

Prior literature has asserted that user experience design is paramount to individuals effectively using the IS (Rosenzweig, 2016). However other research streams in line with human agency, argues that users have ultimate control over their actions (e.g. Boudreau & Robey, 2005). This research recognises the importance of both the user and the IS. Therefore both the UC and technical capital are imperative for the IS to effectively be used. Therefore this research hypothesises:

H14a: The higher (lower) the levels of user capital and technical capital, the higher (lower) the level of effective use.

H14b: High levels of user capital coupled with low levels of technical capital, will result in low levels of effective use.

H14c: Low levels of user capital coupled with high levels of technical capital, will result in low levels of effective use

Brynjolfsson and McAfee (2012) have highlighted the need for organizations to possess both human capital and non-human capital for performance outcomes. Furthermore Ravichandran and Lertwongsatien (2005) has evidenced that human capital and IS characteristics are necessary to achieving a competitive advantage. In this research human capital is encapsulated by UC and non-human capital pertains to technical capital, performance was assessed by individual impact (refer to Figure 28). In addition Serrano and Karahanna (2015) evidenced that less than optimal results for task performance are obtained when there is a discrepancy between system characteristics and user capabilities

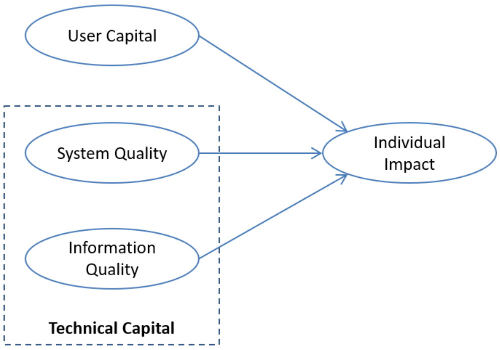


Figure 28: The Relationship between User Capital, Technical Capital, and Individual Impact

Therefore for high levels of individual impact to be obtained both technical capital and user capital need to be. As such, this research hypothesises:

H15a: The higher (lower) the levels of user capital and technical capital, the higher (lower) the level of individual impact.

H15b: High levels of user capital coupled with low levels of technical capital, will result in low levels of individual impact

H15c: Low levels of user capital coupled with high levels of technical capital, will result in low levels of individual impact.

4.4.3 A Nuanced Understanding of Effective Use

This research has proposed that effective use is a necessary and sufficient condition for benefit attainment as measured by individual impact. In the extended DeLone and McLean (1992) model presented in this research, both effective use and user satisfaction are identified as being determinants of individual impact, and to a large extent mediate the relationship between User Capital (UC), information quality, and system quality with individual impact. Therefore it is imperative to gain insights into how the presence of both effective use and user satisfaction impact individual impact (refer to: Figure 29).

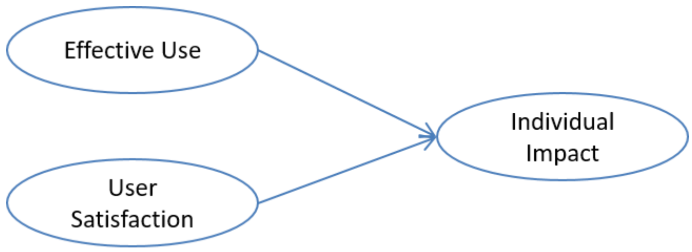


Figure 29: The Relationship between Effective Use, User Satisfaction, and Individual Impact

Effective use is the behaviour an individual performs (Burton-Jones & Grange, 2013), whereas user satisfaction is how satisfied an individual is with performing the behaviour and individual impact is the outcome of performing the behaviour in the IS (DeLone & McLean, 1992). Research pertaining to satisfaction has consistently highlighted that an individual's satisfaction is an antecedent of their performance (Judge, Thoresen, Bono, & Patton, 2001). In addition IS literature has strongly emphasised that IS must be effective used for benefits (Burton-Jones & Grange, 2013). Drawing on the pertinence of satisfaction and effective use, it is anticipated that when a user effectively uses the IS and is satisfied with the IS, optimum levels of individual impact will be obtained.

In addition Orlikowski (2000) highlighted that IS must be used prior to benefits being obtained. Therefore regardless of an individual's satisfaction with the IS, individual impact will be low if the IS is not used. Furthermore individuals, may effectively use the IS, however, if a user is not satisfied with the behaviour, they would unlikely to have favourable perceptions of the impacts of the IS. Therefore this research hypothesises:

H16a: The higher (lower) the levels of effective use and user satisfaction, the higher (lower) the level of individual impact.

H16b: High levels of effective use coupled with low levels of user satisfaction, will result in low levels of individual impact

H16c: Low levels of effective use coupled with high levels of user satisfaction, will result in low levels of individual impact.

4.5 Chapter Summary

In conclusion this chapter examined how User Capital (UC) influenced the success of an IS, through extending the DeLone and McLean (1992) IS success model. Two key extensions were made to the model, which were (i) the incorporation of UC, which was rigorously developed in chapter 3, and (ii) the operationalization of IS use as effective use. Examining the linear relationships present in IS Success 11 hypotheses were formulated and 14 constructs were present (refer to Figure 30)[8]. In addition the combination of multiple predictors on an outcome variable were examined. This resulted in 5 additional high level hypotheses being formulated. Table 18 summarises the hypotheses examined in this research, and Table 19 provides definitions for the higher order constructs.

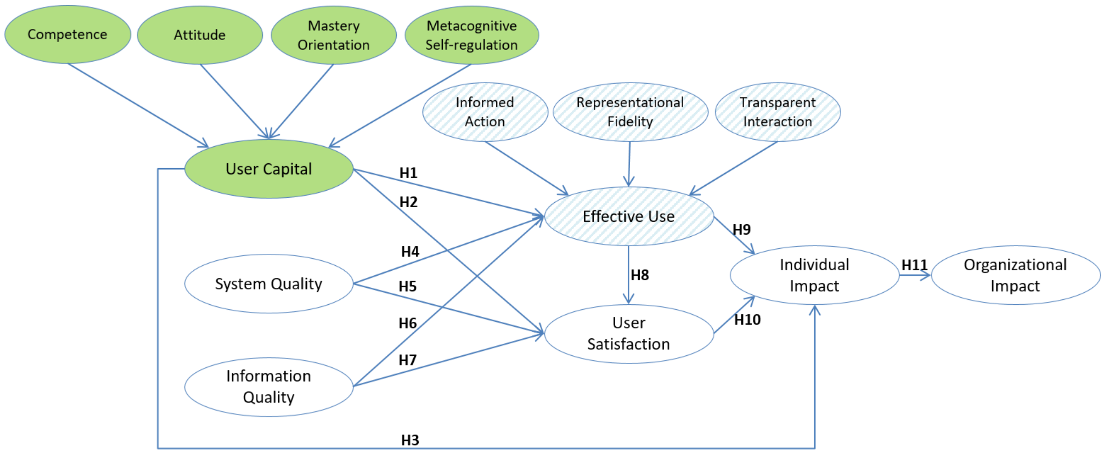


Figure 30: The relationship between User Capital, Effective Use, and IS Success

[8] While a relationship was originally hypothesized between individual impact and organizational impact, it was not examined due to the results of the pilot study and targeted respondents.

Table 18: Summary of Hypothesized Relationships

Hypothesis	**Relationship**	**Relationship Type**
H1	*User capital positively impacts effective use*	New
H2	*User capital positively influences user satisfaction*	New
H3	*User capital positively influences individual impact*	New
H4	*System quality positively influences effective use*	Adapted
H5	*System quality positively influences user satisfaction*	Existing
H6	*Information quality positively influences effective use*	Adapted
H7	*Information quality positively influences user satisfaction*	Existing
H8	*Effective use positively influences user satisfaction*	New
H9	*Effective use positively influences individual impact*	New
H10	*User satisfaction positively influences individual impact*	Existing
H11	*Individual impact positively influences organizational impact*	Existing
H12a	*The higher (lower) the levels of the capabilities and affective components of User Capital, the higher (lower) the level of effective use.*	New
H12b	*High levels of capabilities coupled with low levels of the affective components of User Capital, will result in low levels of effective use.*	New
H12c	*Low levels of capabilities coupled with high levels of the affective components of User Capital, will result in high levels of effective use.*	New
H13a	*The higher (lower) the levels of the capabilities and affective components of User Capital, the higher (lower) the level of individual impact.*	New
H13b	*High levels of capabilities coupled with low levels of the affective components of User Capital, will result in low levels of individual impact.*	New
H13c	*Low levels of capabilities coupled with high levels of the affective components of User Capital, will result in low levels of individual impact.*	New
H14a	*The higher (lower) the levels of user capital and technical capital, the higher (lower) the level of effective use.*	New
H14b	*High levels of user capital coupled with low levels of technical capital, will result in low levels of effective use.*	New

H14c	*Low levels of user capital coupled with high levels of technical capital, will result in low levels of effective use*	New
H15a	*The higher (lower) the levels of user capital and technical capital, the higher (lower) the level of individual impact.*	New
H15b	*High levels of user capital coupled with low levels of technical capital, will result in low levels of individual impact*	New
H15c	*Low levels of user capital coupled with high levels of technical capital, will result in low levels of individual impact.*	New
H16a	*The higher (lower) the levels of effective use and user satisfaction, the higher (lower) the level of individual impact.*	New
H16b	*High levels of effective use coupled with low levels of user satisfaction, will result in low levels of individual impact*	New
H16c	*Low levels of effective use coupled with high levels of user satisfaction, will result in low levels of individual impact.*	New

Table 19: Key Higher-Order Construct Definitions

Construct	Definition	Reference
Effective Use	"U*sing a system in a way that helps attain the goals for using a system."*	Burton-Jones and Grange (2013, p. 633)
Individual Impact	"A *measure of the extent to which the IS has influenced the capabilities and effectiveness, on behalf of the organization, of key users*"	Gable et al. (2008, p. 389)
Information Quality	"A *measure of the quality of the IS outputs: namely the quality of the information the system produces in reports and on-screen*"	Gable et al. (2008, p. 389)
Organizational Impact	"A *measure of the extent to which the IS has promoted improvement in organizational results and capabilities*"	Gable et al. (2008, p. 389)
System Quality	"A *measure of the performance of the IS from a technical and design perspective*"	Gable et al. (2008, p. 390)
User Satisfaction	"U*sers' level of satisfaction with the IS*"	Petter et al. (2013, p. 11)
User Capital	*The attributes possessed by an individual which enables them to use an IS to perform tasks. It is conceptualized as a multidimensional construct consisting of the cognitive characteristics, skills, motivation, and affective attitude possessed by IS users and is specifically operationalised using metacognitive self-regulation, user competence, mastery motivational disposition, and attitude towards using IS.*	

Chapter 5: Instrument Design

The overarching objective of this research, as specified in chapter 1, is to conceptualize User Capital (UC) and examine it in the context of effective use and IS success, using the field research guidelines of Edmondson and McManus (2007, p. 1174). This field study approach consists of seven steps: (i) identify target area of interest; (ii) read the literature; (iii) develop research questions; (iv) design a study; (v) collect and analyse data; (vi) write up results; and (vii) submit (Edmondson & McManus, 2007). However, in accordance with Edmondson and McManus (2007, p. 1174) if a large body of literature surrounds the phenomenon then conceptualization (henceforth referred to as the conceptualization phase) occurs prior to data collection. Therefore in this research, due to the substantial amount of literature pertaining to the knowledge, skills, motivation, and attitude of users (dimensions of UC) as well as IS success, the conceptual models were formulated prior to the analysis and collection of data.

Prior to this chapter the first three phases of the field study approach have been performed as well as the conceptualization phase. Chapter one highlighted that the target area of interest (phase 1) pertained to examining the UC of individuals who use Enterprise Systems (ES) in the post-implementation phase of the lifecycle. Chapter two involved performing the review of the literature (phase 2) which identified a multidimensional approach critically examining the complex nuances in user behaviour in the context of IS success has yet to be performed. Subsequent to the literature review the research questions (phase 3) were refined. Chapter 3 and 4 both involved the conceptualisation phase, in which UC is conceptualised as a multidimensional construct and structural models were created depicting how UC was hypothesised to influence effective use and IS success.

This chapter focuses on phase 4 of the field study approach which is the design of the study. Part of the research design was previewed in chapter 1, which detailed the research as being in alignment with the post-positivist research paradigm. Further, in the introductory chapter it was also highlighted that the survey approach was the predominant method used in this research, however interviews were also used to contextualise the survey instrument.

The objective of this chapter is to illustrate the rigorous procedures that were utilised throughout the data collection phase. Six key themes are discussed in this section, namely: (i) the cohort of respondents for the interview and surveys; (iii) the survey design procedure; (iv) the manner in which the survey instrument was disseminated; (v) the data analysis tools utilised and (vi) the ethical considerations surrounding the data collection and analysis procedures. Table 20 outlines the objectives of each of the aforementioned sections.

Table 20: Objective of Research Design Subsections

Theme	Objective
5.1 Overview of Research Method	▪ Summarise the research methods used.
5.2 Survey Participants	▪ Articulate the type of respondents surveyed. ▪ Specify the number of respondents required.
5.3 Survey Instrument Design	▪ Explain the survey development procedures used. ▪ Identify the validation steps performed. ▪ Specification of the measurement model.
5.4 Distribution of Instrument	▪ Describe and provide rational for how the survey was distributed.
5.5 Data Analysis Tools	▪ Explain the rationale for statistical tools utilised.
5.6 Ethical Considerations	▪ Describe the nature of the ethics application.

5.1 Overview of Research Method

As previously detailed this research adopts a mixed methods approach and involves both quantitative and qualitative data collection techniques. In terms of quantitative methods the survey method was deemed to be appropriate for three reasons: (i) The survey method can adequately answer research questions pertaining to ‘what’ (Pinsonneault & Kraemer, 1993), which is apparent in all of the research questions. (ii) The survey method is capable of objectively testing relationships (Gable, 1994). In this study there are a series of hypothesised relationships that need to be statistically analysed, which the survey method facilitates. (iii) This research is constrained to the individual unit of analysis, and the survey method is appropriate for obtaining individual perceptions, beliefs and attitudes (Fang et al., 2014).

However the survey method whilst being extremely powerful at quantitative assessment often controls for rather than accounts for research contexts (i.e. context stripping) (Johns, 2006). Furthermore in accordance with Edmondson and McManus (2007) when the objective of the research is in alignment with intermediate theories, to ensure methodological fit, both interview and survey methods should be used. Therefore this research is consistent with intermediate theory as it seeks to develop a new construct indicative of User Capital (UC). Thus recognising the importance of the context and methodological fit, interviews were also conducted. For a more detailed explanation of the research method refer to *chapter 1.5: Research Design.*

In this research sixteen interviews were conducted prior to the survey distribution. This provided understanding into the research context, enabled the survey instrument to be contextualised, and identified the demographics that were required to be captured. The interview questions pertained to user characteristics, the

Enterprise System (ES), and tasks performed within the ES (Appendix D). The interview participants were identified by the strategic level as key informants. The key informants were mainly managers, however some operational users were also included. Interviewing management enabled the determination of how each team used the ES. Further it also provided the managers with familiarity into the research project, which fostered management support, thus facilitating survey distribution. An interesting outcome from the interviews was that management used the ES in the same way as operational users, albeit with increased approval functionality. Therefore whilst this research was originally scoped to operational users, a decision was made to include management users who used the ES to perform operational tasks. Consequently rather than just considering operational users, the operational role in terms of tasks performed were also considered. To account for differences the survey instrument included demographics capturing functionality and job title.

5.2 Survey Participants

Subsequent to the analysis of the interview data, the survey instrument was contextualised and distributed. The purpose of the survey was to statistically analyse UC and the hypothesised relationships. In order to identify the relevant survey participants, user logs were examined. Surveys were provided to the individuals who used the ES on average greater than two days a week, or who in the previous week had logged on greater than or equal to two times. This was to ensure that the users were regular users. Furthermore we also discussed the user list with managers to ensure the individuals surveyed were regular users of the ES. The survey also captured information in terms of how often the ES is used and what it is used for (e.g. extent of use, functionality used, etc.). This information effectively provided a filtering mechanism and ensured that the sample was appropriate. In accordance with Hair, Hult, Ringle, and Sarstedt (2014) in order to have a significance level of 5%, 166 completed responses were identified as necessary.

5.2.1 The Organization

The organization was selected based on a series of criteria. In alignment with the research scope, the target organization needed to use an Enterprise System (ES). Secondly, as specified in the literature review, organizations normally experience a dip in performance post-go live and is often associated with user resistance in the shakedown phase. Therefore the target organization should have returned to normal operations since the implementation. Thirdly, due to the number of completed responses necessary the target organization needs to have a large user base. Using a response rate of 50% it was calculated that the organization will need 332 users to achieve the 166 completed responses that are necessary.

The surveys and interviews took place within a single organization that met the aforementioned criteria. The organization was a large tertiary education provider in Australia consisting of seventeen divisions with over 12,000 staff members and over 45,000 students enrolled in undergraduate and postgraduate courses. The organization implemented Oracle Financials (ES) in the 1990s. Since its implementation it has undergone several updates and is now referred to as the Oracle eBusiness Suite. Both self-service and standard modules are included within the ES, which provides functionality into asset management, accounts payable, accounts receivable, general ledger and purchasing. Of the seventeen divisions, fifteen regularly use Oracle eBusiness Suite. The divisions are not centrally located and are dispersed between three geographical regions.

5.3 Survey Instrument Design

Survey instrument validation is a fundamental step in the data collection process (Straub, 1989). Poorly developed instruments have the potential to jeopardise data collection and erroneous findings may result (MacKenzie et al., 2011). In this section, the scale development procedures of MacKenzie et al. (2011) will be explained followed by the application of these guidelines to this research topic.

5.3.1 Scale Development Guidelines

In order to improve the validity of measurement instruments in the IS discipline, MacKenzie et al. (2011) developed comprehensive scale development guidelines which consist of ten high level steps across six phases. Therefore in an attempt to minimise the potential for measurement error and validity issues, this research adheres to the scale development guidelines of MacKenzie et al. (2011).

The objective of the first phase of the scale development procedure is to develop a comprehensive definition of the focal construct (MacKenzie et al., 2011). This is congruent with the guidelines of Haynes, Richard, and Kubany (1995) and is further substantiated by Mohr (1982) who associates broadly defined constructs with inconsistency in interpretation which in turn, minimises the cumulativeness of the resultant theories. In this phase, a comprehensive review of the literature pertaining to the construct domain needs to be performed (Churchill, 1979; MacKenzie et al., 2011). Subsequently the *property* and *entity* of the construct needs to be rationalized (MacKenzie et al., 2011). The *entity* pertains to the unit of analysis (e.g. individual, task, system, organization), whereas the *property* refers to what is being measured (MacKenzie et al., 2011). The property of the construct differs to the actual measures and pertains to whether the construct is indicative of a perception, attitude, cognition, etc. (MacKenzie et al., 2011). Furthermore the construct's dimensionality (e.g. unidimensional, multidimensional) and nature (e.g. formative, reflective) needs to be identified (discussed further in 5.3.2.1.2 Directionality and Dimensionality). Subsequently the focal construct can be comprehensively defined. In addition, all the dimensions (sub-constructs) of multidimensional construct need to be formally defined in the aforementioned manner.

The overall objective of the second phase of the scale development process is to identify items that are representative of the construct domain (MacKenzie et al., 2011). This phase is comprised of two steps, namely: item generation, and assessing content validity. Many methods can be used to generate items, including: expert panels, practitioner interviews, focus groups (MacKenzie et al., 2011), and where possible, existing scales should be adapted from past literature and contextualised if necessary (Froehle & Roth, 2004). However, when adapting existing items, scholars need to be cautious as (i) the instruments may not have been previously validated; and (ii) altering a validated instrument to fit a different context could hinder validity (Straub, 1989). Therefore adapting existing measures does not ensure that content validity is maintained. Content validity is *"the degree to which elements of an assessment instrument are relevant to and representative of the targeted construct for a particular assessment purpose"* (Haynes et al., 1995, p. 238). Therefore content validity ensures that "*developed instruments are measuring what they are supposed to be measuring"* (Straub, 1989, p. 150). Consequently instruments that possess poor content validity may result in erroneous statistical findings and degrade explanatory power (Haynes et al., 1995). A common approach to ensure content validity is to pre-test the instrument, whereby qualitative feedback of the items is received, which facilitates the identification of problematic items (Froehle & Roth, 2004).

The third phase involves formally specifying the measurement model (MacKenzie et al., 2011) by illustrating the relationships between constructs and their measures (Hair et al., 2014). For multidimensional constructs, all dimensions and their measures need to be included (Polites, Roberts, & Thatcher, 2012; Wright, Campbell, Thatcher, & Roberts, 2012). This phase is commonly overlooked with many researchers devoting attention to the structural model at the oversight of the measurement model (Petter et al., 2007), which can decrease the explanatory power of theories (Coltman, Devinney, Midgley, & Venaik, 2008).

Phase four involves performing a pilot study to assess the measures (MacKenzie et al., 2011). A pilot study is a form of pre-testing that examines the degree to which the survey instrument works (Hunt, Sparkman, & Wilcox, 1982) and assists researchers in identifying ambiguous questions and inappropriate vocabulary (Hunt et al., 1982). Quantitative assessments can also be used to determine the extent to which items are representative of constructs (MacKenzie et al., 2011). Whilst Hunt et al. (1982) suggests that the pilot study sample size can range between twelve to thirty, confidence in quantitative interpretations cannot be made unless sample sizes are in excess of sixty respondents (MacKenzie et al., 2011). Depending on the survey length and nature of items, larger sample sizes may be required (MacKenzie et al., 2011). Thus the overall objective of this phase is to refine the survey instrument by minimising errors and inconsistencies prior to main data collection.

Phase five is the validation of the measurement model, which consists of: gathering data from a new sample, assessing scale validity and cross validating the scale (MacKenzie et al., 2011). When gathering data from a new sample it is important to ensure there are sufficient respondents to perform the statistical assessment. For instance, factor analysis requires more responses than items in the model (Hair et al., 2010). Alternatively, for structural equation modelling the '*ten times'* rule is often replied, where the sample size should be "*ten times the largest number of structural paths directed at a particular construct in the structural model"* (Hair et al., 2014, p. 20). Depending on the formative or reflective nature of the measurement model different statistical tests should be performed to assess validity (Straub, Boudreau, & Gefen, 2004). Assessing validity is a key component as it examines whether measurement items are indicative of a specific latent construct and distinguishable from other constructs in the measurement model (MacKenzie et al., 2011). In this phase, MacKenzie et al. (2011) recommends cross validating the instrument with additional datasets.

The final phase of the scale development procedure is norm development. Developing norms provides a baseline for comparing individual scores to the overall sample's score (Churchill, 1979). Furthermore it can compare an individual score to a subset of the sample's score (Churchill, 1979), for instance determining whether a particular female scored high or low in comparison to other females in the sample. However, the development of norms typically involves another round of data collection whereby data is only collected from a representative sample to form a frame of reference and thus is not widely employed (MacKenzie et al., 2011).

5.3.2 Application of the Scale Development Procedure

Notwithstanding the importance of all phases of the scale development process, the process used in this thesis adhered to the first five phases. Thus the development of norms using a representative sample was considered to be outside the research scope. The final step of phase 5 which is the cross validation of the scale was also omitted (Figure 31). This is acknowledged as a limitation and future research can be devoted to the examination of the measurement model in differing contexts. The following sections detail: construct definitions; development of measurement items; measurement model specification; pilot study; and validation techniques.

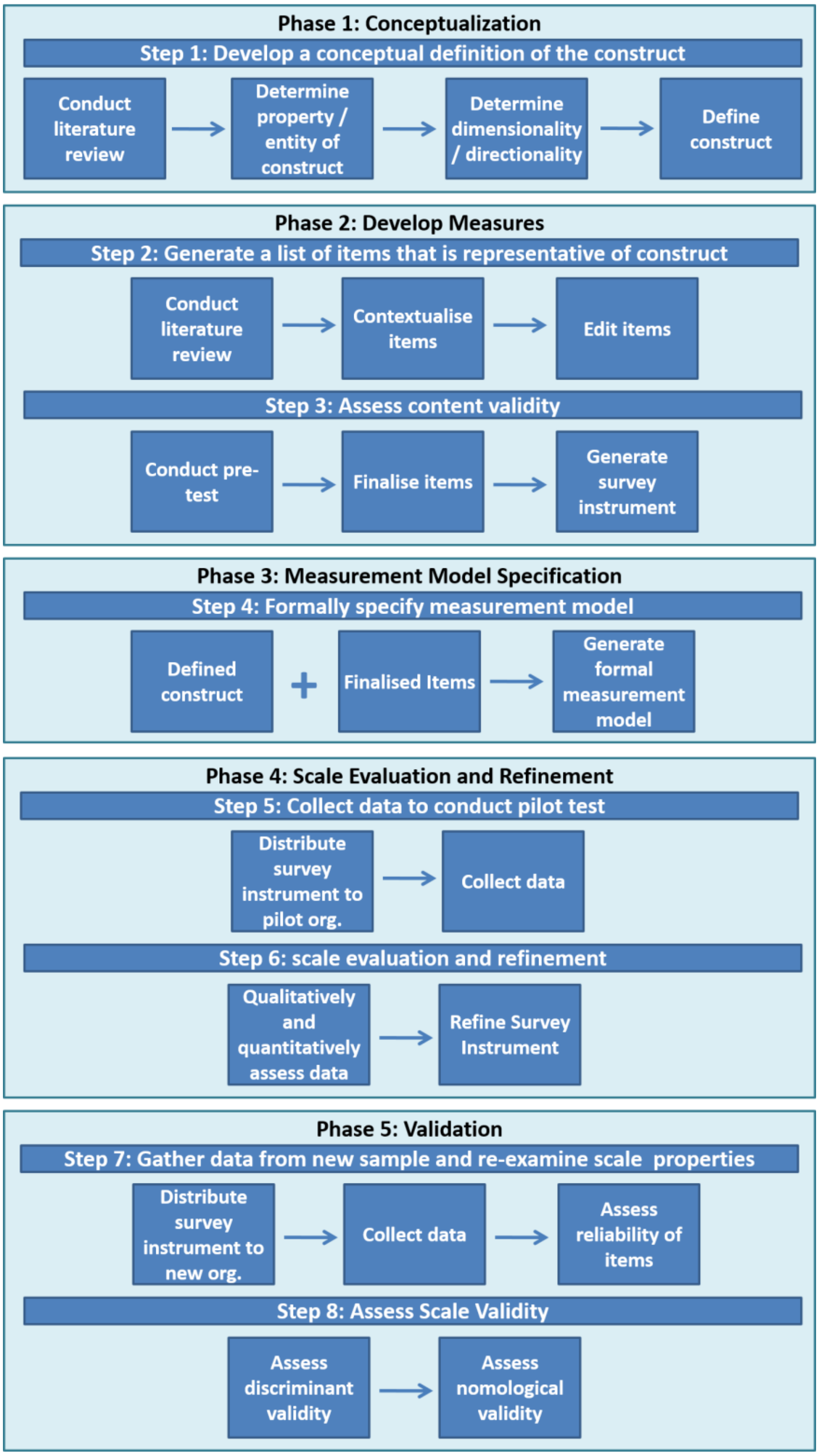


Figure 31: Scale Development Procedure adapted from MacKenzie et al. (2011, p. 297)

5.3.2.1 Construct Definitions

Defining constructs is a fundamental step in developing and testing measurement models. Adhering to MacKenzie et al. (2011) recommendations this section discusses the property and entity of the constructs in this research, followed by the directionality and dimensionality of each construct.

5.3.2.1.1 Characteristics of the Construct

In order to minimise inconsistency in the interpretation of the measurement model, the property and entity of the construct should be clearly articulated MacKenzie et al. (2011). The focal point of this study pertains to user capital (UC) which is multidimensional in nature (refer to section 5.3.2.1.2 Directionality and Dimensionality). UC consists of four dimensions: (i) attitude towards using IS, (ii) user competence, (iii) mastery oriented motivational disposition, and (iv) metacognitive self-regulation. The model was assessed in a nomological net with effective use, which consists of three dimensions: (i) informed action, (ii) representational fidelity, and (iii) transparent interaction. UC was then be assessed in a structural model consisting of the IS Success dimensions: (i) information quality, (ii) system quality, (iii) use, (iv) user satisfaction, (v) individual impact, excluding (vi) organizational impact (DeLone & McLean, 1992). The entity for each of the constructs examined in this study is the individual. The property of thirteen constructs were examined (refer to Table 21).

Table 21: Characteristics of Constructs

Construct	Property
Attitude towards using IS	An individual’s general feelings toward using the IS.
User Competence	A personal/cognitive characteristic of an individual’s IS abilities.
Effective Use	An individual’s behaviour of effectively performing tasks

	using an IS
Individual Impact	An individual's perception of individual outcomes.
Information Quality	An individual's perception of the IS output.
Informed Action	An individual's perception of acting on IS output.
Mastery Orientation	An affective characteristic of motivation towards performing tasks.
Organizational Impact	An individual's perception of organizational outcomes
Representational Fidelity	An individual's perception of the correctness of the outputs of an IS generated from use.
Satisfaction	An individual's positive feelings toward the IS
Metacognitive Self-regulation	A personal/cognitive characteristic to monitor and change behaviour
System Quality	An individual's perception of the IS.
Transparent Interaction	An individual's perception of using an IS unimpeded.
User Capital	An individual's perception of their knowledge, skills, motivation, and attitude.

5.3.2.1.2 Directionality and Dimensionality

There are several key considerations when constructing measurement models. Central to these considerations is the direction of causality between a measurement item and the corresponding latent construct (Petter et al., 2007), which can be a reflective or formative approach (Shin & Kim, 2011). The distinction between formative and reflective measurement models has both theoretical and practical implications (Coltman et al., 2008).

In a myriad of disciplines the reflective approach has been the most widely employed measurement model (Jarvis, MacKenzie, & Podsakoff, 2003; Petter et al., 2007). In reflective measurement models (refer to Figure 32) the "*covariation among measures is explained by variation in an underlying common latent factor"* (MacKenzie, Podsakoff, & Jarvis, 2005, p. 711). Put differently, changes in the latent construct result in changes in the underlying measures (Polites et al., 2012). Therefore the direction of causality is from the construct to the measurement items

(Jarvis et al., 2003; MacKenzie et al., 2005; Petter et al., 2007). Additionally, in a reflective measurement model the items measure the same facet, are interchangeable and need to covary (MacKenzie et al., 2005; Petter et al., 2007). Consequently, high consistency reliability should be apparent in the construct. Therefore the deletion of a measurement item should not negatively impact the underlying meaning of the construct (Jarvis et al., 2003; MacKenzie et al., 2005; Petter et al., 2007).

Alternatively in formative measurement models (refer to Figure 33) "*the measures jointly influence the composite latent construct, and meaning emanates from the measures to the construct*" (MacKenzie et al., 2005, p. 712). Thus the direction of causality is from the measurement items to the latent construct (Jarvis et al., 2003; MacKenzie et al., 2005; Petter et al., 2007). In addition the measures examine different facets and form the construct's definition (Petter et al., 2007). Therefore the removal of a non-redundant item can alter the construct's meaning (Jarvis et al., 2003; MacKenzie et al., 2005; Petter et al., 2007). Unlike reflective constructs the measurement items of a formative construct are not interchangeable and multicollinearity is not desired (MacKenzie et al., 2005; Petter et al., 2007). Therefore consistency reliability is typically poor and emphasis should be placed on nomological and criterion related validity (MacKenzie et al., 2005).

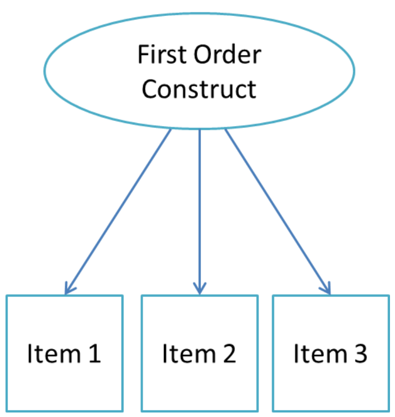


Figure 32: Reflective Measurement Model

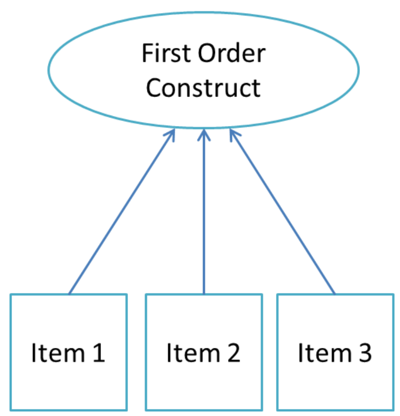


Figure 33: Formative Measurement Model

As the previous discussion eluded, there are many theoretical distinctions between formative and reflective measurement models. Accordingly, Jarvis et al. (2003) developed comprehensive criteria to enable scholars to clearly distinguish whether a construct is reflective or formative in nature. Despite this criteria, model misspecification is still a key issue plaguing the IS discipline, with 30% of formative measurement models in premier publication outlets depicted as reflective (Petter et al., 2007). This issue is not limited to the IS discipline with 29% of top tier marketing publications consisting of model misspecification (Jarvis et al., 2003). The degree of model misspecification can be partially attributed to the hesitancy of scholars to adopt formative measurement models (Petter et al., 2007). This hesitancy stems from the role that classical test theory plays in construct validation procedures (MacKenzie et al., 2005). Classical test theory is built on the premise that causal directionality flows from a construct to its measures, which is a characteristic of reflective measurement models. Regardless the misspecification of measurement models can have detrimental impacts on structural models potentially resulting in false negatives and false positives of hypothesized paths (Petter et al., 2007).

The use of formative measurement models is a highly contentious issue in the IS discipline, limited attention has been devoted to the formative versus reflective nature of multidimensional constructs (Shin & Kim, 2011). In accordance with Petter et al. (2007) scholars need to consider both the causal directionality and dimensionality of constructs. Constructs can either be unidimensional or multidimensional in nature. A unidimensional (first order) construct is one where the items measure the same aspect of the construct (Petter et al., 2007). Whereas multidimensional constructs are used to examine a complex phenomenon (Wright et al., 2012) which is comprised of a series of facets (also referred to as subconstructs or dimensions) (Polites et al., 2012). There are primarily four ways a multidimensional construct can be structured: (i) first order reflective – second order reflective (Figure 34); (ii) first order reflective – second order formative (Figure 35); (iii) first order formative – second order reflective (Figure 36); and (iv) first order formative – second order formative (Figure 37) (Shin & Kim, 2011).

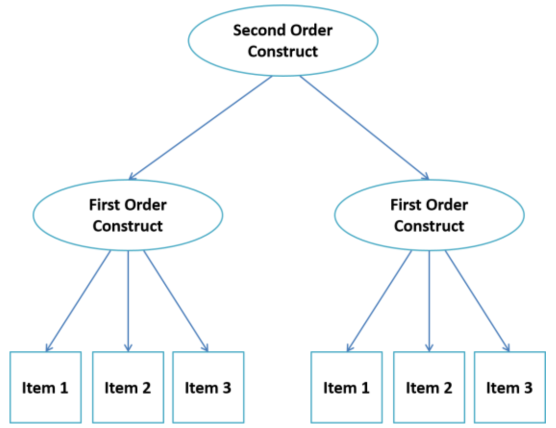


Figure 34: Reflective-Reflective

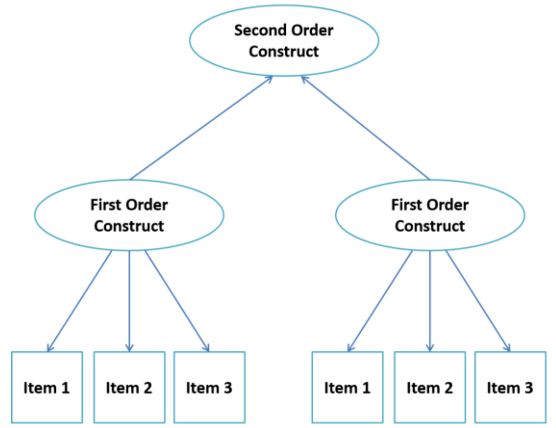


Figure 35: Reflective-Formative

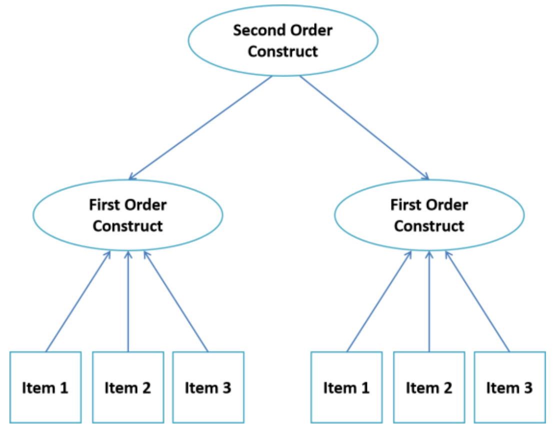


Figure 36: Formative-Reflective

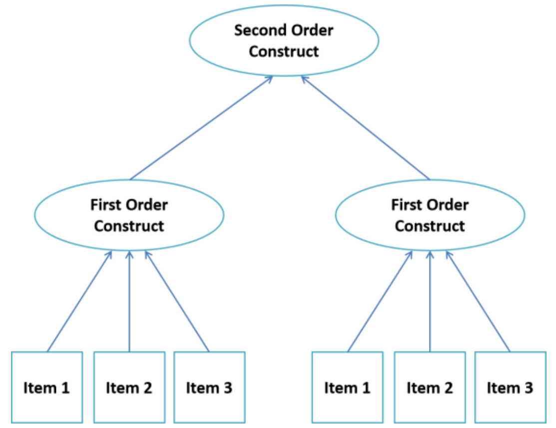


Figure 37: Formative-Formative

In accordance with Shin and Kim (2011) estimation bias is potentially apparent in multidimensional measurement models where the first order construct is formative in nature. Furthermore instability of second order formative constructs can also be present in terms of their dependency on endogenous variables (Shin & Kim, 2011). However, despite these limitations it is important to operationalize the construct as formative or reflective based on their theoretical underpinning in order to preserve the empirical findings generated (Petter et al., 2007).

User Capital (UC) is a multidimensional construct as it is comprised of a series of facets that are each measured with their own set of items. Operationalizing UC as multidimensional as opposed to decomposing it into unidimensional constructs offers key advantages including: retaining parsimony, allowing for insightful explanations, and maintaining theoretical implications (Petter et al., 2007). Furthermore, UC is formed by its dimensions, whereby a change in its underlying dimensions results in a change in the UC construct. Hence UC is formative in nature. However, the dimensions of UC are reflective in nature and as such is considered a second order formative construct with first order reflective dimensions. The dimensions are all measured by multiple items, which is the "*most powerful means of testing and evaluating the construct"* (MacKenzie et al., 2005, p. 715). The reflective/formative nature of all the constructs present in the nomological net and structural models were also assessed following the aforementioned guidelines (refer to Table 22).

Table 22: Dimensionality and Directionality of Constructs

Construct	First Order	Second Order	Formative	Reflective
User Capital		X	X	
• *Attitude towards using IS*	X			X
• *Mastery Motivational Disposition*	X			X
• *Metacognitive Self-regulation*	X			X
• *User Competence*		X		X
Effective Use		X	X	
• *Informed Action*	X			X
• *Representational Fidelity*	X			X
• *Transparent Interaction*	X			X
Individual Impact	X		X	
Information Quality	X		X	
Organizational Impact	X		X	
Satisfaction	X			X
System Quality	X		X	

5.3.2.2 Measure Development

This section of the thesis details the generation and validation of measurement items. Excluding the demographics, all items were measured using a seven-point Likert Scale which ranged from strongly disagree to strongly agree. In accordance with Goodhue and Thompson (1995) agree/disagree scales have shown to have stronger validity than other types of scales.

5.3.2.2.1 Item Formation

In alignment with Froehle and Roth (2004) where possible all measurement items were extracted from previously validated instruments in the literature. The items were then contextualised to be appropriate for this research topic. The measurement items for each of the dimensions of User Capital (UC) are presented in Table 23.

Table 23 User Capital's Dimensions' Measurement Items

Dimension	Items	Adapted From:
Attitude towards using IS	**ATT1:** Using [System Name] is a good idea. **ATT2:** [System Name] makes my work more interesting. **ATT3:** Working with [System Name] is fun. **ATT4:** I like working with [System Name].	Venkatesh et al. (2003)
User Competence	**CC1:** I am proficient in using [System Name] for my day-to-day tasks. **CC2:** I am proficient in using [System Name] for non-routine tasks that are relevant to my job. **CC3:** I am knowledgeable on how to execute my job tasks in [System Name]. **CC4:** I rarely make mistakes when completing my job tasks in [System Name]. **CC5:** I rarely require support when completing my job tasks in [System Name]. **CC6:** Colleagues often come to me for [System Name] assistance	Sedera and Dey (2013); Munro et al. (1997)

	CC7: I am knowledgeable about the software my organization uses in addition to the [System Name] system. **CCF1:** I often apply [System Name] to new and different problems **CCF2:** In general, I am capable at using [System Name] to solve problems at work **CCF3:** In general, I am creative at using [System Name] to solve business problems **CCF4:** In general, I am innovative when using [System Name] to solve business problems **CCF5:** I try to apply [System Name] in new ways when solving a problem	
Motivational Disposition	**MDM1:** I am willing to select a challenging work assignment that I can learn a lot from **MDM2:** I often look for opportunities to develop new skills and knowledge **MDM3:** I enjoy challenging and difficult tasks at work where I'll learn new skills **MDM4:** For me, development of my work ability is important enough to take risks. **MDM5:** I prefer to work in situations that require a high level of ability and talent **MDP1:** I'm concerned with showing that I can perform better than my coworkers. **MDP2:** I try to figure out what it takes to prove my ability to others at work **MDP3:** I enjoy it when others at work are aware of how well I am doing **MDP4:** I prefer to work on projects where I can prove my ability to others **MDA1:** I would avoid taking on a new task if there was a chance that I would appear rather incompetent to others. **MDA2:** Avoiding a show of low ability is more important to me than learning a new skill **MDA3:** I'm concerned about taking on a task at work if my performance would reveal that I had a low ability **MDA4:** I prefer to avoid situations at work where I might perform badly.	Vandewalle (1997)

Self-Regulation	**SRC1:** When using [System Name] I try to completely understand my actions **SRC2:** When I am become confused about performing a task using [System Name], I try to increase my understanding of it (e.g. reading forums, help guides etc.) **SRC3:** If the task I have to complete using [System Name] is difficult, I try to learn more so that I can effectively execute the task. **SRC4:** Before I use [System Name] to complete a new task, I try to briefly explore how the task needs to be organized. **SRC5:** I regularly ask people who have more experience with [System Name] questions to ensure that I am using it correctly. **SRC6:** When using [System Name] I try to determine which concepts I do not understand well. **SRC7:** When completing tasks in [System Name] I set myself goals to ensure I am on track. **SRC8:** If I get confused using [System Name] I make sure I resolve the confusion.	Pintrich et al. (1991)

Nomological validity is an essential validation technique for formative measurement models (MacKenzie et al., 2011) as it assesses whether the measurement model correlates with other constructs as anticipated (Hair et al., 2010). Drawing upon the nomological network of Social Cognitive Theory, it is hypothesized that an increase in UC would result in an increase in the effective use of the IS. Effective use consists of three dimensions: informed action, representational fidelity, and transparent interaction (Burton-Jones & Grange, 2013). The measures used in this research for the aforementioned constructs are listed in Table 24.

Table 24: Measurement Items for Constructs in Nomological Network

Construct	Item*
Informed Action	**IA1:** When I obtain information from [System Name], I look for the relevant aspects that I can act upon to improve my task performance. **IA2:** When I obtain information from [System Name], I seek

	ways to leverage good pieces of information for my job. **IA3:** When I obtain information from [System Name], I avoid acting on information that I think is suspect.
Representational Fidelity	**RF1:** When completing my job task using [System Name], the information provided is complete. **RF2:** When completing my job task using [System Name], the information provided is clear. **RF3:** When completing my job task using [System Name], the information provided is correct. **RF4:** When completing my job task using [System Name], the information provided is meaningful.
Transparent Interaction	**TI1:** When using [System Name], I have seamless access to the content that I need to complete my job task. **TI2:** When using [System Name], I have difficulty obtaining the content I need to complete my job task because of [System Name]'s interface. **TI3:** When using [System Name], I have difficulty obtaining the content I need to complete my job task because of the physical characteristics of the device I use to access [System Name].
*All items pertaining to the dimensions of effective use were adapted from Burton-Jones and Grange (2013)	

Subsequent to the examination of the reliability and validation of the UC construct, the structural model was examined. The structural model statistically examined the hypothesised relationships between UC and the constructs apparent in the IS success model excluding organizational impact. Table 25 details the measurement items for each construct present in the IS success model. Whilst comprehensive, well validated survey instruments of user satisfaction exist (e.g. Doll & Torkzadeh, 1988), Sedera and Tan (2005) identified overlaps between the measures present in these instruments with the measures of other success dimensions. Therefore when examining user satisfaction as a dimension of IS success, a single item measure that is reflective of overall satisfaction was used.

Table 25: Measurement Items for Constructs Present in the IS Success Model

Construct	Item*
Individual Impact	**II1:** I have learnt much through the presence of [System Name]. **II2:** [System Name] enhances my awareness and recall of job related information. **II3:** [System Name] enhances my effectiveness in the job. **II4:** [System Name] increases my productivity.
Information Quality	**IQ1:** [System Name] provides output that seems to be exactly what is needed. **IQ2:** Information needed from [System Name] is always available. **IQ3:** Information from [System Name] is in a form that is readily usable. **IQ4:** Information from [System Name] is easy to understand. **IQ5:** Information from [System Name] appears readable, clear and well formatted. **IQ6:** Information from [System Name] is concise.
System Quality	**SQ1:** [System Name] is easy to use. **SQ2:** [System Name] is easy to learn. **SQ3:** [System Name] meets the department's requirements. **SQ4:** [System Name] includes necessary features and functions. **SQ5:** [System Name] always does what it should. **SQ6:** [System Name]'s user interface can be easily adapted to one's personal approach. **SQ7:** [System Name] requires only the minimum number of fields and screens to achieve a task. **SQ8:** All data within [System Name] is fully integrated and consistent. **SQ9:** [System Name] can be easily modified, corrected or improved.
User Satisfaction	**US1:** How would you rate your satisfaction with SAP?
*All items related to IS success were extracted from Gable et al. (2008)	

Traditional frequency of use measures (refer to Table 26) were also collected to act as a comparison with effective use. Whilst Gable et al. (2008) have argued that frequency of use is less relevant in mandatory use contexts (e.g. enterprise systems), several scholars have appropriated them when examining the success of enterprise systems using the DeLone and McLean (1992) IS success model and received statistically significant results (e.g. Fan & Fang, 2006; Lin et al., 2006).

Table 26: Measurement Items for the Usage Construct

Usage Measure	Adapted From:
I use [System Name] very intensively (many hours per day, at work)	Chang, Cheung, Cheng, and Yeung (2008), Nwankpa and Roumani (2014)
I use [System Name] very frequently (many times per day, at work)	Chang et al. (2008), Nwankpa and Roumani (2014)
Overall, I use [System Name] a lot	Chang et al. (2008), Nwankpa and Roumani (2014)

In order to examine the convergent validity of formative measurement models a reflectively measured global item is necessary (Hair et al., 2014). Therefore each formative construct in the structural model, nomological network model, and measurement model requires a global measure (Table 27). The global items for effective use and UC had not been established in past literature, and were formulated based off their definitions.

Table 27: Global Items for Formative Constructs

Construct	Global Measure	Adapted From:
Effective Use	**CIEU:** Overall I effectively use [System Name] to complete my job tasks.	
Individual Impact	**CIII:** Overall, the impact of [System Name] on me has been positive	Gable et al. (2008)
Information Quality	**CIIQ:** Overall, the [System Name] Information Quality is satisfactory	Gable et al. (2008)
Organizational Impact	**CIOI:** Overall, the impact of [System Name] on the organization has been positive	Gable et al. (2008)
System Quality	**CISQ:** Overall, the [System Name] System Quality is satisfactory	Gable et al. (2008)
User Capital	**CIUC1:** Overall, I believe I possess the necessary skills and motivation in use [System Name] to complete my job tasks. **CIUC2:** Overall, I believe I have the right aptitude and attitude in using [System Name] for my job tasks.	

In quantitative research it is imperative to consider control variables. A control variable is "*a special type of independent variable that is of secondary interest and is neutralized through statistical or design procedures"* (Creswell, 2012, p. 116). Control variables are typically utilized to minimize extraneous variance and spurious results (Huselid, Jackson, & Schuler, 1997) and typically encompass demographic information and characteristics of the respondents (Creswell, 2012). Furthermore in accordance with Sun (2010, p. 194) "*controlling for variables that may potentially influence the dependent variables in a research model provides a stronger test of the theory underlying that research model."* At the individual level, an individual's age, gender, and education level are regularly used demographic controls in the IS discipline (Zahedi, Abbasi, & Chen, 2015). In this research, the variables that are controlled for include an individual's gender, age, educational level, experience with the enterprise system, experience in the organization, and task complexity.

In the context of IS success the influence of an individual's gender on information quality, use and individual impact has typically found two be non-significant (Petter et al., 2013). However, in the acceptance and usage literature the importance placed on perceived usefulness and perceived ease of use, which are common measures of system quality, differs depending on an individual's gender (Venkatesh et al., 2003). Therefore, the survey instrument controlled for an individual's gender. Another demographic variable that has also been found to be non-significant is an individual's age (Petter et al., 2013). However, literature suggests that distinct differences exist between digital natives and digital immigrants perceptions of IS (Prensky, 2009). Therefore age was controlled for in this study. Petter et al. (2013) identified mixed results for an individual's experience with IS, experience within the organization, and education with the dimensions of IS success.

However, expertise literature has highlighted the importance of sustained experience (e.g. Eriksson & Charness, 1993), whereas human capital has highlighted the role of education (e.g. Davidsson & Honig, 2003). Therefore education, experience with the IS, and experience were included as controls. The final variable that was controlled for was task complexity as in accordance with Petter et al. (2013) the characteristics of tasks significantly influence the dimensions of success. As mentioned earlier, other demographic information was also recorded to ensure the sample was accurate. All demographic variables are detailed in Table 28, the completed survey instrument is depicted in *Appendix E: Survey Instrument.*

Table 28: Demographic Items

Construct	Item
Gender	What is your gender?
Age	What is your age?
System Experience	How many years of experience do you have using [system name]
Organization Experience	How long have you been working for [organization name]
Education Level	What is the highest level of education that you attained?
Classification Level	What is your classification level within your organization?
Job Role	What is your job role within your organization?
Division	What faculty, institute, or division do you belong?
Functionality	What functionality do you use in [system name] (select all that apply)
Task Complexity (adapted from Lankton, Wilson, and Mao (2010))	**TC1:** Generally, the job tasks I perform within [system name] are easy. **TC2:** Typically, the job tasks I perform within [system name] are ambiguous. **TC3:** Generally, the job tasks I perform within [system name] are ill-structured. **TC4:** Typically, the job tasks I perform within [system name] are simple.

5.3.2.2.2 Pretesting the Measurement Instrument

A pre-test was conducted subsequent to the completion of the survey instrument. The purpose of the pre-test was to assess the face validity of the instrument. Face validity is a form of content validity, whereby the instrument is assessed by expert judges who examine potential empirical, theoretical, and practical issues associated with the survey instrument (Hair et al., 2010). To assess face validity it is recommended that the expert panel is comprised of three to ten respondents (Rubio, Berg-Weger, Tebb, Lee, & Rauch, 2003).

In conducting the pre-test, the survey instrument was distributed to a total of eight respondents, which was comprised of both experienced academics and PhD students familiar with the construct domain. The respondents provided constructive feedback in an attempt to improve the understandability, format and content of measures. When deemed appropriate the recommendations by the expert panel were adhered to. This included the deletion of five measurement items (please note: the measurement items that were deleted are not listed in tables 7 through to 10); ensuring a consistent Likert scale was used throughout the survey, and rewording several measurement items to improve understandability. In both the pre-test and pilot study the only global item examined was for User Capital as it was the focal construct of this research (refer to Table 27 for a list of global items).

5.3.3 Measurement Model Specification

The objective of this thesis was to conceptualise and empirically examine User Capital (UC). Due to the complex nature of UC, it is imperative to correctly specify the measurement model to minimise the potential of false positives and false negatives (Petter et al., 2007). Specifically UC is an aggregate multidimensional construct, whereby "*each dimension contributes separately to the meaning of the* *construct, but may be differentially weighted*" (Polites et al., 2012, p. 37). Put differently, "*the dimensions combine to produce the construct*" (Wright et al., 2012, p. 372). The finalised measurement model of UC which was refined after the pilot study is depicted in Figure 38 and is discussed in the following paragraphs.

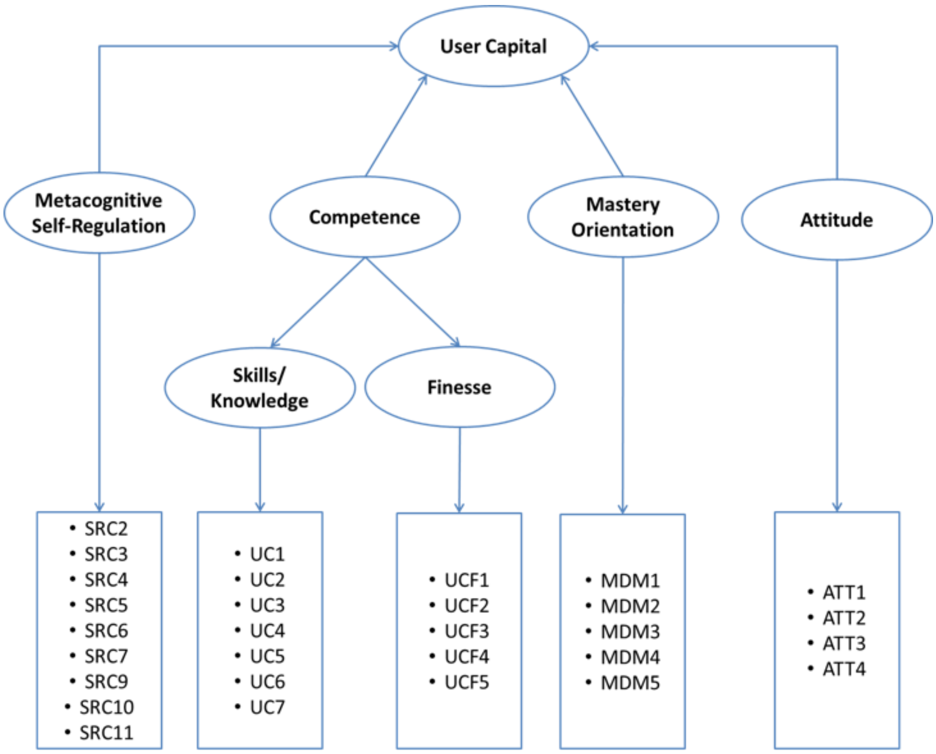


Figure 38: User Capital Measurement Model

UC is formative in nature and consequently is formed by its constituent parts as opposed to causing them. The formative dimensions within UC are measured reflectively and therefore the measures are manifestations of the construct (Polites et al., 2012). In UC, attitude towards using IS, mastery orientation, and metacognitive self-regulation are all unidimensional in nature and lack distinct dimensions. Alternatively, user competence is a second order construct and therefore is comprised of distinct dimensions (Polites et al., 2012). The dimensions within UC are expected to be highly correlated which is indicative of a superordinate multidimensional construct. For instance, user competence is superordinate in nature as it is anticipated that an individual who is competent will be knowledgeable (knowledge/skills dimension) and be able to apply technology to solve different problems (finesse dimension). Therefore the knowledge/skill and finesse dimensions are expected to covary.

To summarise UC is an aggregate multidimensional construct. Attitude towards IS, mastery orientation, and metacognitive self-regulation are unidimensional, reflectively measured constructs. Whereas user competence is a superordinate, multidimensional, first-order/second-order reflective constructs.

5.3.4 Pilot Study

Subsequent to the completion of the pre-test and formulation of the measurement model a pilot study was conducted. The pilot study was conducted in a small and medium enterprise operating in the mining industry in Australia. Due to the geographical dispersion of the organization the survey instrument was distributed physically to the Brisbane headquarters, and an electronic survey was sent to all other locations. In total seventeen employees ranging from operational to management were provided with the survey instrument, however the strategic level were not included due to the scoping of the final research instrument. Fourteen individuals responded to the survey, which resulted in a response rate of 82%. Due to the low number of respondents, quantitative assessment of the instrument was limited. Notwithstanding, in accordance with Hunt et al. (1982) as the sample was between 12 and 30 the pilot itself was adequate and several important observations were extracted and utilised in the final study.

The organizational impact construct which is a dimension of IS success (DeLone & McLean, 1992) was included in the pilot survey. However the results from the pilot study illustrated that 35.8% of all responses for organizational impact contained neutral responses. Furthermore, two instances of the missing data occurred in the organizational impact items. Preliminary observation may suggest that this is ignorable missing data. However, there were only five instances of missing data in the entire dataset, therefore 40% of the missing data occurred in the organizational impact construct. This number is potentially inflated due to the small sample size. However, coupled with the high percentage of neutral responses the data may not be missing completely at random. Consequently the literature was consulted to identify potential reasons for the missing data and high proportion of neutral responses. There is evidence in literature to suggest that the operational level users are more concerned with the system quality and information quality of the IS as opposed to the benefits obtained at the firm level (Gable et al., 2008). Additionally Murphy et al. (2012) highlights that operational users are primarily interested in reaching their goals and improving their outcomes at their level of operation. Therefore organizational impact may not be relevant to operational users. Consequently based on the study context, organizational impact was removed from subsequent investigation.

Secondly, anomalies were present in the expected factor loadings of metacognitive self-regulation. As a consequence of the small sample size, these loadings need to be treated with caution. However, they should not be completely overlooked as the measurement items were rewritten to be contextualised to the IS discipline. Therefore it was necessary to investigate whether the wording of the items could have influenced the resultant factor structure. Specifically, self-regulation loaded on multiple factors, which was not anticipated. Furthermore the communalities of two items were lower than the 0.5 threshold recommended by Hair et al. (2010). Upon examination, no issue with the wording of the items were identified. However both items were negatively worded and therefore may have been misinterpreted. Due to the reflective nature of the self-regulation construct, deletion of items should not alter the underlying meaning of the construct. Furthermore self-regulation was measured by eleven items which is substantially greater than the other dimensions of UC. As a result the two items were removed.

Thirdly, transparent interaction did not load as anticipated. Again these results need to be treated with caution, however examination of the instrument illustrated that these constructs also possessed negatively worded items. As transparent interaction was adapted from literature and had only three measurement items, the items were reworded. The finalised survey instrument is depicted in Appendix E.

5.3.5 Validation

To ensure content validity the instrument was pretested and pilot tested prior to the distribution of the finalised survey instrument. Following the guidelines of MacKenzie et al. (2011, pp. A1-A3) the following validation and reliability assessments were performed:

Following the recommendations by Hair et al. (2014) the reliability and validity of the reflectively measured constructs were assessed by performing:

- Internal consistency reliability was assessed using Cronbach's Alpha, and Composite Reliability tests.
- Convergent validity was assessed by examining indicator reliability and average variance extracted by the construct.
- Discriminant validity was assessed by examining Cross Loadings and Fornell-Larker

In addition the recommendations of Hair et al. (2014) was also followed to assess the reliability and validity of the formatively measured constructs by performing:

- Convergent validity was assessed by performing redundancy analyses
- Collinearity was assessed by examining variance inflation factors
- The relevance of the formative constructs were examined using Outer Weights.

5.4 Distribution of Instrument

The survey instrument was physically distributed to the appropriate individuals within the case organization. The physical distribution method was selected as it has been regularly reported to have higher response rates than electronically distributed surveys (Nulty, 2008). In addition, this research had top management support which also facilitates a high response rate (Davison, Kam, Li, Li, & Ou, 2009). In most instances the managers that were interviewed, assisted in the distribution of the survey instrument to the relevant members of their teams as identified by the criteria in *section 4.1*. However as each team was dispersed across multiple buildings in some cases the survey was provided directly to the individual. When the respondents were provided with the sample they were also provided with an anonymised envelope to enclose the completed surveys. Based on feedback provided by the strategic level, the survey was distributed on Monday and collected on the Friday.

5.5 Data Analysis Tools

A series of different data analysis tools were used to analyse the data, including IBM SPSS, and SmartPLS (Table 29). The appropriateness of Smart PLS for the analysis of formative measurement models is substantiated by Polites et al. (2012)

who identified that 84% of publications that examined a formative construct used SmartPLS.

Table 29: Data Analysis Tools Used

Tool	Purpose	Tasks Performed
IBM SPSS	(1) Cleaning and transforming the data. (2) Statistical Analysis involving polynomial regression.	• Analyse missing data • Imputation of missing data. • Descriptive statistic on sample. • Performed Factor Analysis • Performed multiple polynomial regressions
Smart PLS	Analysis of formative measurement model and structural model.	• Analysed the User Capital (UC) construct • Analysed the relationship between UC and effective use • Analysed the relationship between UC, effective use and IS Success

5.6 Ethical Considerations

In accordance with the National Health and Medical Research Council ethical guidelines, ethics approval is required for all human research. This research was considered to be a negligible low risk project, with the only foreseeable being discomfort to the individual participants. This research was reviewed and approved by the Queensland University of Technology’s Office of Research Ethics and Integrity (approval number: 1500000309).

5.7 Chapter Summary

In summary, this chapter has highlighted the rigorous scale development techniques that were utilised in the formulation of both the measurement model of User Capital (UC) and the survey instrument (*Appendix E: Survey Instrument*). The measurement model of UC consisted of four dimensions, which corresponded to thirty measurement items. In total the survey consisted on eighty Likert scale and nine demographical questions. Where possible the survey instrument was adapted from prior literature and underwent pre-testing and pilot testing phases. The survey was physically distributed to the regular users of the enterprise system based on selection criteria established from the interview rounds.

Chapter 6: Results

As evident in Chapter 1, there are three primary objectives of this research, which are: (i) to conceptualize User Capital (UC), (ii) analyse it in a nomological network with effective use, and (iii) within the variance perspective of Information System (IS) Success. The literature review highlighted key theoretical concepts that could inform the formulation of UC, including: human capital and the learnings outcome model.

The conceptual and structural models were created in Chapter 3 and Chapter 4 respectively. This resulted in UC being operationalised as a multidimensional construct consisting of four dimensions: (i) metacognitive self-regulation, (ii) user competence, (iii) mastery motivational disposition, and (iv) attitude towards IS. In addition sixteen high level hypotheses were proposed for the relationships involving UC, effective use, and IS Success. In order to examine the hypothesised relationships, the survey method was used. The survey was developed following established guidelines (e.g. MacKenzie et al., 2011) in Chapter 5 and consisted of eighty-nine questions.

This chapter seeks to statistically analyse the hypothesised relationships. In doing so the dataset was cleaned, transformed and analysed using IBM SPSS and Smart PLS. Seven key themes are discussed in this chapter (refer to Table 30), including: (i) data cleaning and transformation; (ii) an overview of the respondents (iii) the results of the factor analysis; statistical examination of: (iv) UC; (v) UC operating in a nomological network with effective use; (vi) the relationships involving UC, effective use, and IS Success dimensions (e.g. DeLone & McLean, 1992). In addition (vii) the results of the polynomial regressions using response surface analysis investigating the impact of the interaction between various constructs with effective use and individual impact are presented. This chapter concludes by summarising the outcomes of the hypothesis testing.

Table 30: Objective of Chapter 6: Results' High Level Themes

Theme	Objective
6.1 Data Cleaning and Transformation	▪ Analyse the extent of missing data per variable and case. ▪ Determine imputation method.
6.2 Sample Demographics	▪ Examine the user demographics ▪ Identify the tasks performed by users.
6.3 Analysis of Factor Loadings	▪ Analyse the results of the factor analysis for the reflectively measured constructs.
6.4 Analysis: User Capital	▪ Assess the validity/reliability of the reflective dimensions of UC. ▪ Analyse the multidimensional nature of UC. ▪ Further analyse UC with the presence of different motivational disposition.
6.5 Analysis: User Capital and Effective Use	▪ Assess the validity/reliability of the reflective dimensions of effective use. ▪ Examine the multidimensional nature of effective use. ▪ Statistically examining the relationship between UC and effective use.
6.6 Analysis: User Capital, Effective Use, and IS Success	▪ Assess the validity/reliability of the reflective and formative IS Success dimensions. ▪ Examine the structural model of UC, effective use and IS Success. ▪ Examine the original IS Success model.
6.7 The Interactions of User Capital, Effective Use, and IS Success	▪ Examine the interaction between the affective and capability components of UC with effective use and individual impact. ▪ Analyse the impact of how UC and technical capital interact with effective use and individual impact. ▪ Examine individual impact as predicted by the interaction of user satisfaction and effective use.

6.1 Data Cleaning and Transformation

Analysis of logon data and user demographics identified that 393 individuals at the case organization used the enterprise system in an operational manner. Therefore these individual performed data entry operations rather than only approvals and analysis of reports. The survey was distributed to these individuals and 250 were returned, which corresponds to a response rate of 63.81%. This response rate is greater than the average response rate of 52.7% for physically distributed surveys (Baruch & Holtom, 2008). Prior to analysing the measurement and structural models, the data was prepared. The data preparation involved analysing missing data and determining the appropriate imputation technique to apply.

In analysing missing data "*the primary concern is to identify the patterns and relationships underlying the missing data in order to maintain as close as possible to the original distribution of values when any remedy is applied*" (Hair et al., 2010, p. 42). The missing data was examined across both variables and respondents. In terms of the Likert Scale items (Q1 – Q80), there were 72 (0.36%) instances of missing data. For the demographics (Q81 – Q89), 53 (2.36%) instances of missing data were present. Overall across the entire sample there was only 0.56% missing data. In addition, of the 250 surveys returned, 208 (83.2%) were complete and the remaining 42 (16.8%) possessed missing data. 30 of which, contained less than three instances of missing data. However three cases possessed a relatively higher amount of missing data. Analysis of these responses identified that certain questions had been systematically omitted or alternatively the individual failed to complete the survey. Therefore these three cases were removed from the dataset.

In accordance with Hair et al. (2010, p. 50) "*nonmetric variables are not amenable to imputation.*" Therefore responses which omitted the nonmetric control variables that were required for statistical analysis (e.g. age, gender, years of experience with the system, past education) were excluded from the dataset. In addition, the dataset was also examined to identify if any of the respondents did not use the enterprise system in an operational manner or were infrequent users whose job roles did not require the use of enterprise systems.

This resulted in a dataset of 223 useable cases. This dataset still contained missing quantitative data. In terms of the Likert Scale responses, descriptive demographics and the overall dataset there was 0.18%, 0.45% and 0.21% of missing data respectively (Table 31). As the percentage of missing data is less than 10% any imputation method can be applied (Hair et al., 2010). In this instance the EM imputation method was selected due to its ability to handle "*both non-random and random missing data processes*" while maintaining the "*best representation of original distribution of values with least bias*" (Hair et al., 2010, p. 55).

Table 31: Percentage of Missing Data

	Original Data Set (n = 250)	**Cleaned Data Set (n = 223)**
Likert Scale Responses (Q1-Q80)	0.36%	0.18%
Demographics (Q81-Q89)	2.36%	0.45%
Total	0.56%	0.21%

6.2 Sample Demographics

As previously outlined in Chapter 5, the surveys were distributed to the individuals within the case organization who used Oracle eBusiness Suite in an operational capacity. Of the 223 useable responses, 24.7% were male and 75.3% were female. Whilst there is seemingly a larger proportion of female respondents in the sample, this is also indicative of the nature of administrative workers in Australia, where in accordance with the Workplace Gender Equality Agency (2015) 74.4% of administrative workers in Australia are female with the 25.6% are males. The median age group in the sample was 36-45 although the mode was 46-55. Furthermore, 27.8% of the users were digital natives, the remaining 72.2% were digital immigrants. The median and mode for organization and enterprise system experience was 5-9 years. In addition the most common education level reported was a bachelor degree. Furthermore 216 (96.86%) respondents were administrative, 4 (1.79%) were academics and the remaining 3 (1.39%) did not report a job role. Based on the job roles of the individual, the extent to which an administrative respondent was operational, managerial, and strategic, was determined. Of the administrative respondents, 188 (87.04%) were operational, 25 (11.57%) were managerial, and 3 (1.39%) were strategic (refer to Figure 39). Regardless of their job role, each cohort performed operational duties within the enterprise system. Refer to Appendix F: Descriptive Statistics for a summary of the descriptive statistics for each variable.

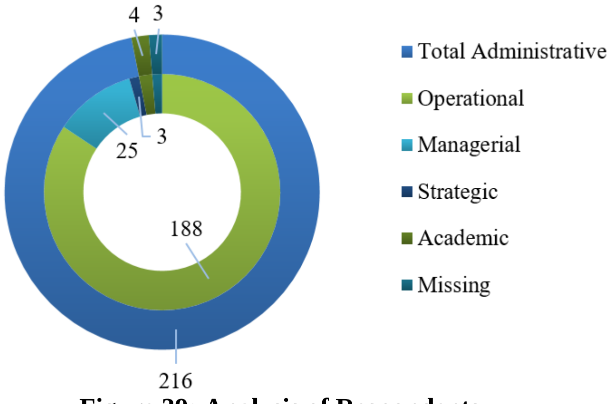


Figure 39: Analysis of Respondents

The operational users performed a wide variety of tasks within Oracle eBusiness Suite, including: accounts payable, accounts receivable, procurement and even some approvals. On average they completed 5 different types of tasks within

Oracle eBusiness Suite. The managerial respondents performed on average 6 different types of tasks within the enterprise system, and performed a similar array of tasks as operational employees, albeit with greater capacity for approvals. Conversely the strategic and academic respondents performed a smaller subset of tasks, and on average 3 and 2 different types of tasks were performed respectively. This was also evident when analysing the overall system use measure (SU3), in which operational and managerial respondents reporting on average a score of 4.98 and 4.52 respectively, whereas strategic and academic users reported a smaller usage score of 2 and 3 respectively. Table 32 highlights the proportion of operational, managerial, strategic, and academic users who perform the main tasks within Oracle eBusiness Suite.

Table 32: Proportion of Users Performing Tasks

	Operational	Managerial	Strategic	Academic
Approvals	25%	68%	100%	50%
Accounts Payable	75%	72%	0%	0%
Accounts Receivable	54.30%	64%	0%	0%
Cash Management	2.10%	8%	0%	0%
Fixed Assets	37.80%	56%	0%	0%
General Ledger	62.80%	80%	0%	0%
iAssets	34%	32%	33.30%	0%
iExpenses	66%	72%	100%	100%
Procurement	62.20%	76%	100%	75%
iProcurement	36.20%	28%	0%	0%
Reports	51.60%	64%	33.30%	50%

A two-step cluster analysis was also performed to identify different user groups based on the characteristics inherent in User Capital (UC). In total three clusters were identified (Figure 40). Cluster 1, cluster 2, and cluster 3 represented the intermediate suboptimal and Optimal User Group respectively. Analysis of the clusters indicated that cluster three consisted of users with high levels of each of the dimensions present within UC, therefore representing an optimal user. Cluster one had comparatively median levels of all the UC dimensions. Alternatively cluster two represented a less than optimal user group and was characterised by users who possessed low self-regulation, user competence, motivation, and attitude.

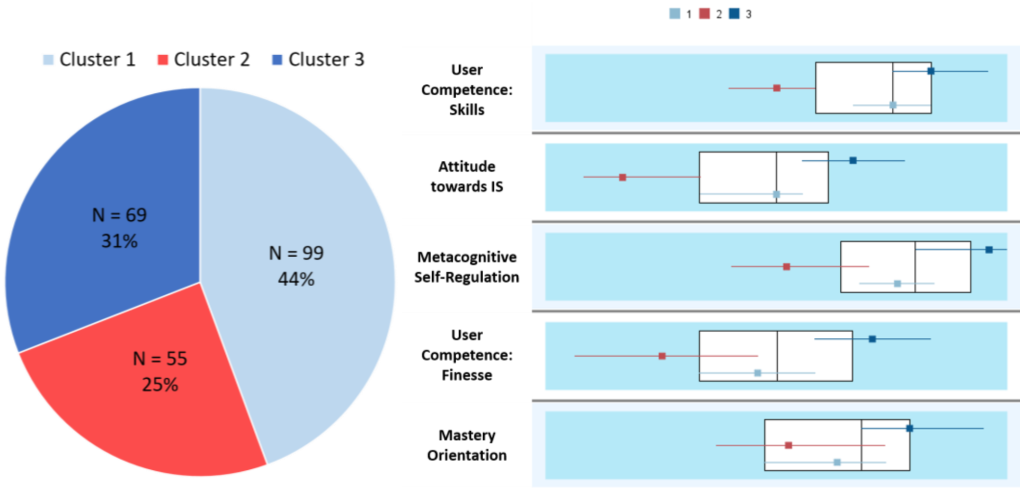


Figure 40: Cluster Analysis: Characteristics of the Users

6.3 Analysis of Factor Loadings

The primary purpose of a factor analysis is *"to define the underlying structure among the variables in the analysis"* (Hair et al., 2010, p. 94). Put differently, it identifies whether a set of items belong to a higher order factor due to the items being highly interrelated (Hair et al., 2010). Therefore factor analysis is a key technique to identify if reflectively measured items belong to a construct. However, items of formative constructs measure different facets and are typically not highly correlated (Petter et al., 2007). Consequently factor analysis is not appropriate for formative constructs (Petter et al., 2007). Therefore an Exploratory Factor Analysis (EFA) was performed using IBM SPSS Version 23 to assess the reflectively measured constructs (refer to *Appendix G: Factor Analysis for Reflectively Measured Items*).

The EFA was conducted in two phases, first at the construct level and then across all the reflectively measured constructs. As previously specified in Chapter 5, there are twelve reflectively measured constructs in the dataset: (i) system use, (ii) effective use transparent interaction, (iii) effective use representational fidelity, (iv) effective use informed action, (v) task complexity, (v) user competence knowledge/skills, (vii) user competence finesse, (viii) mastery motivational disposition, (ix) performance motivational disposition, (x) avoidance motivational disposition, (xi) metacognitive self-regulation, and (xii) attitude towards using IS. Additionally in this research, user competence is comprised of both knowledge/skills and finesse dimensions and therefore an additional EFA examined whether these dimensions are distinct. Similarly an additional EFA was performed to determine whether the types of motivational disposition are distinct from each other.

The results from the EFA with Principal Axis Factoring identified that system usage, mastery motivational disposition, transparent interaction, and representational fidelity items all loaded successfully onto their respective factors. Both performance and avoidance motivational disposition items loaded onto their respective constructs. However, there were issues present with the communalities of some of the items (< 0.500). Due to both performance and avoidance motivational dispositions being reflectively measured constructs coupled with them having greater than three indicators, one item with a low communality (< 0.500) were removed from each (MDP1 and MDA2). After the removal of these items, mastery, performance, and avoidance motivational dispositions were examined together in an EFA. The results illustrated that the items still effectively loaded on their respective constructs, with no obvious cross loading.

User competence consisted of two dimensions (i) depth of knowledge/skills and finesse. In terms of the knowledge/skills dimension, the items loaded onto a single construct. However the communalities for two items (CC6, CC7) were relatively low (< 0.500). As the knowledge/skills dimension was reflectively measured using seven items, the items with low communalities were removed without loss of meaning (Hair et al., 2014). Alternatively, the items for the finesse dimension loaded successfully on a single construct. As user competence is multidimensional, an additional EFA was performed in which the two dimensions were analysed together. While a two factor solution was obtained it was evident that cross loading was occurring, which was largely caused by two items (CC2, CCF2). These items were removed and an appropriate two factor solution with no cross loadings was obtained.

Interestingly, the self-regulation items loaded incorrectly onto two factors. However, it was apparent that this was largely due to a single item (SR5). As self-regulation was reflectively measured with eight items, SR5 was removed without loss of meaning (e.g. Hair et al., 2014). Another construct, whose items appeared to load incorrectly onto two factors was task complexity. Whilst task complexity was reflectively measured with four items, the factors split the items into two groups. Examination of the wordings of the task complexity items indicated that two separate aspects of task complexity were being perceived by respondents: task difficulty and task clarity. As task complexity was a control variable, the measures were retained as two separate constructs each consisting of two items.

Finally, informed action (effective use dimension) loaded on a single factor. Whilst the communality for one of the items was relatively low it was determined to be retained for the purpose of future analysis. The attitude towards IS items also effectively loaded onto a single factor, however ATT1 was removed due to low communality.

In total, the EFAs resulted in the removal of eight items (MDP1, MDA2, SR5, ATT1, CC2, CC6, CC7, CCF2). Following their removal, an EFA fixed to eleven factors was performed on the remaining reflectively measured constructs (excluding task complexity) using Principal Axis Factoring with Varimax Rotation. The items loaded as expected with only minimal cross loadings apparent between transparent interaction and representational fidelity. Transparent interaction and representational fidelity are both dimensions of effective use and as such will be critically examined for discriminant validity issues in the nomological network section.

6.4 Analysis: User Capital

In accordance with Hair et al. (2014), the evaluation of the reliability and validity of the measurement model should occur prior to the examination of the structural model. Reflective constructs are assessed for internal consistency, indicator reliability, convergent validity, and discriminant validity (Hair et al., 2014). Whereas, for formative constructs, convergent validity, collinearity, and significance of outer weights are examined (Hair et al., 2014). The guidelines for the reliability and validity of reflective and formative measurement models are presented in Table 33 and Table 34 respectively.

Table 33: Reliability and Validity Statistical Guidelines for Reflective Measurement Models

Assessment	Statistical Criteria Utilised	Acceptable Ranges*
Internal Consistency Reliability	Cronbach’s Alpha	> 0.70
	Composite Reliability	> 0.70

Convergent Validity	Indicator Reliability	Outer loadings > 0.70
	Average Variance Extracted (AVE)	> 0.50
Discriminant Validity	Cross Loadings	"The indicators outer loading on the associated construct should be greater than all of its loadings on other constructs"
	Fornell-Larker	"The square root of the AVE should be greater than its highest correlation with any other construct"

**Hair et al. (2014, pp. 95-105)*

Table 34: Reliability and Validity Statistical Guidelines for Formative Measurement Models

Assessment	Statistical Criteria Utilised	Acceptable Ranges*
Convergent Validity	Redundancy Analysis	Path loading between Formative and Reflective construct > 0.70
Collinearity Assessment	Variance Inflation Factors (VIF)	< 10
Relevance	Outer Weight	P<0.05 (Check)

**Hair, Hult, Ringle, and Sarstedt (2016) and MacKenzie et al. (2011)*

User Capital (UC), consists of four reflectively measured constructs: metacognitive self-regulation, user competence, mastery motivational disposition, and attitude towards IS. However, user competence is multidimensional and is composed of skills and finesse. Therefore there are five reflectively measured first order constructs, and one second order reflectively measured construct. Whereas UC is a higher order formative construct that is formed by the aforementioned constructs.

Following the guidelines specified by Hair et al. (2014), the reliability and validity of the first order reflective constructs were examined. Only two items from metacognitive self-regulation (i.e. SR6, SR7) did not meet the outer loading threshold, which assesses convergent validity. In alignment with Hair et al. (2014), as the items were reflectively measured and the outer loading was greater than 0.40 and lower than 0.70, the items were removed and the impact on the Average Variance Explained (AVE) was examined. The removal of these items increased the AVE of metacognitive self-regulation and therefore were not used in subsequent analysis. The remainder of the items of the first order reflectively measured constructs met the required thresholds and discriminant validity was confirmed by analysing Fornell-Larker and cross loadings as recommended by Hair et al. (2014) (refer to: Table 35, Table 36).

Table 35: Discriminant Validity Assessment of UC Dimensions: Fornell-Larker

	Attitude towards IS	Finesse	Mastery Orientation	Metacognitive Self-Regulation	Skills
Attitude towards IS	**0.901**				
Finesse	0.458	**0.933**			
Mastery Orientation	0.206	0.333	**0.815**		
Metacognitive Self-regulation	0.466	0.36	0.333	**0.841**	
Skills	0.466	0.547	0.279	0.494	**0.862**

Table 36: Reliability and Validity of First Order Reflectively Measured Constructs within User Capital

Construct	Items	Indicator Reliability	Composite Reliability	AVE	Discriminant Validity
Metacognitive Self-Regulation	SR1	0.850	0.923	0.707	Yes
	SR2	0.852			
	SR3	0.892			
	SR4	0.808			
	SR8	0.798			
Skills	CC1	0.857	0.920	0.743	Yes
	CC3	0.888			
	CC4	0.854			
	CC5	0.848			
Finesse	CCF1	0.883	0.964	0.870	Yes
	CCF3	0.950			
	CCF4	0.954			
	CCF5	0.942			

Mastery Orientation	MDM1	0.850	0.908	0.664	Yes
	MDM2	0.854			
	MDM3	0.831			
	MDM4	0.738			
	MDM5	0.796			
Attitude Towards IS	ATT2	0.890	0.928	0.812	Yes
	ATT3	0.901			
	ATT4	0.913			

Subsequent to the analysis of the reflective dimensions, UC was examined for convergent validity, collinearity, and relevancy. In order to assess convergent validity, a redundancy analysis was performed as recommended by Hair et al. (2014). The redundancy analysis examines the path weight between the formative construct (i.e. UC) and the equivalent global measure that is reflective of that construct (Hair et al., 2014). To demonstrate convergent validity the path weight between the constructs needs to be greater than 0.70 (Hair et al., 2016). As depicted in the redundancy analysis in Figure 41, the path weight between the formatively measured UC and the global reflective measure of UC was 0.734, thus demonstrating convergent validity.

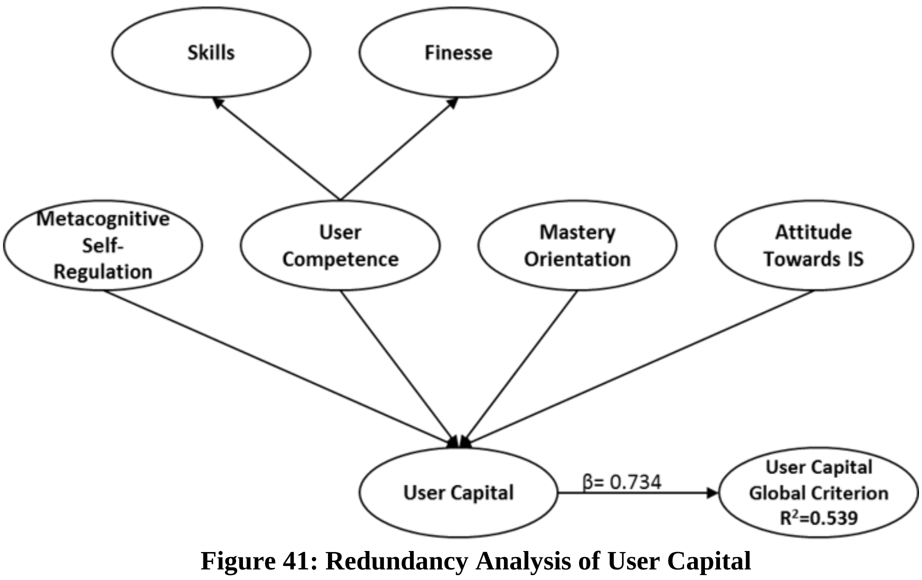


Figure 41: Redundancy Analysis of User Capital

When analysing collinearity, the inner variance inflation factor (VIF) scores of UC with mastery orientation (VIF = 1.189), attitude towards IS (VIF = 1.507), metacognitive self-regulation (VIF = 1.475), and user competence (VIF = 1.609) were examined. All the inner VIF values were less than 10, which is within the acceptable range (e.g. MacKenzie et al., 2011). For the outer VIF values, which examine the reflective indicators of the constructs, it is acceptable for these values to be higher as they are expected to be highly correlated (Hair et al., 2014). However the outer VIF values were also below ten. Therefore this provides evidence to suggest that there are no collinearity issues present within UC.

Next, the relevance of UC was examined by analysing the outerweights. Bootstrapping was performed, which illustrated that all the outerweights were statistically significant ($p < 0.001$). The results depicted that user competence (β = 0.541) was the strongest dimension of UC, followed by metacognitive self-regulation (β = 0.329), mastery orientation (β = 0.227) and attitude towards IS (β = 0.205) (refer to Figure 42).

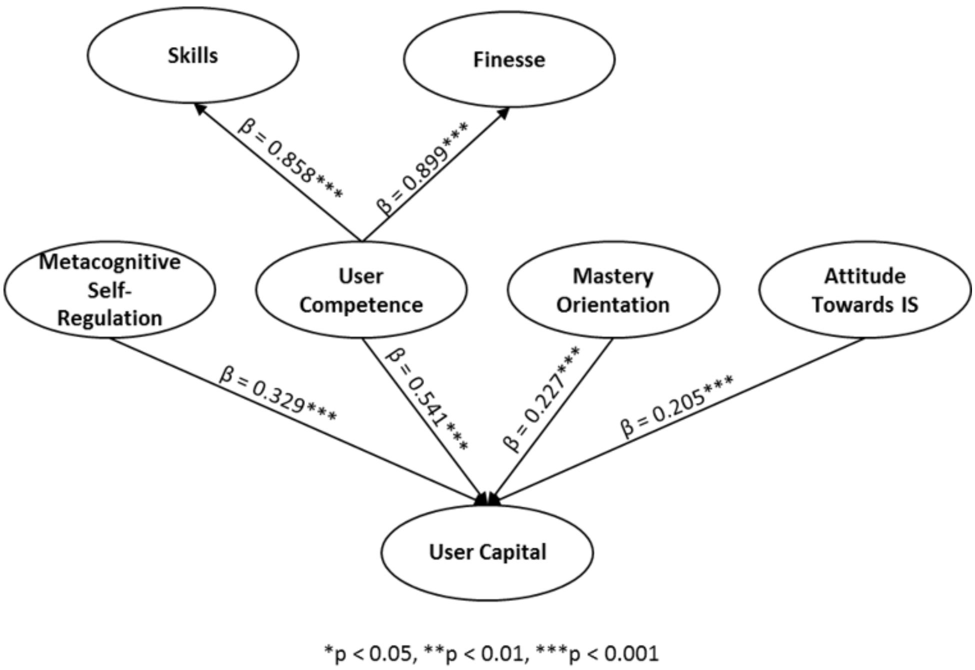


Figure 42: Analysis of User Capital

To provide further validity, UC was examined based on the theoretical concept of motivational disposition. Consequently UC was investigated by replacing mastery orientation with avoidance and performance orientations. As highlighted in Chapter 3, it was expected that avoidance and performance orientation would be a negative statistically significant dimension and a non-significant dimension of UC respectively.

The reflectively measured constructs of avoidance and performance orientations were analysed and found to possess internal consistency, indicator reliability, composite reliability, convergent validity and discriminant validity (refer to Table 37). Subsequently the measurement model of UC was examined.

Table 37: Reliability and Validity of First Order Reflectively Measured Constructs for avoidance and performance orientations

Construct	Items	Indicator Reliability	Composite Reliability	AVE	Discriminant Validity
Avoidance Orientation	MDA1	0.807	0.917	0.788	Yes
	MDA3	0.933			
	MDA4	0.917			
Performance Orientation	MDP2	0.815	0.867	0.687	Yes
	MDP3	0.720			
	MDP4	0.936			

As illustrated in Figure 43, the path weight between avoidance orientation and UC was negative ($\beta = -0.056$). However after performing bootstrapping the relationship was determined to be insignificant ($p = 0.273$). In terms of performance orientation with UC the path weight was positive ($\beta = 0.035$). Yet, when bootstrapping was performed this relationship was also determined to be non-significant ($p = 0.112$).

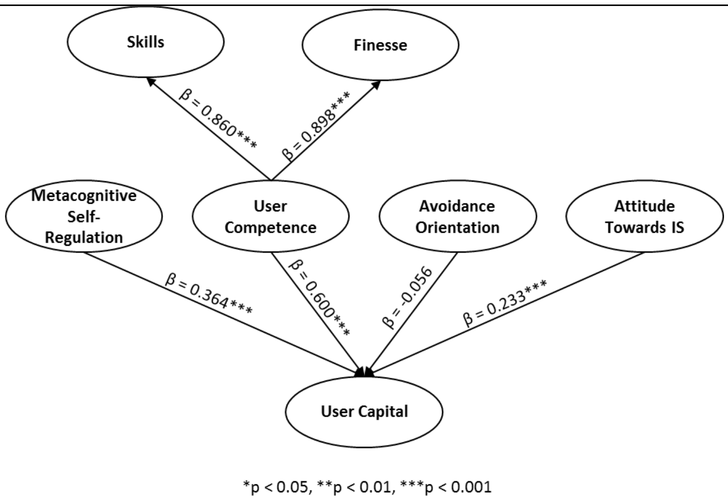


Figure 43: UC with Avoidance Orientation

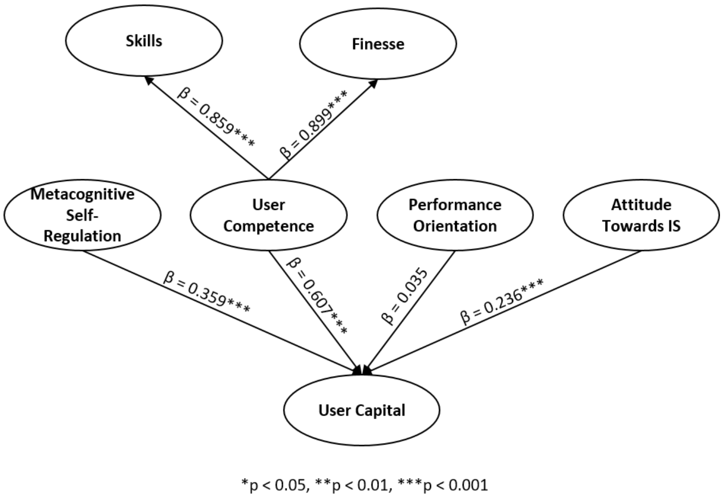


Figure 44: UC with Performance Orientation

Consequently of the three types of motivational disposition, only mastery orientation was a statistically significant dimension of UC. Therefore providing greater evidence to the validity of UC.

6.5 Analysis: User Capital and Effective Use

Prior to examining the structural model of User Capital (UC) and effective use, reliability and validity assessments of effective use were performed. Similar to UC, effective use is multidimensional and is formed by three reflectively measured constructs (i.e. transparent interaction, representational fidelity and informed action). The reliability and validity assessments identified that transparent interaction and representational fidelity exhibited internal consistency reliability, convergent validity, and discriminant validity (refer to Table 38, Table 39). However one informed action item (EUIA3) possessed an indicator reliability below 0.70. Regardless, informed action as a whole possessed good composite reliability, AVE and exhibited discriminant validity based on Fornell-Larker and cross loading analysis. A separate reliability analysis was also performed to examine Cronbach Alpha, the result of which was 0.740, which is above the 0.70 threshold specified by Hair et al. (2014), thus the item was retained.

Table 38: Discriminant Validity Assessment of Effective Use Dimensions: Fornell-Larker

	Informed Action	Representational Fidelity	Transparent Interaction
Informed Action	**0.818**		
Representational Fidelity	0.403	**0.879**	
Transparent Interaction	0.348	0.670	**0.915**

Table 39: Reliability and Validity of First Order Reflectively Measured Effective Use Dimensions

Construct	Items	Indicator Reliability	Composite Reliability	AVE	Discriminant Validity
Transparent Interaction	EUTI1	0.895	0.939	0.837	Yes
	EUTI2	0.948			
	EUTI3	0.901			
Representational Fidelity	EURF1	0.884	0.931	0.772	Yes
	EURF2	0.921			
	EURF3	0.816			
	EURF4	0.891			
Informed Action	EUIA1	0.926	0.853	0.669	Yes
	EUIA2	0.914			
	EUIA3	0.560			

As effective use is formative, it was examined for convergent validity, collinearity, and relevancy. Following the same procedure that was used when examining the convergent validity of UC, a redundancy analysis was performed. To exhibit convergent validity the path in the redundancy analysis should be greater than 0.70 (Hair et al., 2016). In this instance the path was 0.611 (Figure 45). This could be attributed to a potential issue with the global indicator for effective use being too simplistic as opposed to the multidimensional measures of effective use. As the remainder of the reliability and validity tests were successful, the effective use construct was still retained for the nomological network analysis.

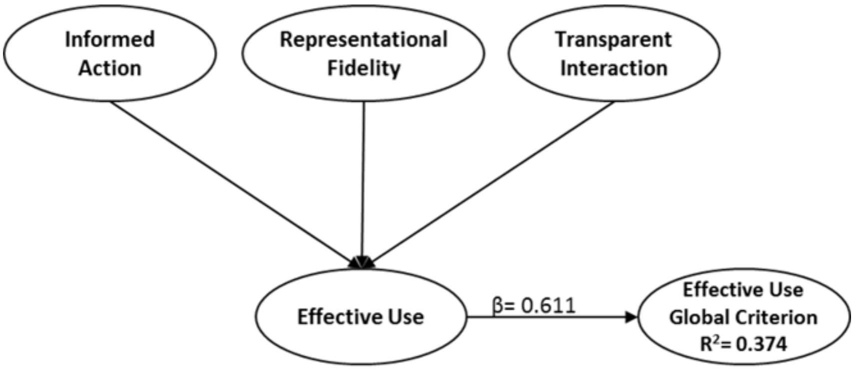


Figure 45: Redundancy Analysis of Effective Use

The collinearity of the dimensions of effective use were then assessed through the examination of inner VIF values. All dimensions had a collinearity score of less than 10 (informed action: VIF = 1.210; representational fidelity: VIF = 1.929; transparent interaction: VIF = 1.838). In addition the outer VIF values were also examined. However as the indicators of the dimensions of effective use were reflective in nature, the VIF values can be higher as the indicators are interrelated. In this instance all indicators were below 10. Therefore providing evidence that multicollinearity is not an issue (MacKenzie et al., 2011).

Following the assessments of convergent validity and collinearity, the relevancy of the dimensions of effective use were examined by analysing outer weights. All outer weights were statistically significant ($p < 0.001$) (Figure 46). Representational fidelity ($\beta = 0.547$) was the strongest dimension of effective use, followed by transparent interaction ($\beta = 0.418$) and informed action ($\beta = 0.230$).

To summarise, there may potentially be issues with the convergent validity of effective use, however there are no multicollinearity issues present and all dimensions of effective use were relevant. Subsequent to the reliability and validity assessment of UC and effective use, the structural model of UC operating in a nomological network with effective use was analysed.

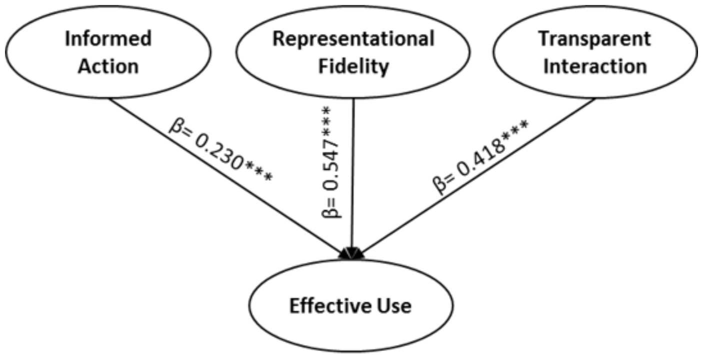


Figure 46: Significance of Effective Use Dimensions

In accordance with Hair et al. (2016) analysing a structural equation model in SmartPLS is a six step process (Figure 47). However, as the endogenous variable (i.e. effective use) is a multidimensional formative construct which is explained by all of its dimensions (R^2 = 1.00) a two-stage approach needs to first be performed (Hair et al., 2016). This approach involves performing the analysis on the structural model with all formative dimensions present and extracting the latent variable scores of the multidimensional constructs (Hair et al., 2014). The structural model is then analysed based on these latent variable scores.

In the specification of the structural model for the relationship between user capital and effective use, several additional variables were controlled for (e.g. education, gender, digital native/immigrant, system experience, task ambiguity and task difficulty). These variables were all connected to the endogenous, dependent variable of effective use.

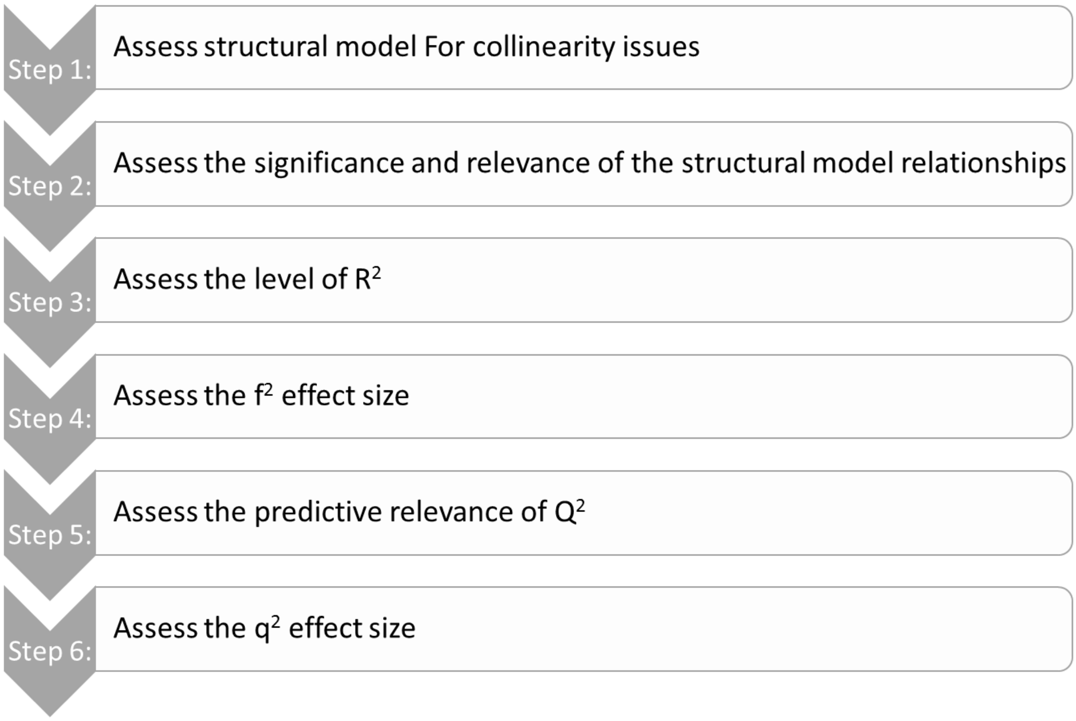


Figure 47: Process of Evaluating a Structural Equation Model in SmartPLS

Subsequent to the two-stage approach, the structural model was first examined for collinearity issues. All inner/outer VIF values were less than 10. Therefore in accordance with the guidelines of MacKenzie et al. (2011) collinearity does not appear to be an issue within the structural model.

The structural model is depicted in Figure 48 and illustrates that the relationship between UC and effective use ($\beta = 0.604$) is statistically significant ($p < 0.001$). In addition only one control variable was statistically significant, which was task clarity, which negatively impacted effective use (β: -0.145, $p < 0.05$). Next the level of R^2 was assessed, which indicated that when controlling for the aforementioned control variables, 49.20% of the variance in effective use was explained.

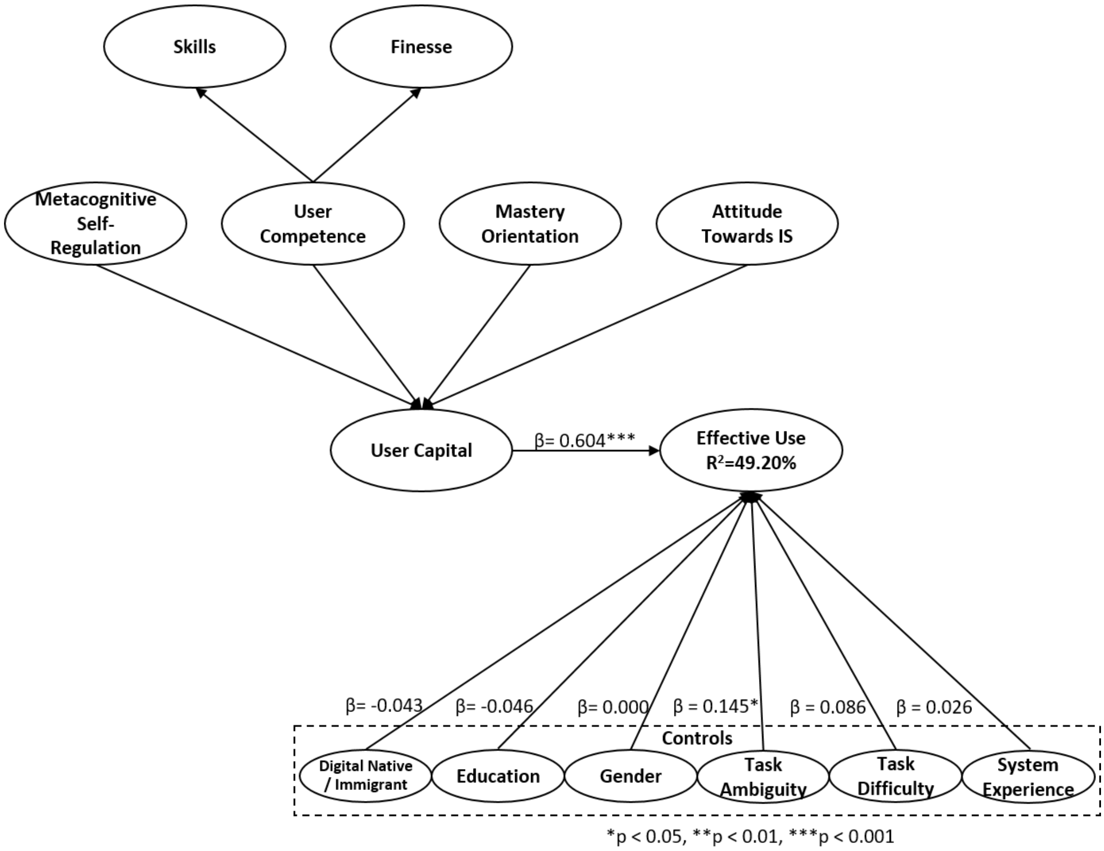


Figure 48: Structural Equation Model of User Capital and Effective Use

The total effects were also examined and identified that each dimension present within UC effects effective use ($p < 0.001$). In addition the examination of total effects highlights that whilst UC has the strongest effect on EU ($\beta = 0.604$), considering only its dimensions, user competence has the strongest effect (0.325), followed by metacognitive self-regulation (0.197), attitude towards IS (0.144), and mastery orientation (0.116).

Table 40: Significance of Total Effects: UC and Effective Use

	T Statistics (|O/STDEV|)	P Values
User Capital -> Effective Use	12.474	0.000
Metacognitive Self-Regulation -> Effective Use	11.763	0.000
User Competence -> Effective Use	15.022	0.000
Mastery Orientation -> Effective Use	6.572	0.000
Attitude towards IS -> Effective Use	11.420	0.000

Subsequently, step four involved analysing Cohen's f^2 effect size. An f^2 effect size of 0.02, 0.15, and 0.35 represent small, medium, and large effects respectively

(Hair et al., 2014). The relationship between UC and effective use had a large effect size ($f^2 = 0.574$).

Step five pertained to analysing the predictive relevance of the model through the examination of Q^2 for the endogenous construct of effective use. The Q^2 value was 0.442, which is greater than 0, which in accordance with Hair et al. (2016) highlights the model has predictive relevance.

The final step in accordance with Hair et al. (2016), is the examination of q^2 effect sizes. To calculate the q^2, the predictive relevance of the model (Q^2) is recorded, then a predictor of the endogenous construct is removed and the Q^2 is recalculated (Hair et al., 2016). After identifying the Q^2 for the inclusion and exclusion of a variable the q^2 effect size is calculated according to the below formula. However, in this instance the only predictor of effective use that was examined was UC. Therefore the model cannot be reevaluated subsequent to the removal of UC as no additional predictors would be present. The evaluation of the q^2 effect size will take place in the subsequent section.

$$q^2 = \frac{Q^2_{included} - Q^2_{excluded}}{1 - Q^2_{included}}$$

To summarise, UC positively influences effective use ($p < 0.001$). Therefore H1 is supported.

6.6 Analysis: User Capital, Effective Use, and IS Success

This section presents the outcomes of the statistical tests involving the extension of IS Success to include User Capital (UC), and Effective Use. The extension of IS Success consists of five formative constructs: (i) UC, (ii) effective use, (iii) individual impact, (iv) information quality, and (v) system quality. The validity and reliability of UC and effective use have already been evidenced in the previous sections. Therefore this section is comprised of the analysis of the reliability and validity of the formative dimensions of IS Success, followed by the analysis of the structural model that extends IS Success.

6.6.1 Reliability and Validity of the Formative Dimensions of IS Success

IS Success consists of three formative constructs: individual impact, information quality, and system quality. As previously specified (Table 34) formative measurement models needs to be assessed for convergent validity, multicollinearity issues, and the relevance of indicators. In order to examine convergent validity, separate redundancy analyses were performed for the aforementioned formative constructs. The results of the redundancy analyses (refer to Figure 49) provided evidence of convergent validity as the path weights were greater than 0.70 (individual impact: $\beta = 0.787$; information quality: $\beta = 0.702$; system quality $\beta = 0.776$).

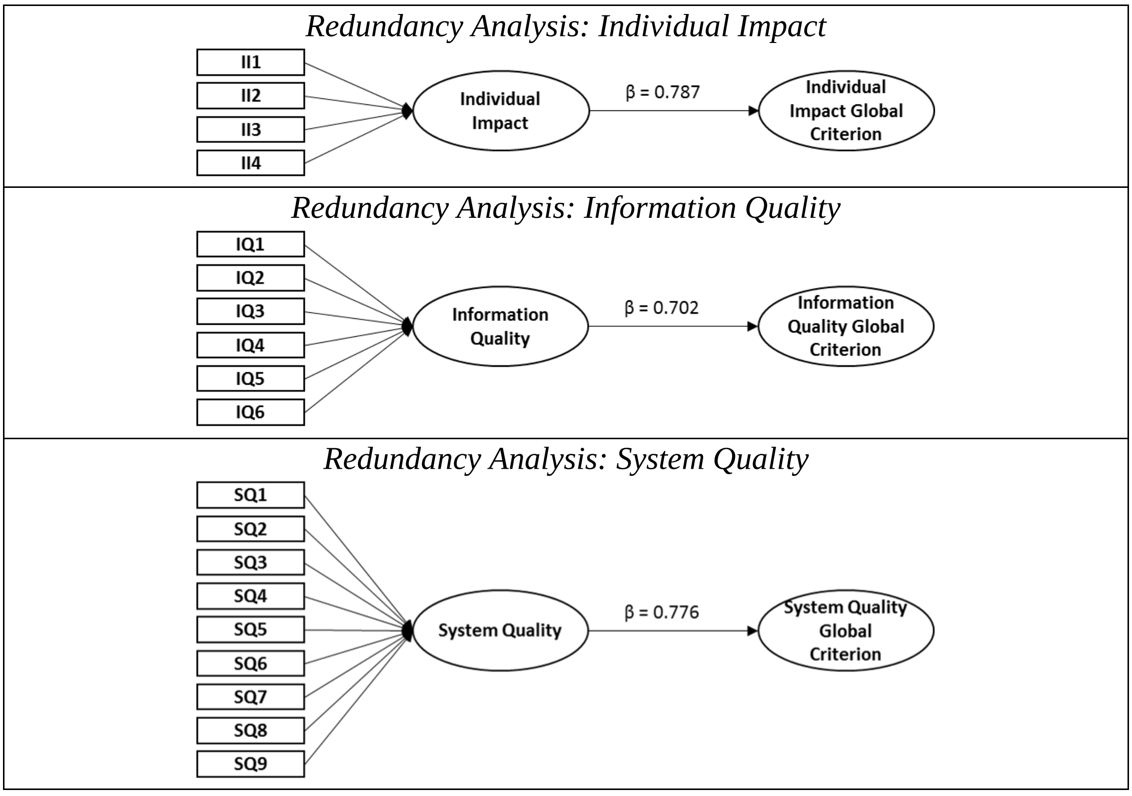


Figure 49: Redundancy Analysis of Formative IS Success Dimensions

Subsequent to the redundancy analysis, the formative indicators were examined for collinearity issues. The outer VIF values of the formative items of individual impact, information quality, and system quality were less than 10. Therefore indicating an absence of multicollinearity (MacKenzie et al., 2011). Next, the significance of the outer weights of the formative items were examined. In total there were 19 formative measures of which 8 have a significant outer weight ($P < 0.05$) (refer to Table 41). However, when outer weights are insignificant, formative items can still be retained if prior research supports their relevancy (Hair et al., 2014). The measures of individual impact, system quality, and information quality, have all been supported in past research (e.g. Gable et al., 2008; Sedera et al., 2013), hence they were retained.

Table 41: Outer VIF Values and Outerweights of Formative Indicators of IS Success Dimensions

Construct	Items	Collinearity Assessment	Outer Weights	
		Outer VIF Values	T Statistics	P-Value
Individual Impact	II1	3.868	2.813	0.005
	II2	4.301	1.077	0.282
	II3	2.975	3.39	0.001
	II4	2.163	3.627	0.000
Information Quality	IQ1	2.711	3.078	0.002
	IQ2	1.918	1.71	0.088
	IQ3	3.488	1.126	0.261
	IQ4	3.705	4.954	0.000
	IQ5	3.68	0.744	0.457
	IQ6	2.352	0.156	0.876
System Quality	SQ1	3.741	4.626	0.000
	SQ2	3.13	0.23	0.818
	SQ3	2.413	2.639	0.009
	SQ4	2.71	2.343	0.019
	SQ5	2.01	0.514	0.608
	SQ6	2.526	0.64	0.523
	SQ7	1.874	0.342	0.732
	SQ8	1.875	1.691	0.091
	SQ9	2.046	1.376	0.169

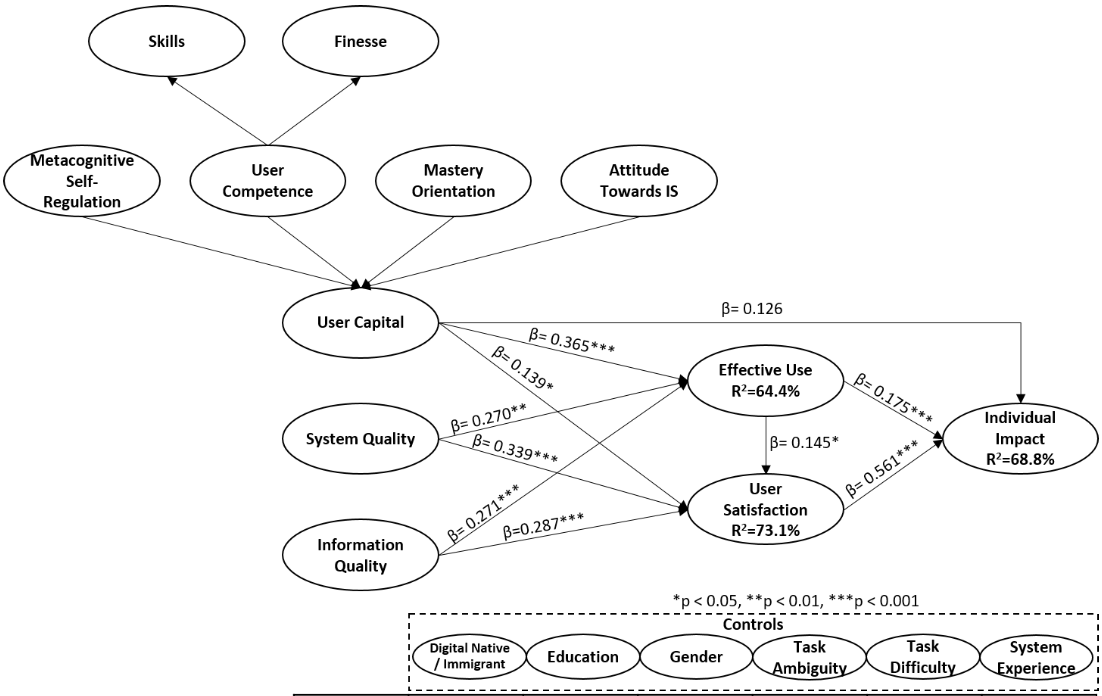
6.6.2 Structural Equation Model of User Capital, Effective Use and IS Success

The structural model of User Capital (UC) and effective use within the context of Information Systems (IS) success consists of only formative constructs with the exception of user satisfaction, which is a single item reflective construct. In addition the following variables were also controlled for: education, gender, digital native/immigrant, system experience, task ambiguity and task difficulty. UC and effective use are both multidimensional and their validity and reliability have been discussed in the previous sections. In accordance with Hair et al. (2014), due to the multidimensional formative nature of the endogenous effective use construct, a two-stage approach was again performed prior to the assessment of the structural model.

Following the six step process of evaluating structural equation models that was explained in the previous section (refer to Figure 47, p. 190), the structural model was analysed. The first phase involved assessing the collinearity of the model through the examination of inner VIF values. Specifically, Inner VIF values were examined for (i) information quality, system quality, and user capital as predictors of effective use; (ii) information quality, system quality, user capital and effective use as predictors of user satisfaction; and (iii) user capital, effective use and user satisfaction as predictors of individual impact. All VIF values were less than 10, therefore collinearity does not appear to be an issue in this analysis.

The path model is depicted in Figure 50 and identifies that the most important driver of individual impacts was user satisfaction ($\beta = 0.561$; $p < 0.001$; H10 supported) followed by effective use ($\beta = 0.175$; $p < 0.001$; H9 supported) and UC ($\beta = 0.126$; $p < 0.100$). Moreover UC ($\beta = 0.365$; $p < 0.001$; H1 supported) was the most important driver of effective use, followed by information quality ($\beta = 0.271$; p

< 0.001; H6 supported) and system quality (β = 0.270; $p < 0.001$; H4 supported). However in terms of user satisfaction, system quality (β = 0.339; $p < 0.001$; H5 supported) was the most important driver followed by information quality (β = 0.287; $p < 0.001$; H7 supported), effective use (β = 0.145; $p < 0.050$; H8 supported), and UC (β = 0.139; $p < 0.050$; H2 supported). In addition bootstrapping was performed, which highlighted that all paths were statistically significant at $p < 0.05$ except for the relationship between UC and individual impact which was only statistically significant at $p < 0.10$. Refer to *Appendix H: Correlation Matrix of User Capital, Effective Use, and Dimensions of IS Success*.



	Digital Native / Immigrant	Education	Gender	Task Ambiguity	Task Difficulty	System Experience
Effective Use	0.004	0.083*	0.011	-0.018	0.003	0.045
Individual Impact	-0.054	-0.10*	-0.053	-0.03	-0.013	0.024
User Satisfaction	-0.111**	-0.039	-0.004	-0.042	0.011	0.103*

Figure 50: Path Model of User Capital, Effective Use and the Dimensions of IS Success

Therefore the presence of both effective use and user satisfaction completely mediated the relationship between UC and individual impact. However examination of the total effects present in the model indicates that user satisfaction (β = 0.561) has the strongest effect on individual impact, followed by UC (β = 0.297, $p < 0.001$; H3 partially supported), system quality (β = 0.260), effective use (β = 0.256), and information quality (β = 0.231). All the total effects were significant at $p < 0.05$ (refer to Table 42).

Table 42: Significance of Total Effects

	T Statistics (|O/STDEV|)	P Values
Effective Use -> Individual Impact	3.346	0.001
Effective Use -> User Satisfaction	2.232	0.026
Information Quality -> Effective Use	3.730	0.000
Information Quality -> Individual Impact	4.847	0.000
Information Quality -> User Satisfaction	4.942	0.000
System Quality -> Effective Use	3.027	0.002
System Quality -> Individual Impact	5.357	0.000
System Quality -> User Satisfaction	5.409	0.000
User Capital -> Effective Use	6.548	0.000
User Capital -> Individual Impact	4.616	0.000
User Capital -> User Satisfaction	3.383	0.001
User Satisfaction -> Individual Impact	7.989	0.000

Subsequent to the analysis of path weights, the R^2 value of the endogenous constructs were examined. It was identified that when controlling for the control variables, 64.4% of the variance of effective use was explained by UC, system quality, and information quality. 73.1% of the variance of user satisfaction was explained by UC, system quality, information quality and effective use. Furthermore 68.8% of individual impact was explained by effective use, UC, and user satisfaction.

Cohen's f^2 effect size of 0.02, 0.15, and 0.35 represent small, medium and large effects respectively (Hair et al., 2014). Based upon these values the effect sizes within the structural model were examined. The relationship between UC and effective use ($f^2 = 0.210$) had a medium effect, and user satisfaction to individual impact ($f^2 = 0.408$) had a large effect. The remainder of the effect sizes were small.

In terms of predictive relevance, Q^2 values of greater than 0 "*suggest that the model has predictive relevance for a certain endogenous construct*" (Hair et al., 2014). All Q^2 values for the endogenous constructs of individual impact (Q^2 = 0.508), effective use (Q^2 = 0.596), and user satisfaction (Q^2 = 0.681) are greater than 0 and therefore indicates that the model exhibits predictive relevance.

The effect size of the predictive relevance (q^2) was then calculated, which examines the effect size of exogenous constructs on endogenous constructs. The q^2 values of 0.02, 0.15, and 0.35 indicate small, medium, or large predictive relevance. Specifically UC has a medium predictive relevance for effective use, and user satisfaction has a medium predictive relevance for individual impact. Furthermore system quality and information quality have a small predictive relevance for effective use; and UC, system quality, information quality, and effective use possess a small predictive relevance for user satisfaction (Table 43).

Table 43: Summary of q^2 effect size

	Effective Use	User Satisfaction	Individual Impact
User Capital	0.193	0.025	0.004
System Quality	0.030	0.094	0.002
Information Quality	0.074	0.082	0.002
Effective Use		0.034	0.014
User Satisfaction	0.005		0.220

To summarize, H1 through to H10 were all supported except for H4, which was only partially supported as it was completely mediated by user satisfaction and effective use.

6.6.3 Examination of the Original Information Systems Success Model

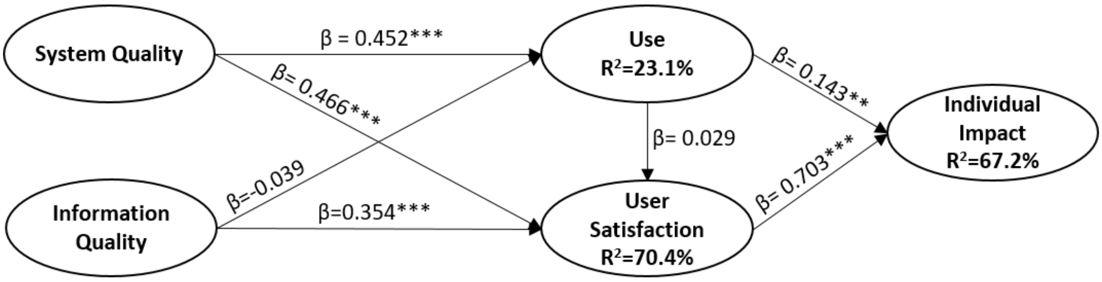
In order to identify whether User Capital (UC) and effective use improves the original understanding of IS Success (i.e. DeLone and McLean (1992)); the original IS Success model excluding organizational impact was analysed. Therefore the model consisted of system quality, information quality, individual impact, user satisfaction, and usage. In addition the following variables were controlled for education, gender, digital native/immigrant, system experience, task ambiguity and task difficulty. The reliability and validity of all elements except for system usage have been verified in the previous sections.

System usage is a reflectively measured construct. Consequently it was examined for indicator reliability, composite reliability, Average Variance Explained (AVE) and discriminant validity. The results present in Table 44 support the reliability and validity of the construct.

Table 44: Reliability and Validity of System Usage

Construct	Items	Indicator Reliability	Composite Reliability	AVE	Discriminant Validity
System Use	SU1	0.914	0.956	0.877	Yes
	SU2	0.963			
	SU3	0.932			

It was identified that when controlling for the aforementioned variables, all relationships were statistically significant ($p \leq 0.001$) except for the relationship between information quality and use, and use and user satisfaction (Figure 51). Furthermore user satisfaction ($\beta = 0.703$) was the strongest determinant of individual impact, followed by use ($\beta = 0.143$). In addition system quality was the strongest determinant of use and user satisfaction ($\beta = 0.452$, $\beta = 466$ respectively). It was also identified that some of the controls had a statistically significant effect. System experience had a positive effect on use and user satisfaction, whereas whether an individual was a digital native/immigrant had a negative effect on use and user satisfaction. It was also found that education had a negative effect on individual impact. 23.1% of the variance of system use, 70.4% of the variance of user satisfaction, and 67.2% of the variance of individual impact was explained. Prior to the addition of the controls, only 14.8%, 67.7%, and 65.7% of the variance in use, user satisfaction and individual impact were respectively explained.



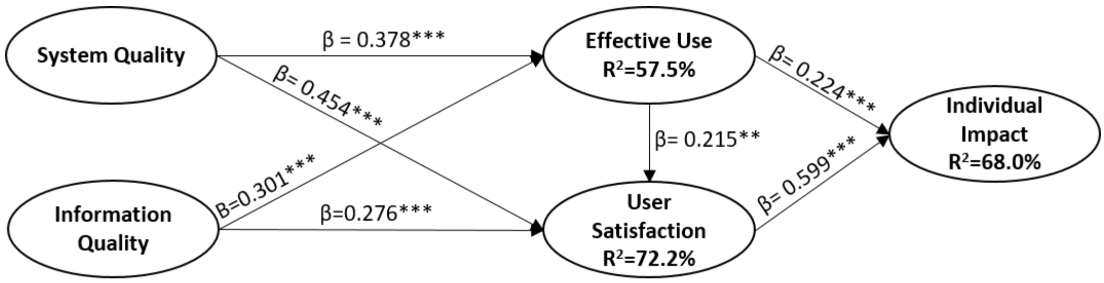
*p < 0.05, **p < 0.01, ***p < 0.001

Controls

	Digital Native / Immigrant	Education	Gender	Task Ambiguity	Task Difficulty	System Experience
System Use	-0.137*	-0.112	-0.031	0.114	0.068	0.217**
Individual Impact	-0.031	-0.105**	-0.040	-0.068	-0.024	0.024
User Satisfaction	-0.122**	-0.074	0.013	-0.06	0.026	0.127**

Figure 51: Path Model of DeLone and McLean (1992) IS Success Model

Subsequent to the analysis of the original IS Success model, system use was replaced with effective use. As identified in Figure 52, all paths were statistically significant ($p \leq 0.001$). User satisfaction ($\beta = 0.599$) was the strongest predictor of individual impact, followed by effective use ($\beta = 0.224$). In addition system quality ($\beta = 0.378$) was the stronger predictor of effective use followed by information quality ($\beta = 0.301$). System quality ($\beta = 0.454$) was also the strongest predictor of user satisfaction, followed by information quality ($\beta = 0.276$), and effective use ($\beta = 0.215$). Furthermore some of the control variables were also statistically significant. Whether an individual was a digital native/immigrant negatively influence user satisfaction; education negatively influenced effective use and individual impact; and experience with the system positively influenced effective use and user satisfaction. In total 68.0% of the variance of individual impact, 57.5% of the variance of effective use, and 72.2% of the variance of user satisfaction was explained.



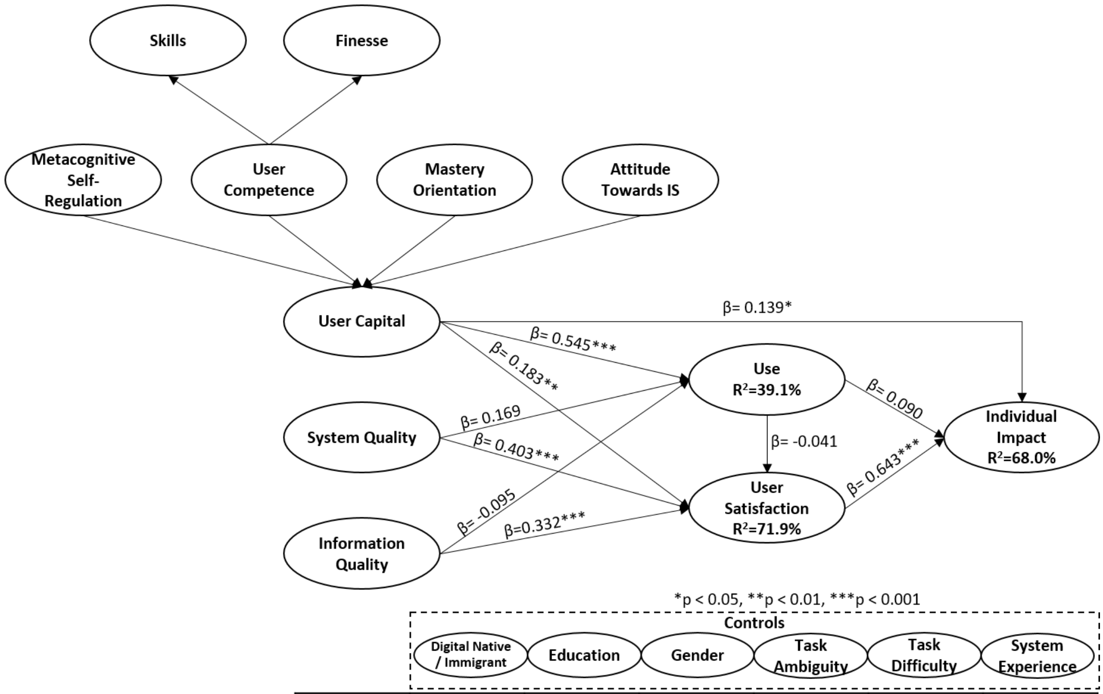
*p < 0.05, **p < 0.01, ***p < 0.001

Controls

	Digital Native / Immigrant	Education	Gender	Task Ambiguity	Task Difficulty	System Experience
Effective Use	-0.016	-0.113*	0.025	-0.046	0.012	0.133**
Individual Impact	-0.057	-0.104**	-0.047	-0.044	-0.011	0.040
User Satisfaction	-0.117**	-0.042	0.001	-0.050	0.015	0.127**

Figure 52: Path Model of DeLone and McLean (1992) IS Success Model with Effective Use

Furthermore the original IS Success model was examined with UC prior to the replacement of system usage with effective use. Most of the relationships were statistically significant except for system quality to use, information quality to use, use to user satisfaction, and use to individual impact. Evidently UC was the strongest predictor of use (β = 0.545). System quality (β = 0.403) was the strongest predictor of user satisfaction, followed by information quality (β = 0.332) and UC (β = 0.183). User satisfaction was the strongest predictor of individual impact (β = 0.643) followed by UC (β = 0.139) and use (0.090). In addition a number of controls were statistically significant: whether an individual was a digital native or immigrant negatively influenced system use and user satisfaction; education level negatively influenced individual impact; task ambiguity positively influenced system use; and experience with the system positively influenced user satisfaction. 39.1% of the variance in use, 71.9% of the variance in user satisfaction and 68% of the variance in individual impact was explained.



	Digital Native / Immigrant	Education	Gender	Task Ambiguity	Task Difficulty	System Experience
System Use	-0.104*	-0.064	--0.057	0.146**	0.041	0.097
Individual Impact	-0.036	-0.103*	-0.048	-0.048	-0.023	0.013
User Satisfaction	-0.121**	-0.065	0.002	-0.041	0.022	0.102*

Figure 53: Path Model of DeLone and McLean (1992) IS Success Model with User Capital

6.7 The Interactions of User Capital, Effective Use, and IS Success

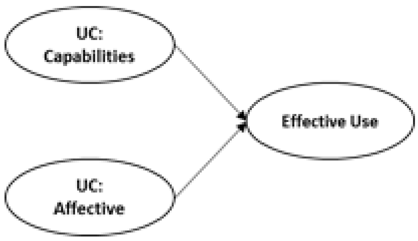
This section provides additional insights into how various components interact to influence effective use and individual impact. For these analyses polynomial regression with response surface analysis (e.g. Atapattu, Sedera, & Ravichandran, 2014; Atapattu, Sedera, Ravichandran, & Grover, 2016) was performed as it "*allows researchers to examine the extent to which combinations of two predictor variables relate to an outcome variable*" (Shanock et al., 2010, p. 543).

6.7.1 User Capital: Capability versus Affective Dimensions

While User Capital (UC) consists of four dimensions, those dimensions can be broadly categorized as capability and affective components. To examine how these components interact and to provide evidence for H12 and H13, polynomial regression with response surface analysis was performed.

The results of the polynomial regression for the interaction between the capability and affective components of UC with effective use are depicted in Table 45. As illustrated in Figure 54, relatively high levels of effective use can be obtained from high levels of capabilities with low levels of the affective components. Conversely, high levels of the affective components and low levels of capabilities, results in low levels of effective use. However, at high levels of affective and only reasonably low levels of capabilities, very high levels of effective use are obtained. This could potentially suggest that some degree of capabilities are required within the IS, however once that minimal degree of capabilities are obtained, users can effectively use the IS due to their determination and attitude. In addition, optimal levels of effective use are only obtained with optimum levels of both capabilities and affective components of UC. This is further substantiated by the positive statistically significant effect of a1 (Table 45). To summarise this provides support for H12a, partial support for H12c, and evidence to reject H12b.

Table 45: Analysis of Capability and Affective Dimensions with Effective Use



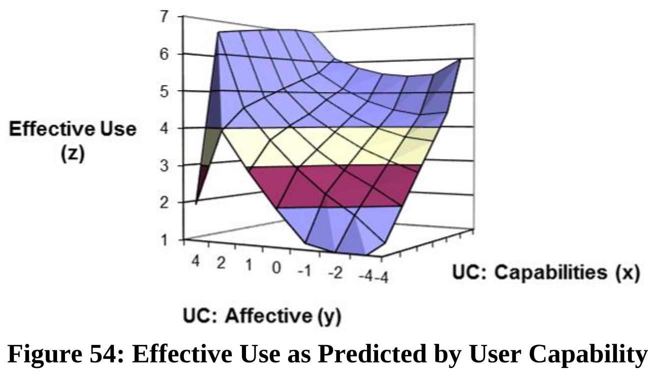
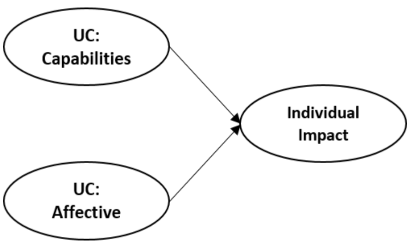


Figure 54: Effective Use as Predicted by User Capability and Affective Dimensions

Effect	Coefficient	Standard Error	Test Stat (t)	*p*-value
a_1: Slope along x = y (as related to Z)	0.96	0.11	8.334	0.000
a_2: Curvature on x = y (as related to Z)	-0.04	0.05	-0.701	0.484
a_3: Slope along x = -y (as related to Z)	-0.05	0.21	-0.231	0.818
a_4: Curvature on x = -y (as related to Z)	0.15	0.15	0.967	0.335

The necessity for both the capability and affective components of UC to be at their optimum level is further evidenced when examining their effect on individual impact (a1: $p < 0.001$) (refer to Figure 55, Table 46). Furthermore at high levels of capability and low levels of the affective components, low levels of individual impact is obtained. Low levels of individual impact are also obtained when capability is low and the affective components are high. Thus supporting H13a, H13b, and H13c.

Table 46: Analysis of Capability and Affective Dimensions with Individual Impact



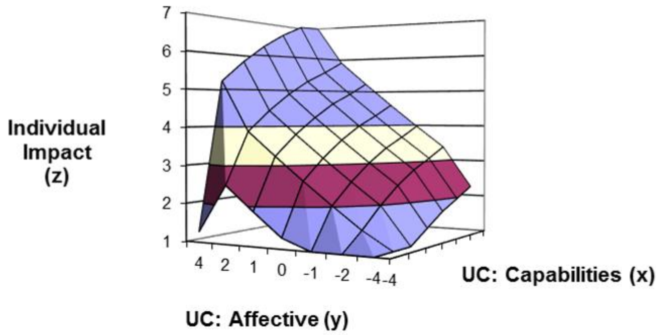


Figure 55: Individual Impact as Predicted by User Capability and Affective Dimensions

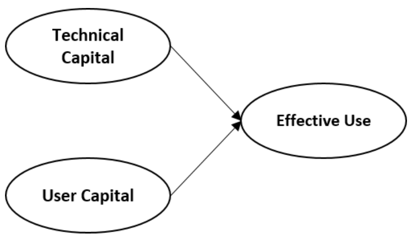
Effect	Coefficient	Standard Error	Test Stat (t)	*p*-value
a_1: Slope along x = y (as related to Z)	1.03	0.15	6.791	0.000
a_2: Curvature on x = y (as related to Z)	-0.03	0.06	-0.420	0.675
a_3: Slope along x = -y (as related to Z)	-0.20	0.27	-0.731	0.466
a_4: Curvature on x = -y (as related to Z)	-0.04	0.20	-0.180	0.857

6.7.2 Interaction between User Capital and Technical Characteristics

In order to analyse how User Capital (UC) and the technical characteristics of the IS interact, polynomial regression with response surface analysis was performed. The technical characteristics, henceforth termed technical capital was calculated by averaging the average values of information quality and system quality. UC and technical capital were then examined as dependent variables for effective use and individual impact in line with hypotheses H14 and H15 respectively.

As evidenced in Figure 56, Table 47, optimum levels of both UC and technical capital are required to achieve optimum levels of effective use (a1: $p < 0.001$). At high levels of UC and low levels of technical capital, only mid-ranged values for effective use are obtained. Yet at high levels of technical capital, and low levels of UC, low levels of effective use are obtained. This suggests that regardless of the technical capabilities of the IS, if the users are not knowledgeable and motivated to use the IS, the use will not be effective. Yet, with users of the optimum quality, the IS will not be effectively used to its potential if the technical capabilities of the IS are lacking. Thus highlighting the necessity to consider both the users and the technology. Therefore providing support for H14a, H14c, and evidence to reject H14b.

Table 47: Analysis of Technical Capital and User Capital with Effective Use



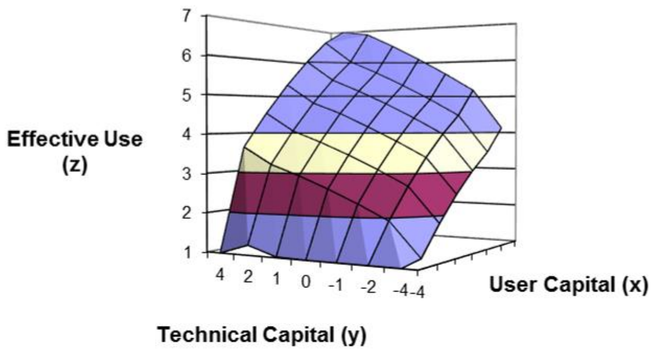
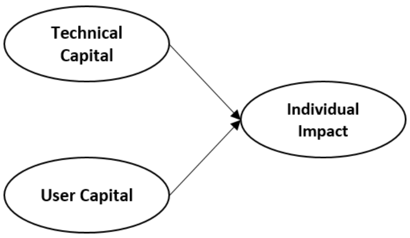


Figure 56: Effective Use as Predicted by User Capital and Technical Capital

Effect	Coefficient	Standard Error	Test Stat (t)	*p*-value
a_1: Slope along x = y (as related to Z)	1.02	0.11	9.178	0.000
a_2: Curvature on x = y (as related to Z)	-0.05	0.06	-0.776	0.439
a_3: Slope along x = -y (as related to Z)	0.31	0.24	1.322	0.188
a_4: Curvature on x = -y (as related to Z)	-0.08	0.12	-0.654	0.514

The analysis of the interaction between technical capital and UC with individual impact are depicted in Figure 57, Table 48. Whilst the relationship between user capital and the components of technical capital on individual were mediated by the presence of effective use and user satisfaction; the total effects were statistically significant. As indicated by the positive and statistically significant effect of a1, as UC and technical capital increase so does individual impact. Therefore providing support for H15a. At high levels of UC and low levels of technical capital relatively high levels of individual impact are obtained. This provides evidence to reject H15b. Similarly at high levels of technical capital and low levels of user capital, overall high levels of individual impact obtained. This is excluding the sharp tail in the diagram as this could be caused by a low number of data points at this extreme value. This provides reasonable evidence to reject H15c.

Table 48: Analysis of Technical Capital and User Capital with Individual Impact



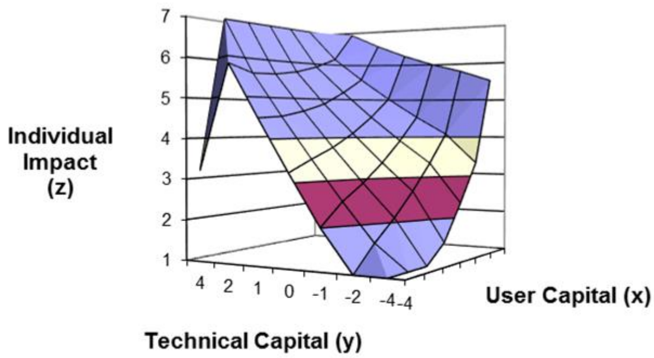


Figure 57: Individual Impact as Predicted by User Capital and Technical Capital

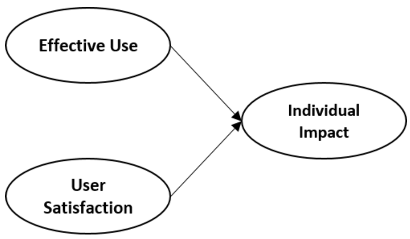
Effect	Coefficient	Standard Error	Test Stat (t)	*p*-value
a_1: Slope along x = y (as related to Z)	1.14	0.13	8.701	0.000
a_2: Curvature on x = y (as related to Z)	-0.06	0.07	-0.773	0.440
a_3: Slope along x = -y (as related to Z)	-0.38	0.29	-1.347	0.179
a_4: Curvature on x = -y (as related to Z)	0.19	0.15	1.275	0.204

6.7.3 Interaction between the Mediators of IS Success

Effective use and user satisfaction mediate the relationship between User Capital (UC), information quality, and system quality with individual impact. To assess how effective use and user satisfaction interact to influence individual impact, polynomial regression was performed with response surface analysis.

The interaction between effective use and user satisfaction is depicted in Figure 58, Table 49. Once again it can be observed that in order to obtain optimum levels of individual impact, optimum levels of both effective use and user satisfaction are required. Therefore as a1 is positive and statistically significant, support is provided for H16a. Furthermore at high levels of user satisfaction and low levels of effective use, low levels of individual impact are obtained. Similarly, at high levels of effective use and low levels of user satisfaction, low levels of individual impact are also obtained. Thus supporting H16b and H16c. However, another interesting finding occurred that wasn't hypothesised for, which was the negative statistically significant value for a4. This value indicates that when effective use and user satisfaction values are not in agreement the value of individual impact reduces as the discrepancy between effective use and user satisfaction becomes larger. This illustrates the need to consider both user satisfaction and effective use.

Table 49: Analysis of Effective Use and User Satisfaction with Individual Impact



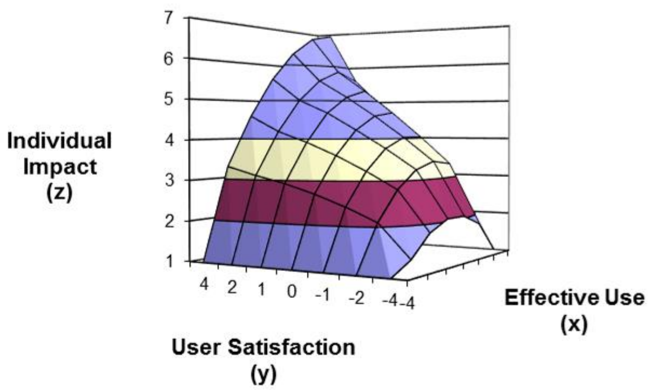


Figure 58: Individual Impact as Predicted by Effective Use and User Satisfaction

Effect	Coefficient	Standard Error	Test Stat (t)	*p*-value
a1: Slope along x = y (as related to Z)	0.94	0.07	13.109	0.000
a2: Curvature on x = y (as related to Z)	-0.06	0.11	-0.579	0.563
a3: Slope along x = -y (as related to Z)	0.06	0.16	0.353	0.724
a4: Curvature on x = -y (as related to Z)	-0.25	0.06	-3.881	0.000

6.8 Summary of Results

In summary, in this section of the thesis a variety of different analytical techniques, including PLS Structural Equation Modelling, Factor Analysis, and Polynomial Regression with Response Surface Analysis were performed with the purpose of statistically examining the hypotheses that were formulated in chapter 4. In total 25 hypotheses were examined, of which 19 were supported, 2 were partially supported and 4 were rejected. Hypothesis 11 was not examined as it was considered to be out of the scope after the pilot study was performed. Table 50 provides an overview of the outcomes of the hypothesis tests.

Table 50: Summary of Hypothesis Testing

Hypothesis	Relationship	Statistical Significance
H1	*User capital positively impacts effective use*	Supported
H2	*User capital positively influences user satisfaction*	Supported
H3	*User capital positively influences individual impact*	Partially Supported*
H4	*System quality positively influences effective use*	Supported
H5	*System quality positively influences user satisfaction*	Supported
H6	*Information quality positively influences effective use*	Supported
H7	*Information quality positively influences user satisfaction*	Supported
H8	*Effective use positively influences user satisfaction*	Supported
H9	*Effective use positively influences individual impact*	Supported
H10	*User satisfaction positively influences individual impact*	Supported
H11	*Individual impact positively influences organizational impact*	N/A
H12a	*The higher (lower) the levels of the capabilities and affective components of User Capital, the higher (lower) the level of effective use.*	Supported
H12b	*High levels of capabilities coupled with low levels of the affective components of User Capital, will result in low levels of effective use.*	Rejected
H12c	*Low levels of capabilities coupled with high levels of the affective components of User Capital, will result in high levels of effective use.*	Partially Supported**
H13a	*The higher (lower) the levels of the capabilities and affective components of User Capital, the higher (lower) the level of individual impact.*	Supported
H13b	*High levels of capabilities coupled with low levels of the affective components of User Capital, will result in low levels of individual impact.*	Supported

H13c	*Low levels of capabilities coupled with high levels of the affective components of User Capital, will result in low levels of individual impact.*	Supported
H14a	*The higher (lower) the levels of user capital and technical capital, the higher (lower) the level of effective use.*	Supported
H14b	*High levels of user capital coupled with low levels of technical capital, will result in low levels of effective use.*	Rejected
H14c	*Low levels of user capital coupled with high levels of technical capital, will result in low levels of effective use*	Supported
H15a	*The higher (lower) the levels of user capital and technical capital, the higher (lower) the level of individual impact.*	Supported
H15b	*High levels of user capital coupled with low levels of technical capital, will result in low levels of individual impact*	Rejected
H15c	*Low levels of user capital coupled with high levels of technical capital, will result in low levels of individual impact.*	Rejected
H16a	*The higher (lower) the levels of effective use and user satisfaction, the higher (lower) the level of individual impact.*	Supported
H16b	*High levels of effective use coupled with low levels of user satisfaction, will result in low levels of individual impact*	Supported
H16c	*Low levels of effective use coupled with high levels of user satisfaction, will result in low levels of individual impact.*	Supported

* The direct relationship between UC and individual impact was completely mediated by the presence of user satisfaction and effective use. However the total effects illustrated a statistically significant path.

**Once the minimal degree of capabilities are obtained, users can effectively use the IS.

Chapter 7: Discussion

As articulated in the introductory chapter, the objectives of this research were three-fold, which were: Firstly, to conceptualize a measurement model indicative of User Capital (UC); Secondly, to empirically examine UC in a nomological network with effective use; Thirdly, to examine UC, effective use and Information Systems (IS) Success in a mandatory IS setting.

The review of the literature (Chapter 2) identified that these objectives were clear gaps in the literature that warranted further exploration. Subsequently, in Chapter 3, the notion of UC was conceptualized by drawing on literature pertinent to human capital and attitude-behaviour. Structural models were then created (Chapter 4), which hypothesized relationships between UC, effective use and IS Success. To statistically assess the measurement and structural models, a survey was created (Chapter 5), the results of which were presented in Chapter 6. This chapter seeks to further discuss the research findings.

In doing so, this section will discuss the results relating to the aforementioned three objectives. In addition, the results will also be linked to a literature base pertinent to mandatory and contemporary settings. Table 51 highlights the objectives of each topic in this chapter.

Table 51: Objectives of the Themes Present within the Discussion Chapter

Theme	Objective
7.1 Discussion: User Capital	▪ Explain the applicability of UC in the contemporary enterprise system environment. ▪ Discuss the multidimensional nature of UC ▪ Explain how UC can be enhanced.
7.2 Discussion: User Capital and Effective Use	▪ Describe the influence of UC on effective use. ▪ Describe how technical and user factors

	influence effective use
7.3 Discussion: User Capital, Effective Use and IS Success	▪ Illustrate how this research resolves some of the limitations apparent in the original IS Success model. ▪ Discuss the necessity of effective use as a dimension of IS Success as opposed to simple use measures.
7.4 Discussion:	▪ Discuss how this research informs theory pertaining to mandatory use settings. ▪ Outline how the findings from this research are applicable to the Digital Age ▪ Provide insights into how UC can be enhanced

7.1 Discussion: User Capital

This research was grounded in multidisciplinary theoretical foundations central to the notion of individual performance, including: human capital, attitude behaviour, and the theory of performance. The result of which was the formulation of the user capital (UC) construct. UC was defined as *the attributes possessed by an individual which enables them to use an IS to perform tasks.* It was conceptualized as a multidimensional construct consisting of the cognitive characteristics, skills, motivation, and affective attitude possessed by IS users and was specifically operationalised using metacognitive self-regulation, user competence, mastery motivational disposition, and attitude towards using IS. Specifically UC was formed by metacognitive self-regulation, user competence, mastery motivational disposition, and attitude towards use IS. All of which were statistically significant dimensions of UC ($p < 0.001$). The definition of UC clearly highlights two critical areas: (i) the need to use a multidimensional approach to understand the nuances in user behaviour; and (i) the necessity to consider the context of the user. Consequently, these two key areas will be discussed in the following section.

7.1.1 User Capital: A Multidimensional Approach

In accordance with Wright et al. (2012) constructs can be conceptualized as either unidimensional or multidimensional. Whilst opponents of multidimensional constructs are evident throughout literature, several scholars have provided useful frameworks and tutorials for the analysis of multidimensional constructs (e.g. Polites et al., 2012; Wright et al., 2012). It is critical to carefully conceptualize the dimensionality of constructs as the analytical results can vary depending on the operationalization used (Polites et al., 2012).

It is widely acknowledge that "*if a complex concept is the focus of the study, it is generally best to create a measurement model with all the critical conceptual distinctions, because it is important to thoroughly test and evaluate the construct. However, when such a construct is not central to the research or part of a complex system of relationships being investigated, then it is generally acceptable to substitute a simple first-order construct or a second order-construct with only a single measure per dimension*" (Wright et al., 2012, p. 370). Therefore, in this research UC was operationalised as a multidimensional construct as it is (i) central to this research; and (ii) represents a complex phenomenon. Specifically UC was operationalised as an aggregate multidimensional construct which consisted of metacognitive self-regulation, user competence, mastery motivational disposition, and attitude towards IS. This aggregate nature means that "*each dimension contributes separately to the meaning of the construct but may be weighted differently*" (Wright et al., 2012).

This multidimensional treatment recognized that Information Systems (IS) users could be highly knowledgeable and skilled, however they could lack the required motivation and attitude to perform their job tasks within the IS and vice versa. Furthermore human capital literature states that motivation is the bridge between knowledge and skills and performance (Wright & McMahan, 2011). In addition this is further substantiated by the theory of performance, in which the combination of knowledge, skills and motivation are a determinant of performance (Campbell et al., 1992).

The statistical analysis of the UC construct revealed that metacognitive self-regulation, user competence, mastery motivational disposition and attitude towards

IS were all statistically significant dimensions of UC ($p < 0.001$). To provide further evidence to support the operationalization of UC, the theoretical concept of motivational disposition was further examined. There are generally considered to be three different types of motivational disposition: mastery, performance, and avoidance (Vandewalle, 1997). It was evidenced that mastery motivational disposition was a positive statistically significant dimension of UC, however it was expected that avoidance and performance motivational dispositions would behave differently. Performance motivational disposition is an individual's "*desire to prove one's competence and to gain favourable judgements about it" (Vandewalle, 1997, p. 1000).* Whereas avoidance motivational disposition is an individual's "*desire to avoid the disproving of one's competence and to avoid negative judgments about it"* (Vandewalle, 1997, p. 1000).

Based on the characteristics inherent within performance and avoidance dispositions, it was anticipated that avoidance would be a negative statistically significant dimension of UC and performance would be a positive yet non-significant dimension of UC. The results from the statistically analysis, highlighted that although avoidance motivational disposition was a negative dimension of UC, it was also non-significant. However, some studies pertaining to motivational disposition have also reported similar findings (Porath et al., 2011). In addition, performance was a non-significant positive dimension. This provides initial evidence towards the validity of UC.

Whilst UC was conceptualized as a multidimensional aggregate construct, a cluster analysis was also performed to identify if different user profiles exist. The solution obtained three different clusters, which indicated that there were indeed users who were optimal, intermediate, and sub-optimal. Each user profile reported different levels of usage, individual impact and user satisfaction. However, when assessed in the structural equation model in SmartPLS the relationships did not differ. Consequently it was determined that the aggregate combination of the dimensions within UC was the most appropriate solution.

As UC is an aggregate multidimensional construct it must be validated in a nomological network (Cenfetelli & Bassellier, 2009), therefore UC was also assessed in the context of effective use (*refer to 7.2 Discussion: User Capital and* Effective Use).

7.1.2 User Capital: Contemporary Enterprise Systems Environment

In order to determine the relevancy of the User Capital (UC) construct, the changing organizational environment and its influence on the demarcations between user groups need to be considered.

As discussed in the literature review, there were generally considered to be three distinct types of Information Systems (IS) users within organizations: operational, managerial, and strategic. Operational users are the individuals within the organization who routinely generate and input data into the IS (Murphy, 2014). Alternatively strategic users make decisions based upon the output from the IS (Gorry & Morton, 1989). Whereas management users act as a bridge between the strategic and operational level and are responsible for the analysis and dissemination of data (Murphy, 2014). These demarcations, largely lie in the principles of Fordism as grounded in Anthony's (1988)

However, due to globalization, technology advancements, and increased competition; organizations can no longer remain competitive if they continue to rely on labour structures, policies and procedures underpinned by the principles of Fordism typically associated with mass production, low skilled labour, and rigid bureaucratic structures (Belanger et al., 2013). Evidently several changes are occurring in organizations, which ultimately blur the demarcations between the aforementioned user groups. These changes include: (i) the nature of tasks being executed (Chaykowski & Gunderson, 2013); and (ii) an operational employee’s level of autonomy and decision making capacity (Kashefi, 2011). Previously operational users were considered to be low skilled (Kashefi, 2011), and completed highly fragmented, routinized tasks (Belanger et al., 2013; Berry & Mok, 2014) under tight supervision (Kashefi, 2011). However due to hyper competition organizations are placing increased pressures on their operational employees to perform greater responsibilities. Specifically operational users a now required to work autonomously (Kashefi, 2011), on multiple tasks (Chaykowski & Gunderson, 2013), with reduced supervision (Belanger et al., 2013), and make increasingly difficult decisions (Belanger et al., 2013; Chaykowski & Gunderson, 2013).

Examining the demographics of this study’s respondents coupled with the preliminary interviews that were conducted prior to the distribution of the survey, provided evidence to suggest this blurring of operational and managerial users are occurring in practice. The managerial employees who usually were responsible for the dissemination of reports to the strategic level, now also performed a vast array of data entry operations. The operational users that were largely responsible for data entry for a specific fragmented tasks now on average approximately five different tasks within the enterprise system, whereas operational employees performed six. This shows that it may no longer be appropriate for an operational user to have a narrow skill set as they need to have diverse skills across a number of tasks. In addition a quarter of operational employees were also provided with the additional responsibility of performing approvals. It was also evident that some strategic users also used the enterprise system in an operational capacity to perform procurement related activities. Therefore in this study's context; operational, managerial, and strategic level individuals all used the enterprise system in an operational capacity. Hence it is important to consider operational use in terms of data entry operations, rather than operational users.

Recognizing the context that IS users are embedded in, this research conceptualised UC in the context of operational use within enterprise systems. Furthermore UC was also conceptualized by drawing on recent literature that attests and provides evidence that even in mandatory use settings, users have agency in the actions they perform (Strong & Volkoff, 2010). Consequently UC was operationalized as a multidimensional construct consisting of metacognitive self-regulation, user competence, mastery motivational disposition, and attitude towards using IS. Table 52 highlights the applicability of UC in the contemporary enterprise systems landscape.

The ubiquitous nature of technology, has not only impacted organizations structures and procedures, it has also impacted individuals. Individuals are now more technologically savvy (Koffer et al., 2014) and more cognizant of different technologies than ever before (Ortbach et al., 2013). Individuals are less hesitant and fearful of digital technologies and they readily strive to leverage their potential capabilities (Ortbach et al., 2013). As a results a growing number of technological innovations are being driven by users in a bottom up fashion (Niehaves et al., 2013).

Table 52: Applicability of User Capital Dimensions

Construct	Definition	Applicability to Context
Metacognitive self-regulation	An individual's knowledge of their skills coupled with their ability to monitor and modify their cognitions (Bartels & Magun-Jackson, 2009; Slife & Weaver, 1992).	• In order to effectively problem solve, which is becoming an essential skill for operational employees (Belanger et al., 2013), individuals need to possess effective metacognitive self-regulation strategies (Slife & Weaver, 1992) • Individuals are now required to perform multiple tasks (Chaykowski & Gunderson, 2013), if an individual lacks metacognitive self-regulation strategies they will be limited in their ability to execute the task, regardless of their knowledge and skills (Kraiger et al., 1993) • Individuals are now facing increasingly complex tasks due to globalisation; self-regulation is critical to transforming routinely applied skills into complex skills that can be applied to new and different problems (Bell & Kozlowski, 2008).
User Competence	***Finesse***: an individual's ability to creatively apply skills to solve a range of non-routine business problems (Munro et al., 1997). ***Skills (depth)***: the extent to which an individual has deep domain specific insights and skills (Munro et al., 1997).	• In today's environment, organizations place increasing pressure on all levels of their employees to solve problems (Belanger et al., 2013), which user competence finesse effectively captures (Munro et al., 1997). • No longer can operational employees be low skilled (Kashefi, 2011); user competence depth captures the skills that operational users possess with technology (Munro et al., 1997) • Organizations require high performing employees so that they can remain competitive (Dobre, 2013), performance is reliant on user competence (Shih, 2006).
Mastery Motivational Disposition	An individual's "*desire to develop the self by acquiring new skills, mastering new situations, and improving one's*	• Individuals with a mastery motivational disposition are self-motivated to perform the required tasks (Dweck & Leggett, 1988), which is imperative in autonomous environments.

	competence" (Vandewalle, 1997, p. 1000)	• Individuals with a mastery motivational disposition thrive in the workplace, "*which is particularly important in today's work environment*" (Porath et al., 2011, p. 250). • Individuals who use ES in an operational capacity now face more difficult tasks, therefore it is important that they can persevere, which is a key characteristic of motivational disposition (Fisher & Ford, 1998).
Attitude towards IS	Attitude is defined as "*the worth or value attached to a targeted object, phenomenon, or behaviour"* (Wilson et al., 2009, p. 225).	• Recognizing the agency of users in an ES setting (e.g. Strong & Volkoff, 2010), coupled with reduced supervision in contemporary organizational settings (Belanger et al., 2013); it is imperative that users have a positive attitude towards using the ES as attitude is a key determinant of behaviour (Kraiger et al., 1993). • In order for organizations to survive in today's hypercompetitive marketplace, organizations require high performing employees (Dobre, 2013). Therefore it is imperative that users have a positive attitude towards using the ES, as attitude towards an object or behaviour is found to consistently be positively related to performance (Riketta, 2008).

7.2 Discussion: User Capital and Effective Use

As User Capital (UC) is a multidimensional formative construct it must be assessed for nomological validity (Cenfetelli & Bassellier, 2009). In this research, the nomological network of the Social Cognitive Theory (Bandura, 1986) was used. Social Cognitive Theory specifies that an individual's behaviour shapes and is shaped by personal cognitive factors and environmental stimuli (Bandura, 1986). An individual's UC is a personal cognitive factor, effective use represented a behaviour, and environmental stimuli was considered outside the scope of this research. However, task difficulty and task ambiguity, which are indicative of environmental factors, were controlled for.

Statistical evidence illustrated that UC explained 49.20% of the variance in effective use. Therefore nomological validity was established for UC. In addition, information quality and system quality were examined in conjunction with UC as antecedents of EU. The results of which indicated that 64.4% of the variance in effective use was explained by information quality, system quality, and user capital. Evidence was also provided into examining how technical capital (e.g. system quality and information quality) interacts with UC to predict effective use. It was determined that at low levels of UC and high levels of technical capital, the effective use of the system was still low. Conversely at high levels of UC and low levels of technical capital, medium levels of effective use were obtained. Furthermore it highlighted that both high level of user capital and high levels of technical capital are required to obtain optimal levels of effective use. Thus highlighting the pertinence of examining both the technical characteristics of the IS and the users.

To identify how these findings compared to prior research, the body of literature pertaining to effective use is examined. The pertinence of effectively using an Information System (IS) in itself is not a new concept to the discipline. However, literature and measurement of effective use is still in its nascent stage, with the seminal work of Burton-Jones and Grange (2013), in which effective use was conceptualized, only recently published. When conceptualizing effective use, Burton-Jones and Grange (2013) also provided preliminary measurement items for effective use in various IS settings. Prior to this conceptualization, the quantitative assessment of use in technology adoption literature typically encompassed simple use measures (e.g. frequency, extent, duration, intention) (Weeger et al., 2014). Yet, these simple measures lack relevance in enterprise systems settings (Weber et al., 2015). However, qualitative literature has made steps into providing a more nuanced understanding of the behaviours of use (e.g. Jones & Karsten, 2008). Arguably the most prominent qualitative view is Adaptive Structuration Theory which highlights that IS "*provide social structures that can be described in terms of their features and spirit. To the extent that [IS] vary in their spirit and structural features set, different forms of social interaction are encourage by the technology*" (DeSanctis & Poole, 1994). Adaptive Structuration Theory also asserts that benefits result from the IS being used in a manner that is faithful to the spirit of the technology (DeSanctis & Poole, 1994). Regardless, use in itself is not sufficient to drive benefits (Seddon, 1997), the use must be effective (Burton-Jones & Grange, 2013; Trieu, 2013).

Since the seminal work of Burton-Jones and Grange (2013) was published, it has been cited 103 times (according to Google Scholar). Examination of these 103 publications, identified that no quantitative assessment of effective use has been performed. Notable conceptual models have been presented. For example Anand, Sharma, and Kohli (2013) hypothesised that IS training influences the effective use of IS, which in turn results in value creating actions. Kretzer, Nadj, and Madche (2015) proposed a conceptual model that examines representational fidelity and informed action components of effective use as an extension to the elaboration likelihood model. Trieu (2013) conceptualised a model which proposed how system learning and enterprise architecture maturity influences the three components of effective use. However they were lacking empirical assessments. Other scholars have provided qualitative insights. For instance Weeger et al. (2014) identified that misfits between organizational requirements and the characteristics of Health IS inhibit effective use. Similarly in a health IS context, Weber et al. (2015) identified that misalignment between the IS, the tasks and the users, disrupt effective use. Haake, Mueller, Maedche, and Lauterbach (2015) provided preliminary insights into the relationship between adaptive system use and effective use.

Overall, there were no articles that have quantitatively assessed the Burton-Jones and Grange (2013) conceptualization of effective use. In addition the studies that provided qualitative insights were still largely in their preliminary phases. Therefore this study represents the first quantitative examination of effective use. The empirical analysis identified that UC is a key determinant of effective use explaining 49.20% of the variance of its variance.

7.3 Discussion: User Capital, Effective Use and IS Success

Information Systems (IS) success has been a key paradigm in the IS discipline promising to be both rigorous and relevant in its application (Rosemann & Vessey, 2008). In this research the DeLone and McLean (1992) IS success model was examined (refer to Chapter *4.3.1: Rationale for DeLone and McLean IS Success*

Perspective). The DeLone and McLean (1992) IS Success model is arguably the most prevalent and impactful conceptualization of IS success and consists of six constructs: system quality, information quality, system use, user satisfaction, individual impact, and organizational impact.

This research extended and improved upon the variance perspective of the DeLone and McLean (1992) IS success model by incorporating UC and operationalising use as effective use. The statistical analysis in Chapter 6 identified that UC was a key dimension of IS success and effective use was a more appropriate operationalisation of use. In addition a more nuanced understanding of the relationships inherent within IS success was provided through understanding how different combination of variables interact to influence effective use and individual impact.

In examining the variance perspective of IS Success, use was operationalised as both extent of use and effective use, so comparisons to past literature could be performed. As evident in Figure 51 (p. 200), when examining IS Success when use is operationalised as extent of use all hypothesised relationships were statistically significant, except for the relationship between information quality and use, and use to user satisfaction. The statistically significant relationships were in agreement with meta-analysis of IS Success performed by Petter et al. (2008). Furthermore, the nonsignificant relationship between information quality and extent of use is not outside the norm, with Petter et al. (2008) highlighting that only 50% of studies that examined this relationship found a statistically significant positive result. This nonsignificant relationship is further supported by Iivari (2005) in a mandatory use setting. The relationship between use and user satisfaction, has not been widely performed, however Petter et al. (2008) identified that this relationship has received moderate support. Yet Iivari (2005), in a mandatory use setting also identified that the relationship between use and user satisfaction, was insignificant at $p < 0.05$. Therefore the findings of the original IS Success model was largely consistent with prior research on IS Success in mandatory use studies. In this research 67.2% of the variance in individual impact was examined, whereas Iivari (2005) reported 35%, and Lin et al. (2006) reported 69%.

However, when examining the IS Success model with use operationalised as effective use, all relationships were statistically significant, and the variance explained increased to 68%. The results of the hypothesis testing ultimately provides further support to the variance perspective of IS Success, and highlights the need to consider effective use rather than extent of use.

It was identified that high levels of effective use could only be obtained if both the technical capital, as measured by system quality and information quality, and UC were both high. Therefore continuous investments into improving the technical aspects of the IS, will not result in optimal levels of effective use, unless the UC is also high. Furthermore the users also needed to possess high levels of both the affective and capability components of UC for optimal levels of effective use to be obtained.

Another interesting result obtained was that the direct relationship between UC and individual impact was completely mediated by effective use and user satisfaction. Whilst examination of direct effects indicated that UC did influence individual impact, it was actually completely mediated by the presence of both effective use and user satisfaction. This is contrary to the initial hypothesis. A potential explanation lies in the individual impact construct being indicative of how the IS impacts the individual's performance, as opposed to solely being a standalone measure of an individual's performance. Petter et al. (2013) when examining studies that investigated how various unidimensional user characteristics influenced individual impact, identified that a majority of studies reported a nonsignificant relationship. To further understand the critical role of the mediators of effective use and user satisfaction, polynomial regression with response surface analysis was performed. The results recognised that regardless of an individual's level of user satisfaction, benefits will not be obtained if effective use is low.

The applicability and relevancy of these findings greatly improves the current understanding of IS Success and minimises many of the cited ambiguities present in the model (Gable et al., 2008; Rai et al., 2002; Sabherwal et al., 2006; Seddon, 1997; Sedera et al., 2013). These improvements are particularly evident when examined in conjunction with Mohr's (1982) framework of the impediments to theory (refer to Figure 59). As observed in Figure 59, interaction and inconsistency in a theory leads to instability, which hinders cumulativeness. Interaction is *"the greatest single problem facing social theory"* (Mohr, 1982, p. 15) and largely stems from model incompleteness. In accordance with Mohr (1982, p. 9), inconsistency pertains to *"a certain vagueness or confusion about the theoretical question actually being addressed, so that at times what may seem like the same question or phenomenon is in reality a different one."* Inconsistency stems from the rendering of dependent variables, unclear labelling tides, and the lack of distinction between process and variance perspectives (Mohr, 1982).

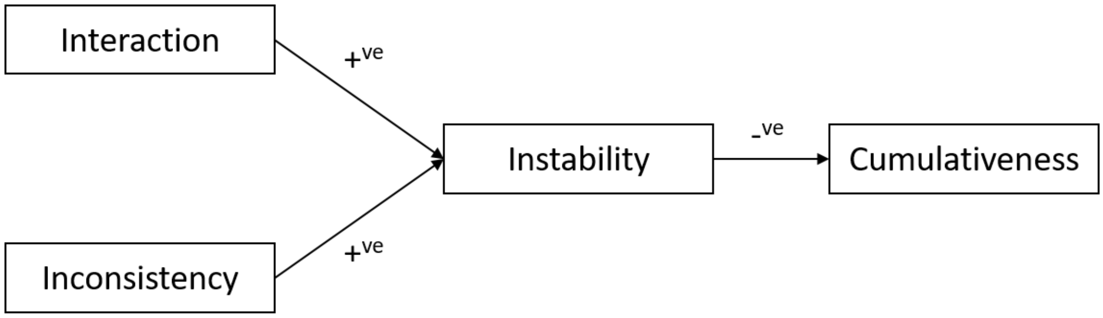


Figure 59: Mohr (1982, p. 9) framework of the impediments to theory

7.3.1 IS Success: Inconsistency in Model Interpretation.

Inconsistency in model interpretation is arguably the most cited criticism of the DeLone and McLean (1992) IS Success model, in terms of its labelling tides and process and variance perspective. The results section illustrated the appropriateness of the variance perspective as evidenced by the statistically significant hypothesised relationships. Therefore this section pertains largely to resolving issues with labelling tides.

The issue with labelling tides centres around broadly defining variables, where a common label is used, which provides only a vague impression of the construct (Mohr, 1982). As previously discussed, Seddon (1997) highlighted three possible ways that use could be understood within the IS Success model, which illustrates a labelling issues surrounding the use construct. DeLone and McLean (2003, p. 16) also acknowledge the issue stating "*the problem to date has been a too simplistic definition of this complex variable"*. Furthermore use in the IS Success model was typically measured with extent of use measures such as frequency and duration (DeLone & McLean, 2003). However extent of use may not be sufficient for benefit attainment (Seddon, 1997) and the effectiveness of that use should be considered (Burton-Jones & Grange, 2013).

In this thesis the DeLone and McLean (1992) IS Success model was investigated using both extent of use and effective use. When extent of use was used, system quality and information quality explained 23.1% of the variance in extent of use. However it was also identified that the relationship between information quality and use was insignificant. However when use was replaced with effective use, all relationships in the IS Success model became statistically significant. Furthermore, system quality and information quality explained 57.5% of the variance in effective use. Therefore effective use provides greater support for the DeLone and McLean (1992) IS Success model in terms of understanding the causal relationships in the structural model.

Whether extent of use or effective use is considered, it was clear that individual impact was largely explained by user satisfaction with use and effective use, with 67.2% and 68% of the variance explained in individual impact respectively. However, according to the structural equation model, the path weights between user satisfaction and individual impact was stronger than between extent of use and individual impact and effective use and individual impact. When use was operationalised as extent of use, the path weight between extent of use and individual impact and user satisfaction and individual impact was 0.143 and 0.703 respectively. Whereas effective use to individual impact and user satisfaction to individual impact was 0.224 and 0.599 respectively. To understand how the combination of both user satisfaction and the different operationalisations of use interacted to predict individual impact, polynomial regression with response surface analysis was performed.

As apparent in Figure 60 and Figure 61 the response surfaces of effective use and extent of use are fundamentally different. While high levels of extent of use and effective use and high levels of user satisfaction are required for high levels of individual impact (extent of use a1: $P<0.001$; effective use a1: $P < 0.001$); the influence of user satisfaction on individual impact with extent of use and effective use radically differs. At high levels of user satisfaction, very high levels of individual impact can be obtained even at low levels of extent of use. Albeit not at the lowest levels of extent of use, as IS must be used for benefits to be obtained (Orlikowski, 2000; Weeger et al., 2014). However at high levels of user satisfaction and low levels of effective use very low levels of individual impact is obtained. This highlights the pertinence of effective use. In addition at high levels of effective use with low levels of user satisfaction, low levels of individual impact are obtained. It is also apparent that individual impact decreases when user satisfaction is less than extent of use (extent of use a3: $p < 0.001$). Which highlights the importance of user satisfaction over extent of use. Yet when there is a discrepancy between effective use and user satisfaction regardless of which one is greater, individual impact also decreases (effective use a4: $p < 0.001$)

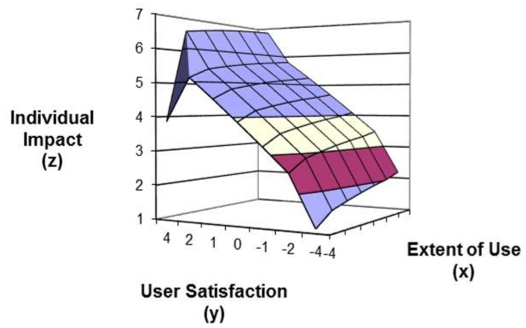


Figure 60: Individual Impact as Predicted by Extent of Use and User Satisfaction

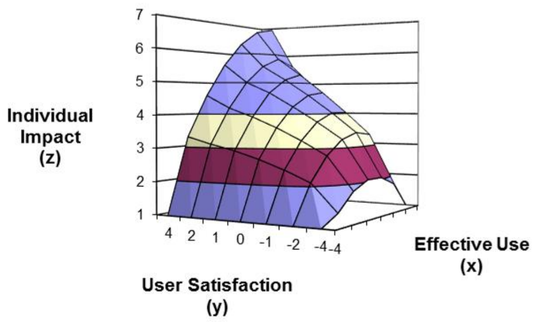


Figure 61: Individual Impact as predicted by Effective Use and User Satisfaction

Based on the analyses that have been performed, effective use is determined to be the most appropriate operationalization of use in the context of IS Success. In addition the results clearly illustrate the importance of labelling constructs in a specific manner rather than a broad definition, as vastly different outcomes can be obtained.

7.3.2 IS Success: Interaction

Interaction largely leads to the instability in the interpretation of the DeLone and McLean (1992) IS Success model, due to model incompleteness. In accordance with Mohr (1982, p. 19) model incompleteness occurs "*when the interacting variables are not juxtaposed, not examined in conjunction with one another, generally because one or more of the interactive variables is omitted entirely from the research or model.*" Therefore, incompleteness can stem from scholars only empirically examining a portion of the model, or if a key variable is omitted in its conceptualization. This research argues that User Capital (UC) is a key variable that is absent in IS Success and should be considered. Supporting assertions can be seen throughout the literature, for example: Burton-Jones and Grange (2013, p. 641) highlighted that user characteristics can influence the effective use of the IS and resultant benefits emphasising that "*users can take several actions to improve their performance; they are not limited to improving it only through the effective use of the system*". Furthermore Weber et al. (2015, p. 3) articulates that "*the performance gains provided by an IS is contingent upon activities of users in post-adoption phases".*

In this research UC was analysed in the IS Success model when use was operationalised as extent of use and effective use. The presence of UC increased the variance explained in extent of use from 23.1% to 39.1% and effective use from 57.5% to 64.4%. In both cases the variance in individual impact also increased by

0.8%. Whilst this is only a marginal improvement to individual impact, greater insights are presented into the causal relationships present in the model.

UC was originally hypothesized in Chapter 4 to directly influence individual impact. Whilst examination of direct effects indicated that UC did influence individual impact, it was actually completely mediated by the presence of both effective use and user satisfaction. This is contrary to the initial hypothesis. A potential explanation lies in the individual impact construct being indicative of how the IS impacts the individual's performance, as opposed to solely being a standalone measure of an individual's performance. Petter et al. (2013) when examining studies that investigated how various unidimensional user characteristics influenced individual impact, identified that a majority of studies reported a nonsignificant relationship.

Recognizing that effective use is the most appropriate operationalisation of use in an enterprise systems setting, the interaction between system characteristics and UC was examined using polynomial regression with response surface analysis. The results of which (refer to Figure 56, p. 205) indicated that even when the highest level of system characteristics is perceived by the users, the IS will not be effectively used unless UC is high. Also only medium levels of effective use are obtained if UC is high and system characteristics are low. Therefore it is imperative to consider both the system characteristics and UC in the context of IS Success. This finding also provides support to Brynjolfsson and McAfee (2012) who highlights that human capital is pertinent to getting the most out of technology.

7.3.3 IS Success, Effective Use and User Capital: A Variance Theory Perspective

As previously highlighted this research examined the IS Success model from a variance perspective lens and extended it to incorporate User Capital (UC) and effective use. In order to identify its applicability as a variance theory, the adapted model was examined in conjunction with Dubin's (1978) components of theory building, which explicates the key features of a variance based theoretical model. In accordance with Dubin (1978, pp. 7-8) the seven components are: (i) Units, which are the constructs that form the model; (ii) Relationships, which are the laws of interaction among the units; (iii) Boundary conditions to which the model holds true; (iv) System states are the areas within the boundary conditions that differ to the rest of the model; (v) Propositions, which are the truth statements of the model; (vi) empirical indicators, which are the measures for determining the value of a unit; (vii) Testable hypotheses in which the proposition is broken into a series of testable statements. Table 53 outlines how the original and extended IS Success models map onto Dubin's (1978) components of theory building.

Table 53: Applicability of the IS Success Model based on Dubin's (1978) components of theory

Dubin's (1978) Components of Theory	IS Success Model
(i) Units <u>*Major variation:*</u> *added and changed a construct*	**Original IS Success Model:** system quality, information quality, use, user satisfaction, individual impact, and organizational impact (DeLone & McLean, 1992). **Extended IS Success Model:** user capital, system quality, information quality, effective use, user satisfaction, individual impact, and organizational impact
(ii) Relationships <u>*Major variation:*</u> *disregarded the sequential relationship*	There are three main types of laws of interactions (relationships) that can be present in a theoretical model: Categoric, Sequential and Determinant interactions. Categoric: "*values of one unit is associated with values of another unit"* (Dubin, 1978, p. 98); Sequential "*employs a time dimension*" (Dubin, 1978, p. 101); Determinant

	"*associates determinant values of one unit with determinant values of another unit*" (Dubin, 1978, p. 106). **Original IS Success Model:** Incorporated Determinant and sequential laws of interaction. A key example of a determinant law would be system quality is positively related to user satisfaction. An example of the sequential law is that system quality and information quality dimensions precede use and user satisfaction, which in turn precedes impacts. **Extended IS Success Model:** Only incorporates determinant laws of interactions between the units.
(iii) Boundary Conditions *No variation:* *boundary conditions remained the same*	The boundary condition of the **original IS Success model** is the evaluation of IS in the post-implementation phase of the IS lifecycle (Sedera et al., 2013). Even though the **extended IS Success Model** in this instance pertained to enterprise systems, it is expected that it will operate in the same boundary conditions as the original IS Success model and will not be constrained solely to enterprise systems.
(iv) System States *No variation:* *system states remained the same*	In the social science discipline it is common for there to be only one system state present in a theoretical model. This is the case for the **original IS Success model** as it is reportedly inconsequential whether the IS is for mandatory of voluntary use (DeLone & McLean, 2003). It is anticipated that the same system state will be present for the **extended IS Success model.**
(v) Propositions *Major variation:* *existing propositions changed and two propositions added*	**Original IS Success Model**: Consisted of two propositions: (i) Success is an interdependent construct which is comprised of six units (ii) The time ordering among variables (process) and causal relationships are present (variance). **Extended IS Success Model:** Consisted of four propositions: (i) IS Success is an interdependent construct consisting of seven units. (ii) IS Success is a variance model, where the time ordering of units is immaterial. (iii) IS must be effectively used to drive business value (iv) UC is a multidimensional construct consisting of affective, cognitive, and skill based components.
(vi) Empirical Indicators *Major variation:* *clarification on measurement items*	**Original IS Success model:** empirical indicators were somewhat lacking, as when the IS Success model was conceptualized it was never empirically validated and measures were not provided. Instead DeLone and McLean (1992) called for researchers to 'try, test, and extend their model'.

used	**Extended IS Success Model:** Since the conception of IS Success a number of scholars have devoted efforts into identifying the empirical indicators of IS Success. For system quality, information quality, user satisfaction and individual impact the measures identified by Gable et al. (2008) were used. In addition the effective use measures identified by Burton-Jones and Grange (2013) were adapted. Furthermore UC was measured using a variety of previously validated measures (e.g. metacognitive self-regulation: Pintrich et al. (1991); user competence: Sedera and Dey (2013) and Munro et al. (1997); mastery motivational disposition: Vandewalle (1997); Attitude: Venkatesh et al. (2003));
(vii) Hypotheses *<u>Major variation:</u>* *four hypotheses changed and two hypotheses added*	**Original IS Success Model:** DeLone and McLean (1992) did not explicitly state the hypotheses in their model, however they specified: *"the nature of these causal associations should be hypothesised"*. In accordance with Petter and McLean (2009) the hypotheses pertained to significant positive relationship between the units. Therefore the hypotheses were: H1: System quality is positively related to system use H2: System quality is positively related to user satisfaction H3: Information quality is positively related to system use H4: Information quality is positively related to user satisfaction H5: Use is positively related to individual impacts H6: Use is positively related to user satisfaction H7: User satisfaction is positively related to use H8: User satisfaction is positively related to individual impact H9: Individual impact is positively related to organizational impact. **Extended IS Success Model:** In the extended IS Success Model some of the original IS Success hypotheses remain the same, which are: H2, H4, H8, H9. However the others change to incorporate the extensions. The term use in H1, H3, H5, and H6 is replaced with effective use. Furthermore H7 is not explored as the concern of this research pertains to effective use driving satisfaction as opposed to the reciprocal relationship. Furthermore the following two hypothesis are added to the model: H10: User capital is positively related to use H11: User capital is positively related to user satisfaction.

The above analysis (Table 53) seeks to clearly highlight how the original and extended IS Success models differ in terms of Dubin's (1978) components of theory building. To summarise, whilst IS Success was originally considered as a process and variance theory, coupled with the lack of clarity into the measures and types of system usages; resulted in inconsistency in the interpretation of the model. However driven by the call made by DeLone and McLean (1992) for scholars to 'try, test, and extend their model,' steps have been made to further strengthen the model by resolving the ambiguities. While some scholars have highlighted concerns with the combined process and approach, evidence has been provided to support the variance perspective of the model (Sedera et al., 2013). The extended model presented in this doctoral thesis, further strengthens the DeLone and McLean (1992) IS Success model by providing greater insights into Dubin's (1978) components of theory building and minimising the instability in the model (e.g. Mohr, 1982). Specifically, this research has clarified the propositions, identified appropriate empirical indicators, resolved the ambiguity surrounding use, and incorporated the concept of UC.

7.4 Discussion: User Capital in Context

As previously discussed User Capital (UC) was conceptualized through recognizing the contemporary organizational environment. There are two other important considerations in the contemporary organizational environment. Firstly, whilst users are purportedly more technologically savvy than ever before (e.g. Koffer et al., 2014), there is also heightened stress surrounding the use of organizational IS (Tarafdar, Tu, & Ragu-Nathan, 2011b). This phenomenon is referred to as technostress, which can have detrimental impacts on the productivity of employees, and therefore is worthy of further investigation.

Secondly, IS that are central to an organizations offerings are largely mandatory (Brown et al., 2002), yet prior technology adoption literature has focused on volitional systems (Boss et al., 2009). Therefore as UC was conceptualized in an enterprise systems setting, which is a mandatory use context further insights could be provided.

In addition, UC was conceptualized using multiple theoretical lenses and its operationalization was informed from the Learning Outcomes Model (LOM) (Kraiger et al., 1993). Consequently UC is a mutable property of an individual that can be improved upon by performing training and ensuring that the environment within the organization is conducive to learning. Therefore in this section of the thesis preliminary insights will be presented into the concepts of technostress, mandatory use settings, and enhancing UC.

7.4.1 Mandatory Use Settings

The voluntariness of Information Systems (IS) use lays on a continuum between volitional use to mandatory use settings (Karahanna et al., 1999). Voluntary IS use is defined as "*an individual's perception of the degree to which the use of the innovation [i.e. IS] is perceived as being voluntary, or of free will" (Tsai, Compeau, & Meister, 2016, pp. 2-3).* Alternatively mandatory IS use is "*where users perceive use to be organizationally compulsory"* (Brown et al., 2002, p. 284). IS can be mandated upon organizations by government agencies, regulatory bodies, and other organizations (Carugati, Fernandez, Mola, & Rossignoli, 2016). Alternatively, organizations can optionally adopt an IS, and mandate their employees to use the IS (Tsai et al., 2016).

Technology adoption research that centres around the Technology Acceptance Model (TAM) is largely confined to the boundary condition of volitional use (Boss et al., 2009; Dishaw & Strong, 1999; Tsai et al., 2016). The TAM is arguable the cornerstone of IS research, with notable scholars highlighting that the cumulative research that stemmed from TAM, potentially detracted from other important paradigms (Benbasat & Barki, 2007). However, most IS offerings within organizations are mandated upon employees (Brown et al., 2002; Rawstorne, Jayasuriya, & Caputi, 1998). A prime example of an IS that is mandated upon users are enterprise systems (ES) (Brown et al., 2002), which is the focus of this research.

Mandatory systems typically result in a change of organizational routines and practices (Carugati et al., 2016). Organizational routines are defined as "*repetitive, recognizable pattern of interdependent actions involving multiple actors*" (Feldman & Pentland, 2003, p. 95) and are associated with benefits of standardization and integration (Volkoff, Strong, & Elmes, 2007). However they are also criticized for lacking flexibility and interfering with task execution (Volkoff et al., 2007). This is particularly applicable to the context of ES, where routines are embedded in the technology that differ to how the routines were previously performed before the adoption (Volkoff et al., 2007).

Yet even when ES are mandated and organizational routines are changed, users still have agency over their actions and variation in use occurs (Tsai et al., 2016). Furthermore, in mandatory use settings, users can "*resent, under-utilize or sabotage the IS*" (Brown et al., 2002). However, whilst frequency and breadth of use may differ (Weber et al., 2015), it is the effectiveness of the use that is important to minimising the issues associated with mandatory settings including the unintentional and intentional unfaithful appropriation of the IS. Furthermore several scholars have also highlighted that simple measures of use, which are commonly employed in technology adoption research are not relevant in mandatory use settings (Brown et al., 2002; Weber et al., 2015). Therefore in mandatory use settings it is imperative to consider the users and their use of the IS.

This PhD thesis, provides additional insights towards fulfilling the gap in mandatory IS adoption literature, through the exploration of User Capital (UC) effective use, and technology characteristics in a mandatory ES context. Specifically the notion of UC was conceptualized by recognizing the agency of users and the need to consider not only knowledge and skill dimensions but also motivational and attitudinal components. Statistical evidence presented in Table 45 supported the need for a user to possess optimal levels of both affective components and capability components for the attainment of optimal levels of effective use in mandatory IS settings. Moreover it was also identified that optimal levels of technical capital and user capital were required for optimal levels of effective use (Table 47). Therefore in mandatory IS settings both the characteristics of the technology and the user are critical. However, regardless of the level of technical capital if UC is low effective use is also low. Furthermore this research evidenced that high levels of individual impact could be attained when extent of use was relatively low and user satisfaction was high. Whereas user satisfaction and effective use levels needed to be in alignment for high levels of individual impact. This highlights that it is imperative that use is operationalised appropriately based on the level of voluntariness of the IS.

7.4.2 User Capital in the Digital Age

The pervasiveness of technology, has resulted in a generation of ‘digital natives’ who have grown up surrounded by technology, and are distinct from their digital immigrant counterparts who have had to adapt to using technology (Prensky, 2001, 2009; Vodanovich et al., 2010). Yet regardless of whether an individual is a digital native or digital immigrant, the vast majority of individuals are immersed in sophisticated technologies in their everyday life. As a result individuals whether digital natives of digital immigrants are more knowledgeable about technology and strive to leverage their potential capabilities (Ortbach et al., 2013).

However, there are unintended consequences surrounding the ubiquity and pervasiveness of digital technologies (Ayyagari et al., 2011). A key example is the concept of technostress, which is defined as "*the stress caused by an inability to cope with the demands of organizational computer usage"* (Tarafdar et al., 2011b, p. 304). In addition technostress is associated with individuals being constantly connected to the workplace, which has *"produced a perpetual urgency and creates expectations that people need, or are obligated to work faster*" (Ayyagari et al., 2011). It is widely reported that technostress can be detrimental to productivity (e.g. Tarafdar et al., 2011b), technology and job satisfaction (e.g. Ragu-Nathan et al., 2008; Tarafdar et al., 2011b), organizational commitment, and continuance commitment (e.g. Ragu-Nathan et al., 2008). Approximately 80% of individuals believe that IS make work more stressful, due to system problems, learning curves, and high proportion of use (Tarafdar, Tu, & Ragu-Nathan, 2011a). Consequently, research has been dedicated to exploring the creators and inhibitors of technostress.

Prominent scholars have identified a range of techno-stress creators, including: techno-overload (e.g. where technologies "*force users to work faster and longer*"); techno-invasion (e.g. when *employees feel the need to be constantly connected, and there is a blurring between work-related and personal contexts");* techno-complexity (e.g. complexity in technology use due to inadequate skills and the pressure placed on users to devote effort towards improving their skills); techno-insecurity (e.g. the perception of users that the technology will replace their jobs); techno-uncertainty (e.g. continuous updates require the users to advance their skills) (Tarafdar et al., 2011b, p. 310).

In addition, research has also been conducted into the factors that inhibit technostress. The technostress inhibitors that have been examined in prior literature, have largely pertained to the organizational and situational mechanisms that may potentially reduce technostress (Ragu-Nathan et al., 2008). Specifically the technostress inhibitors are: (i) availability of technical support for newly implemented technology; and (ii) user involvement during implementation (Ragu-Nathan et al., 2008). However, whilst providing useful insights these inhibitors are largely constrained to implementation and early adoption rather than prolonged use. Other scholars have performed a techno-centric approach to identify the key characteristics in the technology that influence technostress (e.g.Ayyagari et al., 2011). Alternatively, some scholars have examined the influence of user demographics (e.g. gender, age, education, experience on technostress creators (e.g. Tarafdar et al., 2011a) and user competence and self-efficacy, which examined the detrimental impacts of technostress (e.g. Tarafdar et al., 2015).

Drawing on the characteristics of the aforementioned technostress creators, coupled with preliminary research investigating demographical factors in the context of technostress; the applicability of UC as a mitigating effect on the impact of technostress creators can be examined. Examination of the technostress creators highlight that while technostress is largely attributed to constant connectivity (Tarafdar et al., 2011a), a central theme across the technostress creators was the difficulty associated with IS, heavy workloads, and the need to keep learning. In terms of the heavy workloads in technology mediated tasks, it could be argued that increasing the effective use of the IS would result in users being more efficient as they would be less prone to errors. This research identified that increasing UC increased effective use, which in turn could potentially reduce the user's perception of their workloads.

Furthermore the dimensions present within UC can also minimise the difficulty associated with IS and the need to keep learning. For instance UC consists of metacognitive self-regulation and user competence, which deals with knowledge and skills respectively. However, the concept of metacognitive self-regulation is much more sophisticated than just declarative knowledge. Metacognitive self-regulation consists of an *individual's knowledge of their skills coupled with their ability to monitor and modify their cognitions* (Bartels & Magun-Jackson, 2009; Slife & Weaver, 1992). Individuals with high levels of metacognitive self-regulation are dedicated to improving their skillsets and resolving their confusion (Pintrich et al., 1991), which will ultimately reduce the difficulty associated with the IS. In addition UC also consists of mastery oriented motivational disposition which is positively related to motivation to learn (Klein et al., 2006) and individuals with a mastery orientation tend to persevere when presented with difficult tasks (Hirst et al., 2009). Therefore the components of UC could mitigate the effects of the technostress creators that are related to difficulty with using IS and the need to learn.

Consequently whilst UC was conceptualized in the context of operational use of ES specifically with the objective of assessing it within the context of effective use and IS Success; UC could be adapted to explain other IS specific contexts.

7.4.3 Enhancing User Capital

In order to operationalise User Capital (UC) the Learning Outcomes Model (LOM) (Kraiger et al., 1993) was examined. The LOM is a multidimensional model which highlights the cognitive, skill-based and affective dimensions inherent in an individual that can be improved upon to enhance an individuals performance (Aguinis & Kraiger, 2009; Kraiger et al., 1993). As a result of drawing upon the LOM, all constructs apparent within UC can be improved upon with the goal of enhancing an individual's performance. This section provides a brief overview of strategies that can be used to improve the dimensions within UC. However, future research could be directed into the empirical examination of how to improve UC.

The cognitive-based construct which was used in the operationalization of UC was metacognitive self-regulation. Metacognitive self-regulation recognises the complex and dynamic nature of the knowledge acquisition process and extends beyond the concept of declarative knowledge, which is the recognition of collection and facts (Kraiger et al., 1993). Metacognitive self-regulation is defined as an individual's knowledge of their skills coupled with their ability to monitor and modify their cognitions (Bartels & Magun-Jackson, 2009; Slife & Weaver, 1992). In addition metacognitive self-regulation "*contributes greatly to the diversity and flexibility of human behaviour*" (Muraven, Baumeister, & Tice, 1999, p. 446).

Different strategies can be utilised in training environments to measure metacognitive self-regulation. One such strategy is the probed protocol analysis, which involves the trainer probing the trainee on why and how each step is performed, and how those steps relate to the overall task outcome (Kraiger et al., 1993). In addition, self-report measures are also appropriate for the measurement of metacognitive self-regulation (Kraiger et al., 1993). A number of different training techniques can be applied to improving an individual's metacognitive self-regulation. These training techniques shift away from traditional step-by-step processes, which were used to acquire routine skills and verbal knowledge, to active learning processes, involving "*guided exploration, mastery training, and error management training*" (Bell & Kozlowski, 2008, p. 298). In an enterprise systems (ES) environment it would be useful to identify which approach engenders improvements in an individual's meta-cognitive self-regulation due to its centrality to task performance. The approach of guided exploration could be particularly relevant to the ES context, given that ES are heavily underutilised (Bagayogo et al., 2014). Furthermore Sousa and Goodhue (2003, p. 494) emphasise the pertinence of the exploratory use of ES by highlighting that users need to "*move beyond routine use and uncover new ways of using the system"*.

The skills-based learning outcome that was operationalised in UC, was the multidimensional user competence construct, specifically focusing on depth of knowledge and skills and finesse (Munro et al., 1997). The depth dimension of user competence relates to the LOMs definition of procedural skills (Kraiger et al., 1993). whereas the finesse components of user competence, which is the creative application of skills (Munro et al., 1997); aligns with the LOM's compilation skills, which encompasses when individuals apply skills to new situations, and adapt their skills to resolve different problems (Kraiger et al., 1993). The notion of user competency training in the ES context is widely acknowledge and recognized as being a critical success factor (Nah, Lau, & Kuang, 2001). Traditional training approaches for ES largely focus on the acquisition of procedural knowledge (Coulson, Olfman, Ryan, & Shayo, 2012), which links to improvements in depth of user competence. However due to the complexity of ES, different training strategies are necessary. Coulson et al. (2012, p. 297) further highlights the need for conceptual tool training which provides an understanding of the "*workflow of the whole process and the organizational impacts".* Tool conceptual knowledge is recognised as being "*abstractions that can be applied in different domains"* (Sein, Bostrom, & Olfman, 2001, p. 157), which is therefore indicative of user competence finesse.

Unlike traditional learning models, the LOM also recognises the pertinence of affective outcomes (Kraiger et al., 1993). Affective outcomes are comprised of both attitudinal and motivational components and therefore acknowledges the agency of individuals (Kraiger et al., 1993). The inclusion of the affective component is substantiated by literature related to individual performance which emphasises that individuals need to be both willing and able (Pimpakorn & Patterson, 2010). This notion was also further supported by the results presented in this thesis, whereby in order to effectively use an IS, an individual needs to be both highly capable and have high levels of affective components.

A number of training design features can be applied to enhance an individual's attitude and motivation. Rozell and Garner (2000) outlines that individuals with low attitudes towards IS should be trained on simple tasks firsts, with the level of difficulty progressively increasing. In addition training and supporting users has been consistently found to influence a user's attitude towards IS (Hung, Tang, Chang, & Ke, 2009). Training can also influence an individual's degree of motivation (Kraiger et al., 1993). The motivational component that was explored as a dimension of UC was motivational disposition, specifically an individual's mastery orientation. An individual's motivational disposition is adaptable to intervention (Kraiger et al., 1993). Kasemsap (2013, p. 30) highlighted that an individual's motivational disposition (termed goal orientation) can be enhanced by the learning orientation of the firm, which is defined as "*an organizational framework of values creating and sharing capability*". Furthermore Kasemsap (2013) also highlighted the importance of the quality of exchanges between employees and supervisors for improving motivational disposition.

This brief discussion highlights that the concept of UC is mutable and can be enhanced upon by performing training and making the organizational environment more conducive to learning. Future research needs to be performed in this area so that optimal levels of UC can be attained.

7.5 Key Findings of the Discussion

A number of key findings were discussed in this chapter. Firstly, User Capital (UC) was statistically evidenced as being a multidimensional construct consisting of metacognitive self-regulation, user competence, mastery motivational disposition, and attitude towards using Information Systems (IS). Furthermore these dimensions were all evidenced as being pertinent to the contemporary enterprise systems environment. Secondly nomological validity was evidenced by statistically analysing the relationships between UC and effective use as hypothesized by drawing on the Social Cognitive Theory (Bandura, 1986). UC was found to explain 49.20% of the variance in effective use. In addition UC, system quality, and information quality were found to explain 64.4% of the variance in effective use. Furthermore, optimal levels of both user capital and technical capital were necessary for optimal levels of effective use to be obtained. This study represents the first study to quantitatively assess effective use as conceptualized by Burton-Jones and Grange (2013).

Several key findings were also presented by examining the original IS Success model (i.e. DeLone & McLean, 1992) and extended IS model (i.e. Figure 30) through the theoretical frameworks of Mohr (1982) and Dubin (1978). Specifically insights were presented into issues surrounding the unclear labelling tides of the use construct. The discussion highlighted and presented evidence to support that use should be operationalized as effective use. In additions, insights were presented into minimizing the inconsistency in IS Success in terms of its process and variance perspectives. Statistical evidence was presented to support the variance perspective of IS Success. As emphasised by Mohr (1982), interaction in a theory in terms of the omission of pertinent variables can lead to inconsistency in model interpretation. In this research it was argued and statistically evidenced that UC is a key dimension of IS Success. Furthermore, Dubin's (1978) seven components of theory building was used as a framework to effectively compare and contrast between the original and extended IS Success models.

Subsequent to the exploration of UC in the context of IS Success and effective use, a number of preliminary insights were also presented into technostress, mandatory use settings and enhancing UC. It was proposed the UC and technical capital are important factors to consider in terms of minimising the impact of technostress creators. In terms of mandatory use settings, it was highlighted that UC is still applicable as users still have agency over their actions. Furthermore it was also rationalized that effective use was more applicable than extent of use in both mandatory and volitional settings. Initial insights were also provided into substantiating that UC is a key organizational capability that can be improved upon to enhance the performance of an organization.

Chapter 8: Conclusion

The introductory chapter highlighted the need for a more nuanced understanding of Information Systems (IS) users in the context of IS success. Chapter 1 also recognised the need to formulate a construct that was indicative of User Capital (UC). The literature review presented in Chapter 2, identified that only limited research efforts have been devoted to understanding how the combination of knowledge, skills, attitude, and motivation, influenced the success of Enterprise Systems (ES). Recognizing this gap, Chapter 3 sought to develop a conceptual model of UC by drawing on insights from literature related to human capital, attitude-behaviour, the theory of performance and the learning outcomes model.

Subsequent to the development of the UC, Chapter 4 applied Social Cognitive Theory and literature surrounding IS Success to develop structural models, which hypothesized relationships between UC, effective use and the dimensions of IS Success. The survey instrument was developed in Chapter 5 and followed rigorous development procedures (e.g. MacKenzie et al., 2011) The results of the empirical investigation were presented in Chapter 6, and further discussed in Chapter 7.

This chapter concludes the thesis by summarizing the results obtained for each of the research questions. Subsequently, the theoretical and practical contributions are outlined. Followed by the limitations and future research directions (refer to Table 54).

Table 54: Objectives of the Themes Present within the Conclusion Chapter

Theme	Objective
8.1 Summary of Research Findings	▪ Outline the findings of the three research questions.
8.2 Contributions	▪ Examine the contributions to theory ▪ Examine the contributions to practice
8.3 Limitations and Future Research	▪ Outline the limitations of the research ▪ Discuss areas for future research

8.1 Summary of Research Findings

Recognizing the gaps in the literature pertaining to understanding how the knowledge, skills, motivation and attitude of Information Systems (IS) users influences behaviour and resultant outcomes; this thesis sought to critically examine the personal and cognitive characteristics of IS users and their resultant influence on effective use and benefit realization. As a result, this thesis aimed to provide insights into the following three research questions: (i) What constitutes Information System's User Capital in a contemporary enterprise system's environment? (ii) What is the relationship between User Capital and effective use? (iii) What is the relationship between User Capital, effective use and Information Systems Success?

In answering the first research question, the User Capital (UC) construct was defined and operationalised. UC was defined as *the attributes possessed by an individual which enables them to use an IS to perform tasks*. It is conceptualized as a multidimensional construct consisting of the cognitive characteristics, skills, motivation, and affective attitude possessed by IS users. The construct was developed by drawing upon multiple theoretical perspectives including human capital and attitude behaviour literature, as well as the theory of performance. The outcome of which was the operationalization of a multidimensional formative construct, consisting of metacognitive self-regulation, user competence, mastery motivational disposition and attitude towards IS. The multidimensional approach recognized the agency that users have over their actions in mandatory use settings (e.g. Strong & Volkoff, 2010), whereby users can be knowledgeable and skilled but without the required attitude and motivation they will be unlikely to perform the desired behaviour. Evidently without the appropriate motivation and attitude, users can "*resent, under-utilize, or sabotage the IS"* (Brown et al., 2002). In addition, the dimensions apparent in UC were formulated through recognizing the context of the contemporary enterprise system's environment, where employees face greater pressures and are required to complete broadly defined tasks in an autonomous fashion (e.g. Belanger et al., 2013). For example metacognitive self-regulation was selected as in the contemporary enterprise systems environment, operational users are increasingly required to effectively problem solve (Belanger et al., 2013) and users who are deficient in metacognitive self-regulation strategies are ineffective with their problem solving efforts (Slife & Weaver, 1992). In addition, when operationalizing UC, the Learnings Outcome Model was adapted, as a result all dimensions within UC can be enhanced.

The purpose of the second research question was two-fold. Firstly, to provide nomological validity to UC, and secondly to provide insights into a potential determinant for effective use. Based upon Social Cognitive Theory, UC was hypothesised to positively influence the effective use of the IS. The results of the statistical examination confirmed this hypothesis with 49.20% of the variance in effective use explained by UC. Therefore nomological validity was evidenced and insights into the determinants of effective use were provided.

Driven by the vast body of literature illustrating that organizations struggle to attain benefits from IS, coupled with prominent IS success models overlooking the personal, cognitive characteristics of users; this research investigated the impact that UC had on IS Success. In answering this third research question, it was identified that UC, system quality, and information quality positively influenced effective use and user satisfaction, which in turn influenced individual impact. Whilst a direct relationship was hypothesized between user capital and individual impact, the data failed to support a statistically significant direct relationship as it was completely mediated by the presence of effective use and user satisfaction. The extended IS success model presented in this thesis improved upon the original DeLone and McLean (1992) IS Success model by incorporating UC and operationalizing the use construct as effective use. The results obtained provided a more nuanced understanding of the relationships in IS Success and ultimately resolved previously cited issues associated with the DeLone and McLean (1992) IS Success model. Specifically inconsistency in model interpretation was minimised through the clarification of labelling tides, resolving model incompleteness and evidencing the appropriateness of the variance perspective.

Insights were also provided into understanding effective use and the dimensions present within IS Success. Effective use was examined in conjunction with extent of use in the context of IS Success. The results illustrated that the influence that effective use and extent of use had on individual impact, greatly differs. Based on the empirical examination coupled with insights from literature; effective use was found to be a more appropriate operationalization than extent of use.

Furthermore, a greater understanding of the relationships present within IS success was provided through examining how different components interact to predict effective use and individual impact. In practice, improving an individual's performance often takes the form of skill based training (Coulson et al., 2012). However, this study identified that whilst users do need a minimum level of capabilities, affective components (i.e. motivation and attitude) result in higher levels of effective use. A similar relationship was also obtained when examining the effect that capabilities and affective dimensions have on individual impact, in which high levels of both capabilities and affective components are needed for high levels of individual impact.

The prominent IS Success perspective as conceptualized by DeLone and McLean (1992) neglected the user dimension and focused largely on the technical aspects of the IS such as system quality and information quality. However, the findings of this research recognised the sheer importance of considering UC. Ultimately, the results highlighted that even when technical capital is high, users must have some degree of UC for the IS to be effectively used, which is a key driver of benefits.

In summary a total of 25 hypotheses were examined, of which 19 were supported, 2 were partially supported and 4 were rejected (refer to Table 50, page 208).

8.2 Contributions

Following the recommendations of Rosemann and Vessey (2008), this research was both rigorously performed and relevant to practice. The pertinence of rigour and relevance is further substantiated by Corley and Gioia (2011, p. 15) who state "*the idea of contribution rests largely on the ability to provide original insight into a phenomenon by advancing knowledge in a way that is deemed to have utility or usefulness for some purpose*". The contributions that this research has made to theory and practice are discussed in the following sections.

8.2.1 Theoretical Contributions

In accordance with Whetten (1989), a theoretical contribution not only adds a new construct to a theory, but also affects the meaning of the previously accepted relationships. Evidently this thesis contributes to theory through the creation of the User Capital (UC) construct and providing a more nuanced understanding of the relationships between effective use and Information Systems (IS) Success. The theoretical contributions pertaining to UC are:

- UC was defined, conceptualized, and operationalised as a multidimensional construct that acknowledges the agency of users and the complex nuances in users' behaviours.
- In the formulation of UC, the contemporary enterprise systems environment was explicitly considered. This informed the selection of the specific dimensions within UC (e.g. metacognitive self-regulation, user competence, mastery motivational disposition, and attitude towards using IS).
- Extended the constructs of motivational disposition and metacognitive self-regulation to the IS discipline and recognised its pertinence in the post-implementation phase of the IS lifecycle.
- Contributed to the cumulative research in the IS discipline pertaining to user competence and attitude towards using IS.
- Fulfilled the gap in the literature surrounding the examination of the knowledge, skills, attitude and motivation of users in the context of enterprise systems. The results clearly recognised that the users needed to be both willing and able to effectively use the IS.

- Uncovered that the nature of users within organizations are transforming. Specifically the demarcations between users are becoming increasingly blurred, with managerial users performing operational tasks, and operational users performing approval, which has traditionally been characterised as a managerial task.

This research also contributed to theory surrounding effective use, namely:

- This study was the first quantitative examination of effective use. This fulfils a key gap in the literature, as in accordance with Weeger et al. (2014, p. 1) "*IS research still provides few insights on the determinants and barriers of effective use*".
- Identified that UC is a key antecedent of effective use. The results illustrated that 49.20% of the variance in effective use was explained by UC.

In addition, several contributions were made to the IS Success literature:

- Evidenced that UC was a key dimension of IS success. This acknowledges the pertinence of a user for benefit realisation.
- Justified and substantiated with empirical data that effective use is a more appropriate operationalization than extent of use in the context of IS success.
- Outlined the critical role of effective use and user satisfaction in mediating the relationship between UC, system quality and information quality with individual impact.
- Illustrated how the combination of technical capital and UC impacted IS Success. The results clearly showed that both high levels of technical capital and UC are required for the IS to be used effectively.

- Evidenced the appropriateness of the variance perspective of the DeLone and McLean (1992) IS Success model confirming prior research by Sedera et al. (2013).

8.2.2 Practical Contributions

The insights provided in this research into User Capital (UC), effective use, and Information Systems (IS) success are highly relevant to practice. The practical contributions include:

- Training and organizational practices need to be put into place to improve *both* the capabilities (e.g. knowledge and skills) and affective aspects (e.g. attitude and motivation) of users. Only focusing on capabilities or affective components will be detrimental to the organization.

- The UC construct was operationalized by drawing on the Learning Outcomes Model. As a result all aspects within UC can be enhanced. Therefore organizations can use the measurement instrument of UC to progressively assess the users to identify which characteristics require improvement.

- Both UC and the technical capital of the IS influence the effective use of the IS. This is a key contribution as in accordance with Tennant (2014, p. 207) "*to allow for greater and more effective use of IS, it is important for IT practitioners to better understand the enablers, drivers/triggers and inhibitors that impact change in IS use*".

- When determining where investments should be made to improve the effective use of the IS, organizations cannot overlook the qualities of the user or the qualities of the IS as the presence of high technical capital (user capital) with low levels of UC (technical capital) result in low levels of EU.

8.3 Limitations and Future Research

The limitations and potential research directions are outlined in the subsequent paragraphs.

One of the central tenants of positivist research is generalizability (Guba & Lincoln, 1994). Generalizability "*is the researcher's act of arguing, by induction, that there is a reasonable expectation that a knowledge claim already believed to be true in one or more settings is also true to other clearly defined settings*" (Seddon & Scheepers, 2012, p. 7). Yet some scholars have criticized positivist research citing issues surrounding context stripping minimises generalizability (Guba & Lincoln, 1994). This research adopted a post-positivist research stance and sought to comprehensively understand the research context. The intended population was well defined and the survey instrument was provided only to the relevant personnel within the organization. In addition demographics were also collected to verify the appropriateness of the sample. One of the key strengths of this research is the recognition of the context. However, the traditional notion of statistical generalizability pertains to generalizing from "*one random sample to other random samples*" (Lee & Baskerville, 2003, p. 228). Yet this research did not use a random sample as all users within the organization who used the ES in an operational capacity were surveyed. Nonetheless the failure to appreciate the context could also be detrimental to generalizability (Johns, 2006). Based on prior theory, the preliminary interviews that were conducted, and the statistical analysis performed; the findings of this research are likely to be generalizable to similar samples that examine the operational use of ES in the post implementation phase of the lifecycle. Notwithstanding, future research efforts should be performed to test the applicability of UC and its resultant effects in a number of different settings which are discussed below.

This research used the nomological network of Social Cognitive Theory (SCT) to hypothesize that User Capital (UC) influences effective use. However SCT asserts that behaviour (i.e. effective use) is shaped by personal cognitive factors (i.e. UC) and environmental factors (Bandura, 1986). Whilst this research did control for task complexity as an environmental factor, the task complexity measurement items loaded onto two factors. Whilst these measures could still be used for control purposes, in depth analysis involving task complexity could not be further performed as it is best practice for a reflectively measured construct to consist of three measurement items (e.g. Diamantopoulos, Sarstedt, Fuchs, Wilczynski, & Kaiser, 2012). Therefore future research should be directed towards identifying an appropriate measurement instrument for task complexity and its effect of the relationship between UC and effective use.

Task complexity is only one of a plethora of environmental stimuli that could be examined. For example, extant research in the IS discipline has highlighted the pertinence of environmental factors in mandatory use settings, including: organizational enterprise systems fit (Strong & Volkoff, 2010); subjective norms (Brown et al., 2002); perceived behavioural control in the form of availability of resources (Brown et al., 2002); and sanctions and rewards (Liang, Xue, & Wu, 2012). Other disciplines have highlighted the environmental factors of HR practices (Cabello-Medina et al., 2011); organizational climate (Chang, 2015); leadership (Lakshman, 2014); and governance mechanisms (Hansen & Alewell, 2013). Therefore further research could be investigated into understanding how the aforementioned environmental factors, whether technological or organizational influence the relationships between UC and effective use.

In this research effective use was operationalised as a multidimensional formative constructs. The validity and reliability was established. However, the statistical redundancy analysis of effective use did not meet the required threshold. It was identified that the global measure was too simplistic to capture the multidimensional nature of effective use. Therefore future research efforts should be devoted to identifying an appropriate global measure for effective use.

This research was scoped to investigate the UC for users who used enterprise IT in a largely operational capacity. Specifically enterprise resource planning systems were examined. However, within the boundary of enterprise IT there are other types of IS present, including: customer relationship management systems, supply chain management systems etc. Due to the similarities present between these IS (i.e. complex, integrated nature), this thesis anticipates that UC would still be applicable to these settings. However, future research should be directed into analysing the properties of these IS, and statistically assessing them with UC. While overarching similarities are present within these types of enterprise IT; functional IT, and network IT are fundamentally different in their nature (McAfee, 2006), furthermore difference exist between volitional and mandatory IS (Brown et al., 2002). Therefore future research could be performed on these IS as it may result in extending the boundary conditions of UC.

In addition, UC was scoped to the individual unit of analysis and investigated the operational use of the IS. In accordance with Anthony's (1988) levels of control and planning, several scholars have identified that different user groups are present within organizations, including: operational, managerial and strategic (e.g. Murphy et al., 2012; Wickramasinghe & Karunasekara, 2012). Whilst this segmentation of user groups provided useful insights, the preliminary interviews, user logs, and sample demographics in this study outlined that some managerial and even strategic level individuals used the ES in an operational capacity. The distinction between managerial and operational is becoming increasingly blurred. Therefore rather than looking solely at a user's job title or hierarchical position, it may be more informative to understand the nature of their use. In addition organizations have started offering self-service offerings which can have a customer facing front-end (Saeed & Abdinnour, 2013) or require different individuals in the organization, separate to the aforementioned user groups, to use the IS (Cappetta, Maruping, Magni, & Madden, 2015). Therefore due to the changes in these user groups, future research should be dedicated to understanding this broadened notion of a user and how that impacts UC.

Insights from human capital literature were foundational to the conceptualization of UC. Both human capital and UC are applicable to the individual unit of analysis. However, human capital has been extended to different units of analysis. Two notable examples are social capital, which recognizes "*relationships and networks*" and organizational capital which is embedded in "*organizational structures, processes and systems*" (Subramaniam & Youndt, 2005, p. 457). Organizational capital and social capital are pertinent drivers of incremental and radical innovation (Subramaniam & Youndt, 2005). Therefore, it would prove to be extremely informative to examine UC at different levels of analysis.

Furthermore the development of UC recognised the contemporary ES environment and the increasing pressures placed on individuals. Therefore future research should be performed into understanding the influence that UC has on other phenomena. In the discussion three key additional areas and their relevancy was discussed, namely: (i) mandatory versus volitional settings; (ii) technostress; and (iii) antecedents of UC. All of these areas warrant future research attention. In addition a growing number of technological innovations are being driven from the bottom up (Niehaves et al., 2013). Therefore the influence of UC on incremental and radical technological innovation could be extremely informative to both research and practice.

In summary, this research defined, conceptualized, and operationalized UC, and identified UC to be a pertinent driver of effective use and a key dimension of IS Success.

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Appendices

Appendix A: Key Definitions

Term	Definition	Reference
Attitude towards IS	*An individual's positive or negative feelings about using an information system.*	Venkatesh et al. (2003); Fishbein and Ajzen (1975)
Breadth	Extent of knowledge and skills an individual possesses over a broad variety of domains including hardware, software and practices.	Munro et al. (1997)
Depth	The extent to which an individuals has deep domain specific insights and skills.	Munro et al. (1997)
Effective Use	"U*sing a system in a way that helps attain the goals for using a system."*	Burton-Jones and Grange (2013, p. 633)
Finesse	An individual's personal innovativeness to creatively apply themselves	Munro et al. (1997)
Individual Impact	"*measure of the extent to which the IS has influenced the capabilities and effectiveness, on behalf of the organization, of key users*"	Gable et al. (2008, p. 389)
Informed Action	"*The extent to which a user acts upon the faithful representations he or she obtains from the system to improve his or her state."*	Burton-Jones and Grange (2013, p. 642)
Information Quality	A "*measure of the quality of the IS outputs: namely the quality of the information the system produces in reports and on-screen*"	Gable et al. (2008, p. 389)
Information System	"A*n organized collection of people, information, business processes, and information technology designed to transform inputs into outputs in order to achieve a goal"*	Huber et al. (2007, p. 21)
Information System Success	A multidimensional and interdependent construct consisting of: system quality, information quality, use, user satisfaction, individual impact, and organisational impact.	DeLone and McLean (1992)
Managerial Users	Individuals responsible for ensuring the strategic goal as specified by senior management are carried out.	Laudon and Laudon (2012)

Mastery Orientation	An individual's "*desire to develop the self by acquiring new skills, mastering new situations, and improving one's competence.*"	Vandewalle (1997, p. 1000)
Metacognitive self-regulation	An individual's knowledge of their skills coupled with their ability to monitor and modify their cognitions.	Bartels and Magun-Jackson (2009) Slife and Weaver (1992)
Motivational Disposition	The extent to which individuals are motivated to perform a certain behaviour based upon (i) mastering skills (mastery orientation); receiving positive appraisals (performance-prove orientation); and avoiding negative criticisms (performance-avoid orientation)	Vandewalle (1997)
Net Benefits	The net benefits experienced by all relevant parties. This construct is a result of condensing individual impact and organizational impact due to IS influencing parties external to the client organisation.	DeLone and McLean (2003)
Operational User Group	An Information Systems (IS) user that typically performs routine data entry tasks within an IS that vary in difficulty.	Murphy (2014)
Organisational Impact	"A *measure of the extent to which the IS has promoted improvement in organizational results and capabilities*"	Gable et al. (2008, p. 389)
Performance Orientation	An Individual's "*desire to prove one's competence and to gain favourable judgements about it"*	*Vandewalle (1997, p. 1000)*
Representational Fidelity	"*The extent to which a user is obtaining representations from the system that faithfully reflect the domain being represented."*	Burton-Jones and Grange (2013, p. 642)
Service Quality	The overall service/support provided by the IT department	DeLone and McLean (2003)
Strategic Users	The executive management team, whom consumes information to make strategic business decisions.	Murphy (2014)
System Quality	"*measure of the performance of the IS from a technical and design perspective*"	Gable et al. (2008, p. 390)
Transparent Interaction	"*The extent to which a user is accessing the system's representations unimpeded by its surface and physical structures."*	Burton-Jones and Grange (2013, p. 642)
Use	"*An individual user's employment of one or more features of a system to perform a task*"	Burton-Jones and Straub

		(2006, p. 231)
User Competence	"*The user's potential to apply technology to its fullest possible extent so as to maximize performance of specific job tasks.*"	Marcolin et al. (2000, p. 38)
User Capital	The attributes possessed by an individual which enables them to use an IS to perform tasks. It is conceptualized as a multidimensional construct consisting of the cognitive characteristics, skills, motivation, and affective attitude possessed by IS users and is specifically operationalised using metacognitive self-regulation, user competence, mastery motivational disposition, and attitude towards using IS.	
User Satisfaction	A "*users' level of satisfaction with the IS*"	Petter et al. (2013, p. 11)

Appendix B: Information Systems Usage

Construct	Definition	Measures	Reference
Breadth of Use	The usage of a multitude of IS features	The number of IS features used.	Burton-Jones (2005)
Decision of Use	Dichotomous variable to assess whether the IS is used.	IS use/non-use	Moore and Bebasat (1991)
Dependence on Use	The extent to which an individual is dependent on the IS.	Dependent on a specific IS.	Goodhue and Thompson (1995); Rai et al. (2002)
Duration of Use	The duration of time spent using an IS within a given period of time.	System logs, time spent, number of hours used.	Venkatesh et al. (2003)
Effective Use	"*Using a system in a way that helps attain the goals for using a system*"	Informed action, representational fidelity, transparent interaction	Burton-Jones and Grange (2013, p. 633)
Exploitive Use	"*The extent to which the user exploits features in the system to carry out the task.*"	Perceptual measures including: the extent to which you use an IS to support a given task.	Burton-Jones (2005, p. 123); Subramani (2004)
Exploratory Use	"*Captures active examination of new uses of IS*"	Perceptual measures including: "I explore other features and functions of the system"	McLean et al. (2011, p. 3)
Extended Use	"*Users extend the scope of the functions that they use through post-adoptive learning*"	Perceptual measures including: I have learned about and used new functions of the IS to support my work.	Hsieh, Rai, and Xu (2011, p. 2019) Hsieh (2011).
Extent of Use	The extent to which the IS features, functions, reports are utilized.	Number of: searches performed, messages sent, tasks performed, packages used. As well as perception of light, medium, and heavy use.	Straub et al. (1995); Igbaria et al. (1997)

Faithful Appropriation/ Appropriateness of Use	IS usage is "*consistent with the spirit and structural feature design*"	The use is consistent with the IS goals; The IS is used as intended by the IS creators. The use is faithful to the original design	DeSanctis and Poole (1994, p. 130); Saeed and Abdinnour (2013); Chin, Gopal, and Salisbury (1997)
Frequency of Use	The number of times the IS is used within a given duration of time.	Number of times used.	Wu and Wang (2005)
Method of Use	The use of an IS performed by an individual (direct) or on the behalf of an individual (indirect)	The duration and/or frequency of direct/indirect use.	Gelderman (1998)
Proportion of Use	The percentage of self-reported IS usage to complete a task.	Percentage of IS usage	Keil, Beranek, and Konsynski (1995)
Specificity of Use	The use of an IS to perform a specific behaviour.	Context-specific IS usage measures.	Kugler and Smolnik (2014)
Variety of Use	The use of an IS to complete a range of business tasks.	Number of business tasks supported by the IS.	Igbaria et al. (1997)
Voluntariness of Use	Dichotomous variable used to depict whether the IS is mandatory to use.	Mandatory/voluntary usage	Kim and Lee (1986)

Adapted and Extended from Burton-Jones and Straub (2006); Burton-Jones (2005)

Appendix C: Archival Analysis

This appendix details the research method and scoping considerations, classification framework and overview of the results for the archival analysis presented in Chapter 2.

Research Method and Scoping Considerations

In order to determine the user characteristics that have been explored in the IS discipline the archival analysis research method was utilized. Archival analyses extend literature reviews through the identification of research trends and patterns (Eden, Sedera, & Tan, 2012).

The archival analysis was scoped to review journal articles published in the AIS (Association for Information Systems) Senior Scholars Basket of Eight[9] (refer to Table 55). Whilst these journals may not contain all the articles pertaining to user characteristics, they provide an exhaustive array of highly influential studies (see Lowry et al. (2013) for a critical discussion supporting the senior scholars' basket).

Table 55: Journals Reviewed for Archival Analysis

	Journal Name
EJIS	European Journal of Information Systems
ISJ	Information Systems Journal
ISR	Information Systems Research
JAIS	Journal of the Association for Information Systems
JIT	Journal of Information Technology
JMIS	Journal of Management Information Systems
JSIS	Journal of Strategic Information Systems
MISQ	Management Information Systems Quarterly

[9] https://aisnet.org/general/custom.asp?page=SeniorScholarBasket

The objective of the archival analysis was to systematically analyse the studies that have critically analysed IS users. Therefore a number of scoping considerations were made:

1. An IS must be a central theme of the article, for instance if an article pertains predominately to knowledge sharing with little reference to an IS, the article is determined to be outside the scope of the analysis.
2. As the archival analysis seeks to explore user characteristics, IS users must play a key role in the paper, Therefore articles where the central stakeholder group explored are IT personnel are excluded as they are non-direct users of IS (e.g. Ke et al., 2012).
3. The purpose of the archival analysis is to analyse the characteristics of IS users, therefore the unit of analysis is constrained to the individual unit of analysis. Team and group levels will also be considered if they have aggregated individual level results.
4. The archival analysis is constrained to those studies that have attempted to present a more holistic understanding of the IS user and thus have explored more than one type of user characteristics. This is in line with the Theory of Performance and human capital literature which asserts that knowledge, motivation *and* skills are all necessary for enhanced performance. Therefore the articles must include two or more user characteristics stemming from different higher level categories in the abstract, title or keywords (refer to Table 56).

Table 56: Search Terms

Higher Level Category	Lower Level Category
Knowledge	Knowledge, cognitive, cognition
Skills	Skills, competence, ability
Motivation	Motivation, efficacy
Attitude	Attitude, affective

5. This thesis explores the user in the contexts of effective use and IS success. Therefore, the search was constrained to articles published from 1992 inclusive, which was when ISsuccess became a cumulative research tradition.

Classification Framework

The classification framework was formulated based upon the components of human capital and attitude-behaviour literature. Therefore, the high level categories of the classification framework are knowledge, skills, motivation, and attitude. To provide further granularity the four high level themes were decomposed into a number of subcategories (refer to Figure 62).

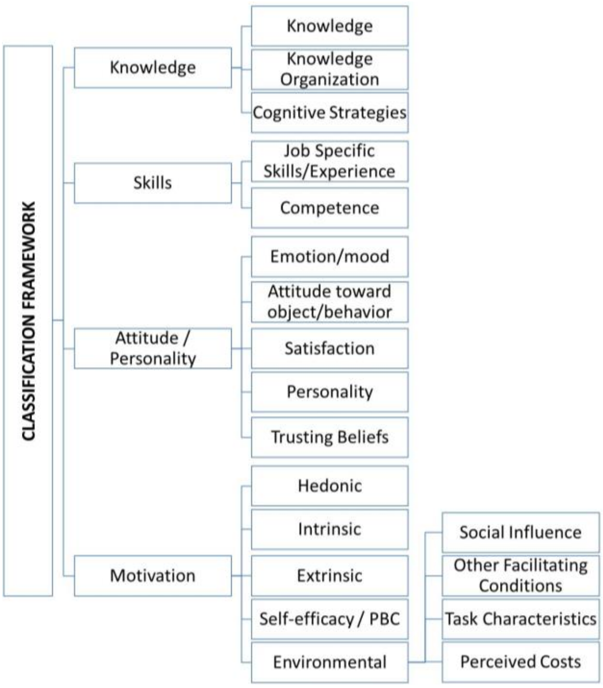

Figure 62: Classification Framework

In accordance with Kraiger et al. (1993) there are three different aspects of an individual's knowledge that can be improved upon with training, which are: the knowledge possessed by individuals; the organization of that knowledge; and the cognitive strategies for regulating knowledge acquisition and use (Aguinis & Kraiger, 2009). Therefore these three themes informed the knowledge subcategories.

In terms of skills, training evaluation literature distinguishes between skill acquisition, skill compilation, and skill automaticity (Kraiger et al., 1993). Upon commencing the archival analysis it become evident that this distinction is scarcely explored in the IS discipline. Yet a distinction is often made between competence and skills, where the former is generally treated as a multidimensional construct (e.g. Bassellier et al., 2003; Munro et al., 1997; Wang & Haggerty, 2011) and the latter pertains to either job-specific skills or general experience. Therefore competence and skills were used as subcategories for skills.

Training evaluation literature cites motivational disposition, self-efficacy and goal setting as internal, mutable, motivational variables (Kraiger et al., 1993). However in the IS discipline, motivation is typically investigated as hedonic (pleasure), intrinsic (learning), and extrinsic (rewards) (e.g. Lowry et al., 2015). In addition, the IS discipline also recognises external (environmental) motivators including social influences and facilitating conditions (Venkatesh et al., 2003). Therefore the motivation category was comprised of internal, environmental, hedonic, intrinsic, and extrinsic motivators.

Attitude encompasses an individual's feelings towards an object or behaviour (Fishbein & Ajzen, 1975) and is an affective variable (Kraiger et al., 1993). In performing a meta-analysis, Riketta (2008) identified that attitude is positively related to an individual's job performance. Additional affective variables were also captured within the attitude category including personality, emotion, trust, and satisfaction.

The aforementioned classification framework serves to capture the attributes of users that have been researched in the IS domain. However, additional contextual information was also collected, including the: (i) type of IS, (ii) type of user, (iii) geographical region where data was collected, (iv) theoretical lens used, and (v) methodology. The type of IS was classified according to McAfee (2006) framework, which consists of Functional IT (FIT), Network IT (NIT) and enterprise IT (EIT). Articles that did not fit into the McAfee (2006) framework and only referred to personal computers or IS in general were categorized into a fourth category "other".

Summary of Results from Archival Analysis

The results of the categorization of articles in the archival analysis are presented in Table 57.

Table 57: Summary of Archival Analysis Results

Category*	References	Total
KSAM	Abdul-Gader and Kozar (1995); Harrison and Rainer (1992); Sharda et al. (2004); Wang and Haggerty (2011); Webster and Martocchio (1992); Yoon et al. (1995)	6
KSA	Hsieh et al. (2012); Simon et al. (1996)	2
KSM	Hwang et al. (2015); Wang and Haggerty (2009); Wei et al. (2011); Yi and Davis (2003)	4
KAM	Bassellier et al. (2001); Bulgurcu et al. (2010); Lam and Lee (2006); McElroy et al. (2007); Romano et al. (2003); Scott (2000) Te'eni (2001)	7
SAM	Johnson and Marakas (2000); Piccoli et al. (2001); Tarafdar et al. (2015); Thomas and Bostrom (2010b); Thompson et al. (1994); Tsai and Bagozzi (2014); Udo and Guimaraes (1994); Urquhart et al. (2008)	8
KS	Bassellier et al. (2003); Thomas and Bostrom (2010a)	2

KA	Alavi et al. (1995)	1
KM	Lin and Silva (2005); Majchrzak, Malhotra, and John (2005); Marcolin et al. (2000)	3
SA	No articles categorised as pertaining to only skills and attitude	0
SM	Compeau and Higgins (1995a); Davis (2013); Dong, Johar, and Kumar (2011); Hardin, Looney, and Fuller (2014); Huysman and Wulf (2006); Kettinger et al. (2015); Kraemer, Danziger, Dunkle, and King (1993); Lindgren et al. (2003); Liu, Li, and Santhanam (2013); Liu et al. (2011); Wasko and Faraj (2005)	11
AM	Anderson and Agarwal (2010); Benlian et al. (2012); Bhattacherjee and Premkumar (2004); Bock, Zmud, Kim, and Lee (2005); Boss et al. (2015); Chang, Hsu, Shiau, and Tsai (2015); Compeau et al. (1999); Devaraj et al. (2008); Gopal, Bostrom, and Chin (1992); Guo et al. (2011); Herath and Rao (2009); Hoefnagel, Oerlemans, and Goedee (2014) Hong, Thong, and Tam (2004); Hunton and Beeler (1997); Hwang (2005); Jarvenpaa and Staples (2000); Jiang and Benbasat (2007); Ke et al. (2012); Kehr, Kowatsch, Wentzel, and Fleisch (2015); Keith, Babb, Lowry, Furner, and Abdullat (2015); Kwan et al. (2010); Lee et al. (2012); Lee and Rao (2012); Lee and Chen (2011); Lewis, Agarwal, and Sambamurthy (2003); Li, Hess, and Valcich (2008); Liang and Xue (2009); Liang, Lai, and Ku (2006); Lin and Bhattacherjee (2010); Palka, Pousttchi, and Wiedemann (2009); Pavlou and Fygenson (2006); Ray, Kim, and Morris (2014); Sun (2010); Szajna (1993); Turel (2015); (Yu, Hu, and Cheng (2015))	36

*K: Knowledge, S: Skills, A: Attitude, M: Motivation

Appendix D: Interview Questions

1. **System and History**
    a. What is the enterprise system that the organization uses to support its business practices?
        i. Can you provide details on the supplier, package, version?
        ii. What specific modules of the enterprise system software were implemented?
    b. When was this enterprise system first implemented and rolled out to the organization?
        i. Have there been any major changes or upgrades since then?
    c. Did the configuration require heavy customization?
    d. Do the users interact with other systems apart from the enterprise system? If so, what systems/what for?
    e. In general, what functionalities does the enterprise system support?

2. **System and Users**
    a. What is the users' general impression of the enterprise system?
        i. Are the users, in general, satisfied with the system?
        ii. What are, in general, the strengths of the system from the perspective of the user?
        iii. What are, in general, the weaknesses of the system from the perspective of the user?
    b. Within the department, what are the hierarchical roles/classification levels of operational employees?
        i. Which of these classification levels use the enterprise system?
    c. Other than classification level, do the users of the enterprise system have different functional roles (i.e., perform different kind of tasks)?
    d. Are the classification levels/roles indicative of the complexity of tasks the users have to perform?
    e. Do different users have different authorization levels and/or access to different functionality?
        i. Is this related to the classification levels/roles of the users?
        ii. Are any users designated as a super user or a VIP user?
    f. Do different classification levels correspond to different levels of authorizations within the system?

3. **System and Tasks**
    a. How does each classification level/functional role use the system?
        i. Do they use the system differently?
    b. How do the tasks within each role differ (in terms of variety, routinization, significance, identity, and autonomy)?
    c. Are the tasks performed within each role typically structured/unstructured?
    d. Are the tasks performed each role typically dependent on the completion of other tasks?
    e. Are there multiple ways to complete the tasks?
    f. How is the completion of tasks typically assessed?

Appendix E: Survey Instrument

The survey instrument is below. Please note that minor formatting differences are apparent from the original survey.

QUT Queensland University of Technology	PARTICIPANT INFORMATION FOR QUT RESEARCH PROJECT

Survey Instrument: Understanding the Use and Benefits of Enterprise Systems
QUT Ethics Approval Number: 1500000309

RESEARCH TEAM

Principal Researcher:	Rebekah Eden: PhD Student
Associate Researchers:	Dr Erwin Fielt: Principal Supervisor, Science and Engineering Faculty Dr Glen Murphy: Associate Supervisor, QUT Business School Queensland University of Technology (QUT)

DESCRIPTION

This survey is part of the PhD research project Miss Rebekah Eden is undertaking to understand the usage and benefits of Enterprise Systems. In particular this research seeks to examine the user and technical characteristics that will influence whether an enterprise system is effectively used. You are invited to participate in this research project because you utilise Oracle Financials (also referred to as Oracle E-business Suite) in your workplace.

PARTICIPATION

Your participation will involve completing an anonymous survey with Likert scale responses (e.g. 1-7 scale strongly disagree to strongly agree) that will take approximately 10 minutes of your time.

Questions will include:

1. I try to apply Oracle Financials in new ways when solving a problem.
2. I am proficient in using Oracle Financials for my day to day tasks.
3. I enjoy challenging and difficult tasks at work where I'll learn new skills.

EXPECTED BENEFITS

It is expected that this project will not benefit you directly. However, the aggregated results can be used by the organization to improve the Oracle Financials and training outcomes.

RISKS

There are no risks beyond normal day-to-day living associated with your participation in this project.

PRIVACY AND CONFIDENTIALITY

All comments and responses will be treated confidentially. The survey is anonymous and your details are not required in any of the responses at any stage of the research. Any data collected as part of this project will be stored securely as per QUT's management of research data policy.

CONSENT TO PARTICIPATE

Submitting the survey is accepted as an indication of your consent to participate in this project.

QUESTIONS/FURTHER INFORMATION ABOUT THE PROJECT

If you have any questions or require any further information please contact one of the researchers listed below:

Rebekah Eden:	rg.eden@qut.edu.au	
Erwin Fielt:	e.fielt@qut.edu.au	07 3138 1207

CONCERNS/COMPLAINTS REGARDING THE CONDUCT OF THE PROJECT

QUT is committed to research integrity and the ethical conduct of research projects. However, if you do have any concerns or complaints about the ethical conduct of the project you may contact the QUT Research Ethics Unit on 07 3138 5123 or email ethicscontact@qut.edu.au. The QUT Research Ethics Unit is not connected with the research project and can facilitate a resolution to your concern in an impartial manner.

Thank you for helping with this research project. Please keep this sheet for your information

INSTRUCTIONS

Thank you for agreeing to participate in this study. Please complete all of the questions on each page, responding with open and honest answers.

SYSTEM USAGE

System usage refers to how often you use Oracle Financials. Please indicate the extent of agreement or disagreement on the following questions. Where 1 = strongly disagree, to 7= strongly agree.		
		Strongly Disagree *Neutral* *Strongly Agree*
1	I use Oracle Financials very intensively (many hours per day).	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
2	I use Oracle Financials very frequently (many times per day).	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
3	Overall, I use Oracle Financials a lot.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

TRANSPARENT INTERACTION		
Transparent interaction refers to whether you can access the content you require in the Oracle Financials. Please indicate the extent of agreement or disagreement on the following questions. Where 1 = strongly disagree, to 7= strongly agree.		
		Strongly Disagree *Neutral* *Strongly Agree*
4	When using Oracle Financials, I have seamless access to the content (e.g. data, information, etc.) that I need to complete my job task.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
5	When using Oracle Financials, I can easily obtain the content I need (e.g. data, information, etc.) to complete my job task because of Oracle Financials' interface.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
6	When using Oracle Financials, I can easily obtain the content (e.g. data, information, etc.) I need to complete my job task because of the physical characteristics of the device I use to access Oracle Financials.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

REPRESENTATIONAL FIDELITY		
Representational Fidelity refers to your perception of whether the information you generate from Oracle Financials is clear, correct, complete and meaningful. Please indicate the extent of agreement or disagreement on the following questions. Where 1 = strongly disagree, to 7= strongly agree.		
		Strongly Disagree *Neutral* *Strongly Agree*
7	When completing my job task using Oracle Financials, the information provided is complete.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
8	When completing my job task using Oracle Financials, the information provided is clear.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
9	When completing my job task using Oracle Financials, the information provided is correct.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
10	When completing my job task using Oracle Financials, the information provided is meaningful.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

INFORMED ACTION

Informed action refers to how you leverage Oracle Financials. Please indicate the extent of agreement or disagreement on the following questions. Where 1 = strongly disagree, to 7= strongly agree.								
		Strongly Disagree			*Neutral*			*Strongly Agree*
11	When I obtain information from Oracle Financials, I look for the relevant aspects that I can act upon to improve my task performance.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
12	When I obtain information from Oracle Financials, I seek ways to leverage good pieces of information for my job.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
13	When I obtain information from Oracle Financials, I avoid acting on information that I think is suspect.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐

TASK COMPLEXITY

Task complexity refers to how you perceive the complexity of your job tasks. Please indicate the extent of agreement or disagreement on the following questions. Where 1 = strongly disagree, to 7= strongly agree.								
		Strongly Disagree			*Neutral*			*Strongly Agree*
14	Generally, the job tasks I perform within Oracle Financials are easy.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
15	Typically, the job tasks I perform within Oracle Financials are ambiguous.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
16	Generally, the job tasks I perform within Oracle Financials are ill-structured.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
17	Typically, the job tasks I perform within Oracle Financials are simple.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐

COMPUTER COMPETENCE

Computer competence refers to your knowledge and skills associated with using Oracle Financials. Please indicate the extent of agreement or disagreement on the following questions. Where 1 = strongly disagree, to 7= strongly agree.								
		Strongly Disagree			*Neutral*			*Strongly Agree*
18	I am proficient in using Oracle Financials for my day-to-day tasks.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
19	I am proficient in using Oracle Financials for non-routine tasks that are relevant to my job.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
20	I am knowledgeable on how to execute my job tasks in Oracle Financials.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
21	I rarely make mistakes when completing my job tasks in Oracle Financials.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
22	I rarely require support when completing my job tasks in Oracle Financials.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
23	Colleagues often come to me seeking Oracle Financials assistance.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐

24	I am knowledgeable about the software my organization uses in addition to Oracle Financials.	1 2 3 4 5 6 7
25	I often apply Oracle Financials to new and different problems.	1 2 3 4 5 6 7
26	In general, I am capable at using Oracle Financials to solve problems at work.	1 2 3 4 5 6 7
27	In general, I am creative at using Oracle Financials to solve business problems.	1 2 3 4 5 6 7
28	In general, I am innovative when using Oracle Financials to solve business problems.	1 2 3 4 5 6 7
29	I try to apply Oracle Financials in new ways when solving a problem.	1 2 3 4 5 6 7

MOTIVATIONAL DISPOSITION

Motivational disposition refers to how you motivate yourself to develop and demonstrate your abilities. Please indicate the extent of agreement or disagreement on the following questions. Where 1 = strongly disagree, to 7= strongly agree.

		Strongly Disagree — *Neutral* — *Strongly Agree*
30	I am willing to select a challenging work assignment that I can learn a lot from.	1 2 3 4 5 6 7
31	I often look for opportunities to develop new skills and knowledge.	1 2 3 4 5 6 7
32	I enjoy challenging and difficult tasks at work where I'll learn new skills.	1 2 3 4 5 6 7
33	For me, development of my work ability is important enough to take risks.	1 2 3 4 5 6 7
34	I prefer to work in situations that require a high level of ability and talent.	1 2 3 4 5 6 7
35	I'm concerned with showing that I can perform better than my coworkers.	1 2 3 4 5 6 7
36	I try to figure out what it takes to prove my ability to others at work.	1 2 3 4 5 6 7
37	I enjoy it when others at work are aware of how well I am doing.	1 2 3 4 5 6 7
38	I prefer to work on projects where I can prove my ability to others.	1 2 3 4 5 6 7
39	I would avoid taking on a new task if there was a chance that I would appear rather incompetent to others.	1 2 3 4 5 6 7
40	Avoiding a show of low ability is more important to me than learning a new skill.	1 2 3 4 5 6 7

41	I'm concerned about taking on a task at work if my performance would reveal that I had a low ability.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
42	I prefer to avoid situations at work where I might perform badly.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

SELF-REGULATION

Self-regulation refers to how you develop and obtain knowledge, skills and abilities. Please indicate the <u>extent of agreement</u> or <u>disagreement</u> on the following questions. Where 1 = strongly disagree, to 7= strongly agree.

		Strongly Disagree … *Neutral* … *Strongly Agree*
43	When using Oracle Financials I try to completely understand what I am doing.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
44	When I become confused about performing a task using Oracle Financials, I try to increase my understanding of it (e.g. reading forums, help guides etc.).	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
45	If the task I have to complete using Oracle Financials is difficult, I try to learn more so that I can effectively execute the task.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
46	Before I use Oracle Financials to complete a new task, I try to briefly explore how the task needs to be organized.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
47	I regularly ask people who are more experienced with Oracle Financials, questions to ensure that I am using it correctly.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
48	When using Oracle Financials I try to determine which concepts I do not understand well.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
49	When completing tasks in Oracle Financials I set myself goals to ensure I am on track.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
50	If I get confused using Oracle Financials I make sure I resolve the confusion.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

ATTITUDE TOWARDS AN INFORMATION SYSTEM

Attitude towards an Information System refers to your feelings towards using Oracle Financials. Please indicate the <u>extent of agreement</u> or <u>disagreement</u> on the following questions. Where 1 = strongly disagree, to 7= strongly agree.

		Strongly Disagree … *Neutral* … *Strongly Agree*
51	Using Oracle Financials is a good idea.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
52	Oracle Financials makes my work more interesting.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
53	Working with Oracle Financials is fun.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
54	I like working with Oracle Financials.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

SYSTEM QUALITY		
System quality refers to how you perceive the quality of Oracle Financials. Please indicate the <u>extent of agreement</u> or <u>disagreement</u> on the following questions. Where 1 = strongly disagree, to 7= strongly agree		
		Strongly Disagree *Neutral* *Strongly Agree*
55	Oracle Financials is easy to use.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
56	Oracle Financials is easy to learn.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
57	Oracle Financials meets the department's requirements.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
58	Oracle Financials includes necessary features and functions.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
59	Oracle Financials always does what it should.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
60	Oracle Financials' user interface can be easily adapted to one's personal approach	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
61	Oracle Financials requires only the minimum number of fields and screens to achieve a task.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
62	All data within Oracle Financials is fully integrated and consistent.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
63	Oracle Financials can be easily modified, corrected or improved.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

INFORMATION QUALITY		
Information quality refers to how you perceive the quality of the information provided by Oracle Financials. Please indicate the <u>extent of agreement</u> or <u>disagreement</u> on the following questions. Where 1 = strongly disagree, to 7= strongly agree		
		Strongly Disagree *Neutral* *Strongly Agree*
64	Oracle Financials provides output that seems to be exactly what is needed.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
65	Information needed from Oracle Financials is always available.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
66	Information from Oracle Financials is in a form that is readily usable.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
67	Information from Oracle Financials is easy to understand.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
68	Information from Oracle Financials appears readable, clear and well formatted	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

69	Information from Oracle Financials is concise.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

INDIVIDUAL IMPACT

Individual Impact refers to how you believe Oracle Financials has affected you. Please indicate the extent of agreement or disagreement on the following questions. Where 1 = strongly disagree, to 7= strongly agree.

		Strongly Disagree — *Neutral* — *Strongly Agree*
70	Oracle Financials enhances my effectiveness in the job.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
71	Oracle Financials increases my productivity.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
72	Oracle Financials enhances my awareness and recall of job related information.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
73	I have learnt much through the presence of Oracle Financials.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

SATISFACTION

Satisfaction refers to your level of satisfaction with Oracle Financials. Please indicate the extent of agreement or disagreement on the following questions. Where 1 = strongly disagree, to 7= strongly agree.

		Strongly Disagree — *Neutral* — *Strongly Agree*
74	Overall, I am completely satisfied with Oracle Financials.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

SUMMARY QUESTION

The following questions are designed to assess your overall perception of various topics. Please indicate the extent of agreement or disagreement on the following questions. Where 1 = strongly disagree, to 7= strongly agree.

		Strongly Disagree — *Neutral* — *Strongly Agree*
75	Overall, I believe I have the right aptitude and attitude in using Oracle Financials for my job tasks.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
76	Overall, I believe I possess the necessary skills and motivation in using Oracle Financials to complete my job tasks.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
77	Overall, the impact of Oracle Financials on me has been positive.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
78	Overall, I effectively use Oracle Financials to complete my job tasks.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
79	Overall, I believe the Oracle Financials' system quality is satisfactory.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

80	Overall, I believe the Oracle Financials' information quality is satisfactory.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

GENERAL DEMOGRAPHICS

Please answer the following demographic questions:

81	What is your gender?	☐ Male ☐ Female
82	What is your age?	☐ 17 years or younger ☐ 18-25 years ☐ 26-35 years ☐ 36-45 years ☐ 46-55 years ☐ 56-65 years ☐ 66 years and older
83	How many years of experience do you have using Oracle Financials?	☐ Less than 1 year ☐ 1-2 years ☐ 3-4 years ☐ 5-9 years ☐ 10-14 years ☐ 15-19 years ☐ 20-24 years ☐ 25 years or more
84	How long have you been working for [Organization name]?	☐ Less than 1 year ☐ 1-2 years ☐ 3-4 years ☐ 5-9 years ☐ 10-14 years ☐ 15-19 years ☐ 20-24 years ☐ 25 years or more

85	What is the highest level of education that you attained?	☐ Secondary Education ☐ Certificate I, II, III, or IV ☐ Advanced Diploma/Diploma ☐ Bachelor's Degree ☐ Graduate Diploma/Graduate Certificate ☐ Postgraduate Other, please specify:
86	What is your classification level within your organization?	**PROFESSIONAL** ☐ HEW1 ☐ HEW2 ☐ HEW3 ☐ HEW4 ☐ HEW5 ☐ HEW6 ☐ HEW7 ☐ HEW8 ☐ HEW9 ☐ HEW10 **ACADEMIC** ☐ Level A ☐ Level B ☐ Level C ☐ Level D ☐ Level E **Other, please specify:**
87	What is your job role within your organization?	**PROFESSIONAL** ☐ Assistant Administration Officer ☐ Assistant Finance Officer ☐ Administration Officer ☐ Budget Officer ☐ Finance and Budget Coordinator ☐ Finance Officer ☐ Finance Manager ☐ Personal Assistant ☐ Project Officer ☐ Senior Administration Officer ☐ Senior Finance Officer **ACADEMIC** ☐ Associate Lecturer ☐ Lecturer ☐ Senior Lecturer ☐ Associate Professor ☐ Professor **Other, please specify:**

88	What faculty, institute, or division do you belong to?	☐ Caboolture Campus ☐ Central Allocations ☐ Chancellery ☐ Creative Industries Faculty ☐ Division of Administrative Services ☐ Division of Finance and Resource Planning ☐ Division of International and Development ☐ Division of Research and Commercialisation ☐ Division of Technology, Information and Learning Support ☐ Faculty of Education ☐ Faculty of Health ☐ Faculty of Law ☐ Institute for Future Environments ☐ Institute of Health and Biomedical Innovation (IHBI) ☐ QUT Bookshop ☐ QUT Business School ☐ Science and Engineering Faculty
89	What functionality do you use in Oracle Financials (select all that applies)?	☐ Approvals ☐ Accounts Payable ☐ Accounts Receivable ☐ Cash Management ☐ Fixed Assets ☐ General Ledger ☐ iAssets ☐ iExpenses ☐ Procurement ☐ Procurement Catalogue (Staples) ☐ Reports **Other, please specify:**

Appendix F: Descriptive Statistics

Items	Likert Scale Response (%)							Mean	STD
	1	2	3	4	5	6	7		
Effective Use: Transparent Interaction									
EUTI1	1.8	13.0	13.9	16.6	26.9	17.5	10.3	4.47	1.580
EUTI2	4.0	11.7	16.1	18.4	26.5	15.7	7.6	4.29	1.580
EUTI3	2.7	9.0	13.0	22.8	24.7	21.1	6.7	4.48	1.482
Effective Use: Representational Fidelity									
EURF1	2.2	4.5	11.7	17.9	26.5	27.4	9.9	4.83	1.435
EURF2	2.2	8.5	12.1	21.1	25.6	22.0	8.5	4.59	1.492
EURF3	0.4	2.2	4.0	16.6	28.7	33.6	14.3	5.29	1.197
EURF4	1.8	5.4	7.6	23.8	26.5	25.6	9.4	4.82	1.387
Effective Use: Informed Action									
EUIA1	1.8	6.7	6.7	19.3	28.3	25.1	12.1	4.89	1.445
EUIA2	1.8	4.0	5.4	19.7	26.1	30.0	13.0	5.06	1.374
EUIA3	8.1	9.4	5.8	22.4	12.6	22.9	18.8	4.66	1.865
Effective Use (Global Item)									
CIEU	1.3	1.8	4.5	10.8	30.0	35.9	15.7	5.37	1.234
User Capital: Attitude towards Using Information Systems									
ATT2	7.2	11.2	12.6	29.1	22.9	11.2	5.8	4.06	1.558
ATT3	17.5	18.4	14.8	30.9	10.8	4.0	3.6	3.26	1.583
ATT4	9.9	7.6	12.1	31.4	21.5	11.7	5.8	4.05	1.590
User Capital: Metacognitive Self-regulation									
SR1	0.4	0.9	2.7	7.7	17.5	35.4	35.4	5.89	1.151
SR2	0.4	2.3	4.5	4.9	18.4	35.4	34.1	5.81	1.252
SR3	0.0	0.4	0.9	7.6	16.6	39.5	35.0	5.99	0.989
SR4	0.9	0.4	5.0	13.5	26.0	29.1	25.1	5.51	1.248
SR6	1.3	2.3	8.1	23.3	23.3	27.4	14.3	5.04	1.352
SR7	2.7	6.7	10.8	33.1	17.5	18.4	10.8	4.54	1.487
SR8	0.4	0.5	3.1	9.4	20.6	38.6	27.4	5.74	1.124
User Capital: Motivational Disposition: Mastery									
MDM1	0.9	0.9	1.3	6.3	24.2	42.2	24.2	5.75	1.081

Items	Likert Scale Response (%)							Mean	STD
	1	2	3	4	5	6	7		
MDM2	0.4	0.5	0.0	5.8	21.6	39.9	31.8	5.95	0.976
MDM3	0.0	0.9	0.4	3.6	26.5	38.6	30.0	5.91	0.943
MDM4	1.3	4.1	2.7	17.0	27.8	27.8	19.3	5.26	1.356
MDM5	0.4	0.5	0.9	11.2	27.8	38.1	21.1	5.64	1.038
User Capital: Motivational Disposition: Performance									
MDP2	9.0	10.3	13.0	27.8	23.3	11.2	5.4	4.01	1.590
MDP3	4.9	4.1	7.6	29.1	27.4	19.3	7.6	4.58	1.443
MDP4	5.8	7.7	8.1	30.9	24.2	16.1	7.2	4.37	1.522
Motivational Disposition: Avoidance									
MDA1	14.3	26.5	25.1	18.0	10.3	4.0	1.8	3.03	1.445
MDA3	19.7	29.2	17.0	13.5	15.2	4.5	0.9	2.93	1.541
MDA4	18.4	24.6	15.7	20.7	13.9	5.8	0.9	3.08	1.553
User Capital: User Competence: Skills									
CC1	0.4	2.7	4.5	11.7	21.1	34.0	25.6	5.55	1.297
CC3	1.3	1.3	1.8	12.1	22.9	39.5	21.1	5.57	1.206
CC4	0.9	2.7	9.9	18.4	21.5	36.3	10.3	5.07	1.320
CC5	2.2	4.5	12.6	13.0	21.5	32.3	13.9	5.00	1.511
User Capital: User Competence: Finesse									
CCF1	13.0	16.1	16.6	23.4	15.2	12.6	3.1	3.62	1.669
CCF3	8.5	11.7	12.1	27.3	23.8	11.2	5.4	4.01	1.592
CCF4	9.0	12.5	12.1	30.9	17.5	13.5	4.5	3.94	1.598
CCF5	9.0	11.2	16.1	27.4	21.1	10.3	4.9	3.91	1.577
User Capital (Global Items)									
CIUC1	0.4	1.4	4.9	12.1	25.6	38.6	17.0	5.45	1.176
CIUC2	0.0	0.9	3.1	10.8	28.3	37.2	19.7	5.57	1.075
Information Systems Success: Individual Impact									
II1	1.8	6.7	8.1	22.9	30.9	24.2	5.4	4.69	1.346
II2	4.9	7.6	9.4	26.9	26.5	20.2	4.5	4.41	1.470
II3	3.1	7.7	6.7	30.5	30.5	17.0	4.5	4.47	1.355
II4	5.3	7.2	9.4	27.4	25.6	18.4	6.7	4.43	1.510
CIII	3.1	4.5	10.8	22.4	22.9	26.4	9.9	4.76	1.474

Items	Likert Scale Response (%)							Mean	STD
	1	2	3	4	5	6	7		
Information Systems Success: Information Quality									
IQ1	4.0	11.2	13.0	34.1	27.8	8.6	1.3	4.01	1.300
IQ2	2.7	9.0	16.1	22.9	32.3	13.9	3.1	4.27	1.363
IQ3	7.2	12.1	19.3	21.9	26.0	9.9	3.6	3.91	1.518
IQ4	3.6	10.8	22.4	21.5	28.3	11.2	2.2	4.03	1.385
IQ5	6.7	13.0	14.8	28.7	25.6	9.0	2.2	3.89	1.445
IQ6	2.7	8.5	11.2	33.7	33.2	8.5	2.2	4.21	1.238
CIIQ	2.2	4.5	11.2	18.4	30.9	24.7	8.1	4.78	1.387
Information Systems Success: System Quality									
SQ1	8.5	10.3	17.1	17.0	22.9	20.6	3.6	4.12	1.651
SQ2	7.2	7.6	18.4	17.5	27.3	18.4	3.6	4.20	1.562
SQ3	3.6	2.7	9.9	24.2	31.4	24.2	4.0	4.66	1.321
SQ4	4.0	4.1	11.2	30.0	28.7	19.3	2.7	4.44	1.324
SQ5	5.8	10.8	21.1	30.5	21.1	8.5	2.2	3.85	1.380
SQ6	12.6	17.9	19.3	31.8	13.0	4.1	1.3	3.32	1.415
SQ7	10.8	18.8	19.7	24.2	19.8	4.9	1.8	3.45	1.478
SQ8	6.3	10.8	17.9	34.5	18.8	8.6	3.1	3.87	1.407
SQ9	14.3	12.6	17.5	38.1	11.2	4.5	1.8	3.40	1.438
CISQ	3.6	5.4	13.5	20.6	28.7	20.6	7.6	4.58	1.465
Information Systems Success: System Use									
SU1	21.5	12.6	9.0	13.0	14.3	11.7	17.9	3.93	2.184
SU2	11.2	12.1	9.0	9.9	15.2	17.0	25.6	4.59	2.094
SU3	6.7	10.8	10.3	9.0	18.4	17.0	27.8	4.84	1.952
Information Systems Success: User Satisfaction									
US1	4.5	15.2	11.7	18.8	29.2	19.3	1.3	4.16	1.516
Task Complexity: Task Ambiguity									
TC2	9.9	21.1	16.5	29.2	15.2	6.3	1.8	3.44	1.472
TC3	12.6	24.7	17.9	25.1	11.2	4.9	3.6	3.27	1.550
Task Complexity: Task Difficulty									
TC1*	11.7	27.8	25.1	14.8	11.7	6.7	2.2	3.16	1.519
TC4*	6.3	21.5	22.4	21.1	14.8	10.3	3.6	3.62	1.549
*scale reversed									

Appendix G: Factor Analysis for Reflectively Measured Items

Items	Factors										
				Effectively Use			Motivational Disposition			User Competence	
	Attitude towards IS	System Use	Self-Regulation	Representational Fidelity	Transparent Interaction	Informed Action	Mastery	Prove	Avoidance	Knowledge / skills	Finesse
SU1		**.788**									
SU2		**.864**									
SU3		**.809**									
EUTI1				*.335*	**.655**						
EUTI2				*.498*	**.685**						
EUTI3				*.475*	**.598**						
EURF1				**.782**							
EURF2				**.842**							
EURF3				**.649**							
EURF4				**.758**							
EUIA1						**.790**					
EUIA2						**.730**					*.312*
EUIA3						**.370**					
CC1		.361								**.610**	
CC3										**.707**	
CC4										**.693**	
CC5				*.321*						**.656**	
CCF1											**.711**
CCF3											**.852**
CCF4											**.848**
CCF5											**.827**
MDM1							**.747**				
MDM2							**.804**				
MDM3							**.758**				
MDM4							**.685**				
MDM5							**.655**				
MDP2								**.699**			
MDP3								**.646**			
MDP4								**.798**			
MDA1									**.696**		
MDA3									**.914**		
MDA4									**.815**		

SR1			**.696**								
SR2			**.653**								
SR3			**.725**								
SR4			**.779**								
SR6			**.658**		.313						
SR7			**.575**								*.346*
SR8			**.649**								
ATT2	**.636**		*.301*								
ATT3	**.726**										
ATT4	**.688**			*.400*							

Appendix H: Correlation Matrix of User Capital, Effective Use, and Dimensions of IS Success

	Effective Use	Individual Impact	Information Quality	System Quality	User Capital	User Satisfaction
Effective Use	1					
Individual Impact	0.690	1				
Information Quality	0.673	0.679	1			
System Quality	0.710	0.732	0.795	1		
User Capital	0.689	0.631	0.511	0.608	1	
User Satisfaction	0.717	0.797	0.755	0.791	0.640	1