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TRUST AND RISK IN CONSUMER ACCEPTANCE OF E-SERVICES

THESIS

Submitted in fulfilment of the requirements for the Degree of Doctor of Philosophy in the field of Information Systems

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Date: 24 February 2015

DECLARATION

I declare that this thesis is my own, unaided work except as acknowledged in the text. It is being submitted for the degree of Doctor of Philosophy in Information Systems to the University of the Witwatersrand, Johannesburg. It has not been submitted before for any other degree or examination at this or any other University.

Signed _____

Jian Mou

February 2015

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ABSTRACT

Electronic services (or e-services) are defined as any service whose delivery is based on Internet, IT and communications technology, and which incorporates a large self-service component. They offer consumers the promise of increased convenience, lower-cost of transacting, greater choice and accessibility by eliminating space and time constraints to their interactions with service providers. Benefits of e-services cannot however materialize without consumer acceptance. Unfortunately, uncertainty and fears of opportunism still characterize the online context and varying degrees of consumer acceptance and engagement in use of e-services has thus been observed. The extant literature considers consumer perceptions of risk and their trust beliefs amongst the most important psychological states influencing their online behavior. However, despite the number of empirical studies that have explored the effects of trust and risk perceptions on consumer acceptance of e-services, the field remains fragmented and the posited research models are contradictory. For example, the trust-risk relationship has been modeled differently in past studies and the causal relationship between trust and risk perceptions has not been clarified. In addition, research into the antecedents of trust has not been integrated to provide an answer as to which are the most significant antecedents. Furthermore, past research has paid more attention to initial trust or risk perceptions and has not adequately examined whether these perceptions change over time or how they come to influence later stage acceptance of e-services. To address these gaps in our understanding of trust and risk in consumer acceptance of e-services, this thesis adopted three research designs, namely meta-analytic approaches, cross-sectional surveys and longitudinal designs.

First, a meta-analytic study[1] was used to aggregate empirical findings from across prior studies in e-service. This allowed the nature of the relationship between trust, perceived risk, and acceptance of e-services to be synthesized and for competing nomological models of the trust-risk-acceptance relationship to be compared. 52 studies were examined and it was found that trust is most important to form consumer positive attitude for acceptance. By comparing competing models, it found that trust and risk are significantly related and trust may influence risk in consumer acceptance of e-services.

[1] Presented at 34th International Conference on Information Systems (ICIS 2013), Milano, Italy.

Moderator analysis within the meta-analysis was also carried out to determine if different types of consumer cultures (e.g., Western versus Eastern), different types of e-services (e.g., commercial versus non-commercial), or different objects of trust (e.g., trust in vendor versus trust in website technology) influence the relationships between trust, risk and acceptance of e-services. Furthermore, the antecedents of trust as suggested by past research were examined via a second meta-analysis of 59 prior studies[2]. The antecedents of trust were classified as vendor and institution-based antecedents, technological-based antecedents, knowledge-based antecedents, and consumer characteristics-based antecedents. Technological-based antecedents were found the most significant antecedents of trust. For all antecedents, studies classified as having been carried out in Eastern cultures reported on average stronger effect sizes than those carried out in Western cultures.

In addition to the meta-analytical studies, this thesis also carried out cross-sectional and longitudinal investigations to study trust and risk in an understudied context of e-services, namely consumer acceptance of online health information services. The motivation to adopt this context is because previous studies of e-services were mostly focused on commercial (e.g., e-commerce, e-shopping and e-banking, etc) and mostly on non-commercial context such as e-government. However, e-health services are relatively under-explored. Moreover, the Web has become an important health information dissemination channel. People are increasingly searching for health information online and engaging in the self-management of their health. Trust and risk are considered important to the online health context, and it therefore served as an appropriate e-service context for empirical analysis.

Two cross-sectional studies[3,4] were carried out to explain user acceptance of online health information services. This cross-sectional work was underpinned by multiple theoretical perspectives namely Theory of Reasoned Action (TRA), Health Belief Model (HBM) and Extended Valence Framework (EVF). Findings showed that multiple dimensions of trust (trust in provider, trust in website and trust in institutional structures) have both direct and indirect effects, via perceived usefulness, on consumer acceptance.

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[2] Presented at 18th Pacific Asia Conference on Information Systems (PACIS 2014), Chengdu, China.
[3] Forthcoming at 35th International Conference on Information Systems (ICIS 2014), Auckland, New Zealand.
[4] Forthcoming at 25th Australasian Conference on Information Systems (ACIS 2014), Auckland, New Zealand.

One-dimensional risk was not found to have a significant influence on consumer acceptance. However, multi-dimensional risk (performance risk, psychological risk and time risk) did combine with health belief variables such as perceived susceptibility and severity to influence consumer acceptance.

Because cross-sectional data is limited in its ability to address causal connections amongst phenomena, two longitudinal investigations were also carried out. These investigations were used to explain whether trust beliefs and risk perceptions change over time in consumer acceptance of e-services, how early stage trust and risk perceptions influence later stage acceptance and usage behaviors, and whether there is reciprocal causality between trust and risk perceptions. This work was underpinned by TRA and Expectation-Confirmation Theory (ECT), and employed both path modeling and cross-lagged structural equation modeling techniques. The results showed that trust, risk perceptions and perceived usefulness are important to the prediction of consumer acceptance of online health services at both the early and later usage phases[5]. Furthermore, trust in provider and trust in website have reciprocal relations and empirical data supported the influence of risk perceptions on trust.

Through the meta-analytic design, cross-sectional approaches and longitudinal designs, this thesis contributes to research on e-services in a number of ways. First, meta-analytic approaches integrated the available evidence from prior studies, which resulted in the generation of a dataset which was larger in scope and scale than could feasibly be achieved in any single research study. This dataset could then be used to compare competing nomological models found in the literature. In so doing, results have improved our understanding of how trust and risk are related, how they combine to influence consumer acceptance, as well as identifying the most important antecedents of trust. Results provide a benchmark against which future studies can compare their effect sizes. Moreover, by examining the heterogeneity of effect sizes, the meta-analysis has also identified moderators that can account for observed inconsistencies in the effect sizes reported by prior studies. Together, the findings have extended our understanding of how trust and risk relate to e-service acceptance in different e-service contexts, across

[5] Presented at 18th Pacific Asia Conference on Information Systems (PACIS 2014), Chengdu, China.

different consumer cultures, and whether trust in the vendor or technology platform has relatively greater importance to consumers.

Second, this thesis also integrated trust into HBM to examine online health information seeking as both a health behavior and online consumer behavior. Results help us better understand this specific case of e-service acceptance.

Third, this study is also the first to develop and validate a dynamic trust and risk model in consumer acceptance of online health information services. The longitudinal design integrates trust into the theoretical framework of TRA and ECT to develop the dynamic research model. Tests of the model have made a key contribution to the development of a theory that explains the dynamic nature of e-service acceptance. Furthermore, the cross-lagged longitudinal design contributed to our understanding of the casual relationship between consumers' trust and risk perceptions in the context of online health information services.

Taken together this thesis illustrates how meta-analysis and structural equation modeling can be integrated together to approach the fragmented and contradictory nature of the field. Moreover, this thesis addresses the lack of longitudinal studies on acceptance, and presents a novel method, cross-lagged structural equation modeling, to examine controversial causal relationships within the field of Information Systems.

This thesis also has important practical implications. It provides insights into the relative importance of trust and risk perceptions necessary to inform practitioners on risk reduction and trust-building mechanisms. The investigation into the antecedents of trust reveals especially important factors which are within the control of e-service providers. With this understanding, practitioners can be better positioned to establish their online service offerings. Website designers can also benefit from understanding the extent to which particular antecedents of trust (e.g., ease of use and system quality) are important for e-service acceptance. By studying the online health information services context, this thesis has also shed light on the general perceptions and attitudes of consumers towards this high-potential area of e-service.

Key words: Trust, Risk, Perceived Usefulness, Perceived Susceptibility, Perceived Severity, Health Beliefs, Electronic Services, Online Health Services, Meta-analysis, Longitudinal Study, Cross-lagged Design.

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CHAPTER 1: INTRODUCTION TO THE PROBLEM OF TRUST AND RISK IN E-SERVICES

1.1 Background

In the last two decades, the Internet and information technology (IT) have had widespread usage and have rapidly developed. This has resulted in increased online transactions and information sharing possibilities. In particular, the conduct of service transactions has changed, from face-to-face service to online information or e-services exchange. In this thesis, e-service is defined as any service whose delivery is based on Internet, IT and communications technology, and which incorporates a large self-service component. E-services include all forms of interaction and transaction taking place between service providers and consumers over electronic communication networks in contexts that are both commercial (e.g., e-tailing and e-banking) and non-commercial (e.g., e-government and e-health). E-services offer consumers the promise of increased convenience, lower-cost of transacting increased choice of providers, and greater accessibility by eliminating space and time constraints to their interactions with service providers (de Ruyter et al., 2001; Rust and Kannan, 2003).

Despite this potential, uncertainty and fears of opportunism still characterize the online context and varying degrees of consumer acceptance and engagement in the use of e-services has been observed (Featherman and Pavlou, 2003; Kim et al., 2009a). The uncertainty and opportunism inherent in e-services results in increased consumer perceptions of risk and elevates the need for trust in electronic exchange relationships (Pavlou, 2003). Lack of trust and perceived risk are identified as inhibitors that challenge the increased spread of e-services (Pavlou, 2003). Consequently, consumers' risk perceptions and their trust beliefs are considered amongst the most important psychological states influencing their online behaviors (Pavlou and Gefen, 2002; Pavlou, 2003; Kim et al., 2008).

1.2 Research Problems and Objectives

Although information systems (IS) researchers have long been interested in understanding trust and risk perceptions in consumer acceptance of e-services (e.g.,

Gefen, 2002a; Pavlou, 2003; Pavlou and Gefen, 2004), previous studies have been inconsistent in modeling the relationship between trust and risk, and how they come to influence acceptance of e-service in terms of consumer attitudes and behavioral intentions.

Many studies theorized that trust negatively affects perceived risk (e.g., Jarvenpaa et al., 2000; Gefen, 2002b; Pavlou, 2003; Pavlou and Gefen, 2004; Kim et al., 2008), but others have theorized that perceived risk negatively affects trust (e.g., Horst et al., 2007; Dinev and Hart, 2006). Furthermore, some studies argue that trust and perceived risk are independent predictors of online consumer purchase (e.g., Song, 2010; Bianchi and Andrews, 2012), whilst others model risk as moderating the effects of trust on consumer attitudes and behavioral intentions or model trust as moderating the effect of risk perceptions on consumer attitudes and behavioral intentions. Consequently, the causal relationship between trust and risk is unclear and their roles in e-service acceptance require further attention (Gefen et al., 2003b; Lim, 2003). In addition to the field's confusion surrounding the trust-risk relationship, the antecedents of trust are not yet well understood. For example, the extent to which trust and risk are influenced by technology factors such as perceived ease of use and perceived usefulness, vendor and institution related factors such as reputation, security concerns and privacy concerns or individual factors such as disposition to trust have not been sufficiently well established, and we consequently lack a complete understanding of how trust and risk perceptions are determined. Moreover, past trust-risk research has paid more attention to initial trust or risk perceptions (e.g., McKnight et al., 2002; Gefen, 2002a; Yi et al., 2013) and trust or risk building (e.g., Pavlou and Gefen, 2004), but has not adequately examined the dynamic nature of trust and risk perceptions. i.e., whether trust and risk perceptions change over time, and how early-stage trust and risk perceptions might influence later-stage adoption and use. The need to address this gap and to examine the dynamic nature of trust and risk through longitudinal research designs has been noted in the literature (e.g., Urban et al., 2009).

Consequently, this study aims to answer some fundamental research questions:

RQ1. What is the overall relationship[6] between trust and risk perceptions in e-service?

RQ2. What is the overall relationship between consumer acceptance of e-services (reflected in their attitudes and intentions toward the use of e-services) and their trust and risk perceptions?

RQ3. What are the antecedents of trust in consumer acceptance of e-services?

RQ4. To what extent do trust and risk perceptions change over time and how do those changes influence consumer usage behaviors?

To address these questions, this thesis adopted three research designs, namely meta-analytical design, cross-sectional survey design, and longitudinal design.

More specifically, to address research questions RQ1, RQ2 and RQ3, this study carried out meta-analytical investigations of past studies in e-service, including studies carry out across a number of commercial and no-commercial e-service contexts. This is used to synthesize the available evidence regarding (a) the relationships between trust and risk, (b) the effects of trust and risk on consumer acceptance of e-service, and (c) the effects of selected antecedents on trust. The meta-analytic studies reported in Chapter 3 and 4 can help identify which of a multitude of competing nomological networks is best supported by past empirical evidence. This was achieved by using the data from the meta-analysis to test and compare various models relating trust, risk and consumer acceptance. Moreover, the meta-analyses also helped answer a secondary question regarding whether any heterogeneity in effect sizes between trust, risk and consumer acceptance - as reported in prior studies – is explained by moderator variables such as population under study (e.g., students versus consumers), consumer culture (e.g., Western versus Eastern), and type of e-service (e.g., commercial versus non-commercial). RQ2 is further addressed in two cross-sectional studies reported in Chapter 5 and Chapter 6. These studies adopted the online consumer health information setting as a specific e-services context to explore RQ2.

[6] In the context of a meta-analysis, an overall relationship refers to effect sizes, such as weighted mean effect size and true-score correlation.

To address research question RQ4, this study carried out longitudinal investigations to determine whether trust and risk perceptions change over time and how early-stage perceptions influence consumer attitudes toward continued usage of e-services. This was reported in Chapter 7 and Chapter 8 and continues with the online health information service context. Further Chapter 8 address RQ1 by adopting a cross-lagged SEM design to determine the causality between trust and risk and continuances with the online health information context. The outline of this study mapped to proposed thesis chapters is reported in Figure 1, and explained further below.

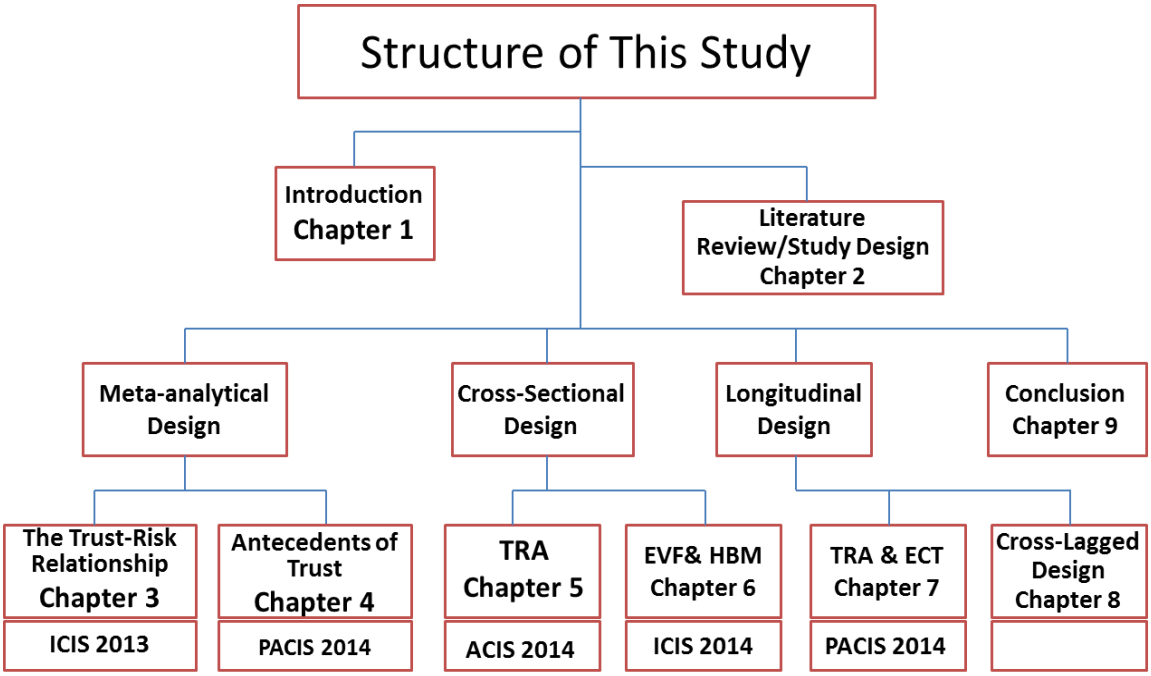


Figure 1: The Outline of This Study Mapped to Thesis Chapter

The structure of this thesis is as follows. This thesis totally includes 9 Chapters, Chapter 1 and Chapter 2 aim to introduce the problems of trust and risk in e-service, literature review and study design. Chapter 3 and Chapter 4 adopted meta-analytic approaches to address the effects of trust and risk perceptions, the antecedents of trust, and the casual relationship between trust and risk. Chapter 5 and Chapter 6 adopted two cross-sectional studies that aim to explain user acceptance of online health information services from a static perspective. These chapters draw on Theory of Reasoned Action (TRA), Extended Valence Framework (EVF) and Health Belief Model (HBM). Chapter 7 and Chapter 8 carried out longitudinal investigations to address whether trust beliefs and risk

perceptions change over time in consumer acceptance of e-services, and how early stage trust and risk perceptions influence later stage acceptance and usage behaviors, as well as the reciprocal causality between trust and risk perceptions. Theory of Reasoned Action (TRA) and Expectation Confirmation Theory (ECT) were adopted for these longitudinal investigations. The last Chapter discusses the contributions and limitations of this thesis. Chapter 3 through Chapter 7 have already been published, and the publication status is reported in Table 1. In all cases, the papers have been updated and improved for the purpose of the thesis.

Chapter	Status
3	Mou, J., and Cohen, J.F. 2013. "Trust and Risk in Consumer Acceptance of e-Services: A Meta-Analysis and a Test of Competing Models," Proceedings of the 34th International Conference on Information Systems (**ICIS**), Milan, Italy.
4	Mou, J., and Cohen, J.F. 2014. "Trust in Electronic-Service Providers: A Meta-Analysis of Antecedents," Proceedings of the 18th Pacific Asia Conference on Information Systems (**PACIS**), ChengDu, China.
5	Mou, J., and Cohen, J.F. 2014. "Trust, Risk and Perceived Usefulness in Consumer Acceptance of Online Health Services," Forthcoming at Proceedings of the 25th Australasian Conference on Information Systems (**ACIS**), Auckland, New Zealand.
6	Mou, J., and Cohen, J.F. 2014. "Trust, Risk and Health Beliefs in Consumer Acceptance of Online Health Services," Forthcoming at Proceedings of the 35th International Conference on Information Systems (**ICIS**), Auckland, New Zealand.
7	Mou, J., and Cohen, J.F. 2014. "A Longitudinal Study of Trust and Perceived Usefulness in Consumer Acceptance of an E-Service: The Case of Online Health Services," in Proceedings of the 18th Pacific Asia Conference on Information Systems (**PACIS**), ChengDu, China.
8	Mou, J., and Cohen, J.F. 2014. "Testing Casual Relationships between Trust and Risk: A Cross-Lagged Structural Equation Modeling Approach," Working Paper.

Table 1: Chapter Publication Status

1.3 Research Motivations

Managing consumer trust and perceptions of online risk are considered critical to the continued development and success of the online service environment (Pavlou, 2003). However, the efforts of e-service providers to mitigate risk perceptions and build trust are hampered by a lack of understanding of how trust and risk perceptions interact and how they come to influence online behavior. This study determined not only the antecedents of trust, and the consequences of trust and risk, but also investigated the causal relationships between trust and risk as well as the dynamic nature of trust and risk.

This study therefore aims to examine how trust and risk influence consumer acceptance of e-services, and determine the antecedents of trust, as well as to develop a cross-

lagged model to explain the relationship between trust and risk and how temporal changes in consumer's risk perceptions and trust beliefs toward e-services will influence their use of e-services.

1.4 Contributions of the Study

This study aims to address (1) the inconsistent treatment of trust and risk perceptions in the study of consumer acceptance of e-services (i.e., the relationship between trust and risk, the key antecedents of trust, and the key consequences of trust and risk), (2) lack of research of temporal changes in consumer's risk perceptions and trust beliefs, and (3) how those changes influence consumer attitudes, intentions and actual usage of e-services. The meta-analyses addressed the trust-risk relationship, the antecedents of trust, and the effects on acceptance by integrating available evidence from prior studies on trust and risk perceptions. The cross-sectional studies examine the effects of trust and risk on acceptance in the understanded context of online health information services. The longitudinal studies addressed the problem of temporal changes by collecting primary data at two points in time and lack of evidence on the causal relationships between trust and risk.

This thesis contributes to research on e-services in a number of ways. The major contributions of this study are determining the antecedents of trust and the consequences of trust and risk. This is the first study to use a meta-analysis to examine the antecedents of trust in e-services context. The meta-analytic results provide a benchmark against which future studies can compare their effect sizes. Furthermore, the MASEM analysis allows for competing nomological models found in the literature to be tested and compared. This improves our understanding of how trust and risk are related and how they combine to influence consumer acceptance. Also, by examining the heterogeneity of effect sizes, the meta-analysis identifies some potentially important moderators (e.g., the object of trust and consumer culture) which hitherto have been unexplored. This study is also the first to develop and validate a dynamic nature of trust and risk model in the context of online health e-services. The longitudinal design integrates trust and risk into the theoretical framework of TRA and ECT to develop a dynamic e-services research model. Tests of the model will make a key contribution to the development of a theory that explains the dynamic nature of e-service acceptance. Moreover, as a methodological contribution, the thesis illustrates how meta-analysis and structural equation modeling

can be integrated together to approach the fragmented and contradictory nature of the field. Furthermore, the application of the cross-lagged SEM design can help IS researchers better understand how this method can be used to study controversial causal relationships in our field.

Given the potential of e-services[7], this study's investigations are also important for practitioners. This study provides insights into the relevant importance of trust and risk perceptions which can be useful for guiding practitioners to focus on improving e-service acceptance through additional risk reduction mechanisms or to focus on increasing trust through implementation of trust-building mechanisms. The investigations into the antecedents of trust reveal some of these mechanisms which are within the control of e-service providers, as well as those outside of their control but of which they should be aware. With this understanding, practitioners can be better positioned to establish their online service offerings. Website designers also benefit from understanding whether particular antecedents of trust beliefs e.g., ease of use and system quality are important for e-service acceptance. E-service providers are often unaware of how to prioritize efforts to improve user acceptance of their online services. Without understanding whether trust in their service is grounded in technology factors, usage experience, site content, provider's brand reputation, or even in individual consumer characteristics, e-service providers will poorly positioned to invest scare resources towards enhancing consumer acceptance. By adopting online health information services as a context for the longitudinal study, results also shed light on the general perceptions and attitudes of consumers towards this high-potential area of e-service.

The next chapter presents a review of the literature on e-services, and defines the study's constructs of trust and risk in e-services, and past studies into the antecedents and consequences of trust and risk e-services.

[7] Recent reports indicate that 240 million Europeans bough online in 2013 (PostNord, 2014). 51% smart phone owners carried out mobile banking in 2013 (Federal Reserve Board report, 2014). 72% of Internet users look online for health-related information in 2013 (Fox and Duggan 2013) and it is estimated that there will be around 1.96 billion social network users in 2015 (Statista, 2015).

CHAPTER 2: LITERATURE REVIEW AND STUDY DESIGN

2.1 Literature Review

This chapter first introduces trust and risk. It then presents a literature review on e-services, trust and risk in consumer adoption of e-service, and a discussion of the relationship between trust and risk, as well as the antecedents of trust and the consequence of trust and risk. Then, study design and research methods that applied in this thesis are outlined in greater detail together with the theoretical frameworks adopted in this thesis.

2.1.1 Trust and Risk in Human Choice and Behavior

Trust is essential for understanding interpersonal and group behavior, managerial effectiveness, economic exchange, social or political stability and organizational behavior (Hosmer, 1995). Multiple perspectives on trust have been presented by prior researchers (e.g., Hosmer, 1995; Rousseau et al., 1998). First, trust can be considered from a psychological perspective. From this perspective, trust refers to an individual's expectation about the outcomes of an uncertain event, given conditions of personal vulnerability and lack of control over the actions of others (Hosmer, 1995). Thus trust involves cognitive processes namely, feelings of vulnerability and expectations of how the partner is likely to behave across time (Simpson, 2007). Trust is a decision to accept vulnerability (Rousseau et al., 1998), and the development of trust involves a process of uncertainty reduction based on the trustor's belief that their partner is trustworthy (Simpson 2007). Second, trust can be considered from a social perspective. Here, trust is a property of collective units (the social system) based on the relationships among people and not on individual psychological states (Lewis and Weigert, 1985). Trust thus serves a social function. Third, trust can be considered from the economic perspective. Here, economic exchange theory sees trust as a specialized form of interpersonal behavior (Hosmer, 1995). In economic exchange, trust reduces contractual bureaucracy and speeds establishment of flexible relationships (McLain and Hackman, 1999). In the workplace, trust can be built between managers and employees, while, in social exchange environment, trust can be built between a customer and supplier. Trust

requires the belief that the other party's word or promise is reliable and that the party will fulfil their obligations in the exchange relationship (Rotter, 1967). In considering these multiple perspectives on trust, Hosmer (1995) defines trust as "the expectation by one person, group, or firm of ethically justifiable behaviour-that is, morally correct decisions and actions based upon ethical principles of analysis-on the part of the other person, group, or firms in a joint endeavour or economic exchange". Others, for example, McLain and Hackman (1999) summarized the four characteristics of trust as 1) trust is a collective attribute between people, 2) trust has transaction cost benefits when individuals try to achieve goals, 3) trust attaches more strongly to an individual, and 4) trust is dynamic construct and can be changed over time.

Trust is related to the concept of risk. Because trust can substitute for information, it can reduce the complexity of decision making in unfamiliar and risky situations (McLain and Hackman, 1999). The concept of "risk" has been studied in theories of decision making in economics, finance, and decision sciences (Dowling and Staelin, 1994). According those theories, risk is related to choice situations involving both potentially positive and potentially negative outcomes (Stone and Grønhaug, 1993). In the marketing literature, Mitchell (1999) argues that subjective (perceived) risk should be considered rather than "real word" (objective) risk. Bauer (1960) introduced the concept of "perceived risk" to the marketing literature. Here, perceived risk refers to the uncertainty and adverse consequences of buying a product/service (Dowling and Staelin, 1994). In addition, researchers have proposed that perceived risk also relates to various types of loss, such as performance, social, physical, financial, psychosocial, time or frustration losses (Dowling, 1986). Perceived risk thus creates the conditions necessary for trust to be operative, and trust is a mechanism for risk reduction (Mitchell, 1999; Myer et al., 1995).

Because of the role that trust and risk play in exchange relationships, it has drawn the attention of e-service researchers (Corbitt et al., 2003; Teo and Liu, 2007). Trust and risk in e-services is discussed next.

2.1.2 An Overview of E-service

de Ruyter et al. (2001) define e-service as "an interactive content-centered and Internet-based customer service". Later Rowley (2006) defined e-service as any "deeds, efforts or performances whose delivery is mediated by information technology (including the Web,

information kiosks and mobile devices)". E-services not only facilitate provider-to-consumer interaction but also play an important role in self-service delivery (Rowley, 2006; Teo and Liu, 2007). In this thesis, e-service is thus defined as any service whose delivery is based on Internet, IT, communication technology and which incorporates a large self-service component. Thus e-services include e-commerce/e-shopping, e-banking service (ATM, mobile banking, and Internet banking), e-health service (e.g., online health information), e-government service, online legal services, mobile payment services and other computer-mediated communication services. One example of an e-commerce service is Amazon.com. It is the biggest and leading online retail store in the world, which announced "… people can find and discover anything they want to buy online" (Amazon.com Investor Relations, 2013). It not only facilitates consumers to buy products and services online but allows them to write/read product reviews. Another e-service is online banking. The e-banking such as Internet banking and mobile banking can perform a wide range electronically transaction such as paying bills, transferring money, printing statements and inquiring about account balances (Martins et al., 2014). Another emerging e-service is e-government services. The services can better address citizen information needs; offer more efficient and effective government (e.g., application for documents and filing tax returns) thereby enrich citizen's quality of life (Detlor et al., 2013; Hsieh et al., 2013). In the health context, well-known health information providers such as the WebMD (www.webmd.com) and MedlinePlus (www.nlm.nih.gov/medlineplus) offer a form of e-services. They provide information such as treatments for a symptom, health-related news, as well as general health issues that including diet and nutrition, exercise and fitness. Online travel sites are another growing e-service channel offering travel-related information, options for flights, and hotel booking (Amaro and Duarte, 2015).

The emergence of these and other e-services brings a number of benefits to providers e.g., broadening market reach, lowering of entry barrier to new markets and gaining competitive advantages (Lu, 2001), as well as benefiting consumers with convenience, low cost and accessibility (de Ruyter et al., 2001; Boyer et al., 2002). Despite these various benefits, e-services are also associated with numerous uncertainties. The virtual environment within which e-services occur are prone to security and encryption problems (Vassilakis et al., 2005), Moreover, the technology mediated nature of e-service creates a temporal and physical distance between the service consumer and the service provider, which can lead to opportunistic behaviors such as misrepresentation, unfair pricing,

conveying inaccurate information and violations of privacy (Gefen et al., 2003a; Dinev and Hart, 2006; Kim et al., 2008). For example, Malhotra et al. (2004) state that personal information can be easily copied, transmuted, and integrated in online environments. Therefore, privacy risk and security concerns become an important issue in online shopping. In online shopping, Hannak et al. (2014) found that price steering and discrimination were occurring on some top online shopping sites. Consumers are exposed to numerous stories that highlight the risk and feed into uncertainties and problems of trust. For example, Family Online Safety Institute (FOSI) reported most parents are concerned that their children overshare personal information online, enabling companies to track their child's online activity for marketing purposes (Johnston, 12 November 2014). Moreover, Pew Research Center reported that a majority of surveyed population in U.S. who use social networking sites are concerned about third parties accessing the data they shared online (Lomas, 12 November 2014). Moreover, Lee (2009) points out there exists the potential for monetary loss due to transaction error or investment account misuse. While, for online health information services, Kitchens et al. (2014) state that inaccurate or unsubstantiated health information that is published online may mislead health information seekers and negatively impact their decision makings. All of these examples illustrate how consumers face uncertainty in the e-service environment. Consideration of these uncertainties has led past research to examine perceived risk and trust as two important factors affecting the adoption of e-services by consumers (de Ruyter et al., 2001).

Those past studies have contributed to our understanding of trust and risk in e-services in a number of ways. These include (1) articulating the dimensions of trust and risk, (2) operationalizing trust and risk within empirical e-services research, (3) proposing and examining antecedents of trust and consequences of trust and risk perceptions, (4) uncovering potential moderators of the relationships between trust, risk and e-service acceptance, and (5) illustrating the need for research into trust and risk to be undertaken using varying research methods. These contributions are outlined next.

2.1.3 Trust and E-service

McKnight et al. (1998) expanded the definition of trust beliefs to refer to perceptions of the benevolence, competence, honesty, and predictability of an organisational relationship. This multi-dimensional perspective on trust has been adapted in the e-services context.

For example, Gefen (2002b) classified the dimensions of trust as the ability, integrity, and benevolence of the online vendor. Bhattacherjee (2002) also captured trust in terms of trustee's ability, benevolence, and integrity, while McKnight et al. (2002) similarly developed and validated cognitive-based trust measurement as the consumer's perception of the provider's benevolence, integrity and competence.

McAllister (1995) posited a distinction between cognitive-based trust and affective-based trust. While the former is focused on a belief or expectation that refer to responsibility, dependability, competence, ability, integrity, credibility, or reliability; the later involves emotional, concern or care, objective, or mood. Subsequent empirical studies into e-services have shown cognitive-based trust to be the more important of the two for predicting consumer behaviors (e.g., Jarvenpaa et al., 2000; Gefen, 2002b; McKnight et al., 2002).

In addition, some studies have distinguished between trust and distrust viewing them as separate constructs. While trust is conceptualized as a "positive expectation" regarding the vendor or technology, distrust is a "negative expectation" of a consumer typically resulting from previous injurious conduct of an e-vendor (Chang and Fang, 2013). Table 2 summarized the definitions of trust that have been adopted in past studies.

In the online context, researches have also distinguished between trust in the website interface (e.g., Dinev and Hart, 2006; Liao et al., 2011) and trust in the e-service provider (e.g., Gefen, 2002b; Pavlou and Gefen, 2004; Nicolaou and McKnight, 2006; Kim et al., 2008, 2009a). Others have separated trust in the e-services context into trust in the provider, trust in the Internet, and trust in the e-services. For example, in the context of mobile payments (m-payments), Chandra et al. (2010) considered trust in the mobile service provider and trust in mobile technology as two distinct trust dimensions. More recently, Thatcher et al. (2013) classified general trust and specific trust in B2C e-commerce context. General trust includes trust in IT infrastructure and trust in institutional mechanisms; specific trust includes trust in merchant and trust in website. Trust in the website implies Internet websites are a safe environment in which to exchange information with others (Liao et al., 2011). Trust in the e-service provider is defined as the consumer's belief in the integrity, ability and benevolence of the vendor (Rotter, 1967; Morgan and Hunt, 1994; Bhattacherjee, 2002; Pavlou and Gefen, 2002; Kim et al., 2004) and their willingness to be vulnerable to actions taken by the vendor based on their

feelings of confidence and assurance (Gefen, 2000). If e-vendors are not considered trustworthy, they will lose their customers (Zhu et al., 2011).

Study	Definition	Trust Object
Rotter (1967)	Trust is "the belief that a party's word or promise is reliable and a party will fulfil his/her obligations in an exchange relationship".	interpersonal trust
Morgan and Hunt (1994)	Trust occurs "when one party has confidence in an exchange partner's reliability and integrity"	relationship marketing
Mayer et al. (1995)	Trust is "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party".	organizational trust
Rousseau et al. (1998)	Trust is a "psychological state comprising the intention to accept vulnerability based upon positive expectation of the intentions or behavior of another".	organizational trust
Jarvenpaa et al. (2000)	Conceptualized as "the store's trustworthiness".	Internet store
Gefen (2000)	Trust on an online vendor is the "willingness to make oneself vulnerable to actions taken by the trusted party based on the feeling of confidence and assurance".	e-commerce
Ba and Pavlou (2002)	Trust is "the subjective assessment of one party that another party will perform a particular transaction according to his or her confidant expectation in an environment characterised by uncertainty"	electronic markets
Bhattacherjee (2002)	"in terms of trustor's beliefs in the trustee's ability, benevolence, and integrity".	online firms
McKnight et al. (2002)	"…initial trust, that is, trust in an unfamiliar web vendor, one with whom the consumer has no prior experience".	e-commerce
Pavlou and Gefen (2002)	"Trust in a community of sellers is defined as the buyer's subjective belief that online transactions with sellers in a specific marketplace will occur in a manner consistent with his/her expectations of trustworthy behavior".	online marketplaces
Kim et al. (2004)	"Trust as the belief that the other party will behave in a dependable manner in an exchange relationship".	online trust

Table 2: Definitions of Trust (adapted from Yousafzai et al., 2003)

In the online environment, trust takes on great importance. This is because online exchange with providers is associated with a number of uncertainties for consumers. Consumers have little prior experience with an e-vendor (McKnight et al., 2002) and e-service providers often collect a consumer's personal and/or financial information during transactions (Hagel and Rayport, 1997). This results in some consumers fearing to interact in an online environment. Due to these uncertainties, trust beliefs are playing an

important role in how IS researchers are theorizing about consumer acceptance of e-services. Past work has associated trust in the e-service provider and/or technology platform with the adoption and use of e-services in a number of contexts such as: e-commerce/e-shopping (Jarvenpaa et al., 2000; Corbitt et al., 2003; Gefen et al., 2003a; Pavlou, 2003; Teo and Liu, 2007; Kim et al., 2008; Zhu et al., 2011), e-banking (Yousafzai et al., 2009; Luo et al., 2010), online health care services (Egea and Gonzalez, 2011; Zahedi and Song, 2008), online legal services (Cho, 2006), mobile payment services (Lu et al., 2011) and e-government (Horst et al., 2007; Bélanger and Carter, 2008).

2.1.4 Risk and E-service

Garbarino and Strahilevitz (2004) define perceived risk as an individual's perception of the potential for loss and the seriousness of outcome if loss was to occur. The definitions of risk adopted in selected past studies are show in Table 3

Study	Definition	Risk Object
Bauer (1967)	"a combination of uncertainty plus seriousness of outcome involved"	consumer behavior
Peter and Ryan (1976)	"The expectation of losses associated with purchase and, as such, acts as an inhibitor to purchase".	brand level
Featherman and Pavlou (2003)	"The potential for loss in the pursuit of a desired outcome of using an e-service".	e-services
Zimmer et al. (2010)	"The expectation of a high potential loss of control over the disclosed personal information to a website".	online information disclosure

Table 3: Definitions of Risk (Perceived Risk)

In addition to more general dimensions of risk, others have distinguished between different types of risks. For example, Lim (2003) identified nine kinds of risks relevant to different types of e-services these are: financial, performance, social, physical, psychological, time-loss, personal, privacy and source-based risks. The source-based risks include: (1) technology-related perceived risk, (2) Internet vendor related perceived risk, (3) consumer-related risk and (4) product related risk. Moreover, Featherman and Pavlou (2003) identifies performance risk, financial risk, privacy risk, time risk, psychological risk, social risk and overall risk in e-service context. The definition of each type of risk is defined in Table 4.

Risk Dimensions	Definition
Performance risk	The possibility of the product malfunctioning and not performing as it was designed and advertised and therefore failing to deliver the desired benefits.
Financial risk	The potential monetary outlay associated with the initial purchase price as well as the subsequent maintenance cost of the product.
Time risk	Consumers may lose time when making a bad purchasing decision by wasting time researching and making the purchase, learning how to use a product or service only to have to replace it if it does not perform to expectations.
Psychological risk	The risk that the service will lower the consumer's self-image.
Social risk	The risk that using a product or service may lead to embarrassment before one's social group.
Privacy risk	Potential loss of control over personal information, such as when information about you is used without your knowledge or permission.
Physical risk	The risk to the buyer's or other's safety in using products.
Overall risk	A general measure of perceived risk when all criteria are evaluated together

Table 4: Definition of Types of Risks (Adopted from Luo et al. 2010)

Slovic et al. (2004) also distinguished between the dimensions of risk as analysis (cognitive-based risk) and risk as feelings (affective-based risk). Research in e-services has been focused largely on the cognitive-based risk perceptions (e.g., Jarvenpaa et al., 2000; Gefen, 2002a).

According to Dowling (1986) risk perceptions are best indicated by perceptions of uncertainty, adverse consequences, and probability of loss. Past works define risk perceptions as a barrier to consumers' online transacting (Kim et al., 2008). Privacy related risks predominate in the online environment (Dinev and Hart, 2006). This is due to loss of control over the disclosed personal information to a website (Zimmer et al., 2010). Other types of risks in the online context include financial risks resulting from disclosure of financial data such as credit card data (Kim et al., 2008; Liao et al., 2011), performance risks relating to product or service quality (Hong and Yi, 2012), social and psychological risks relating to potential loss of status or negative self-perceptions that could result from e-service use (Featherman and Pavlou, 2003). Past research has associated risks with both commercial and non-commercial e-service contexts e.g., in e-commerce/e-shopping (Jarvenpaa et al., 2000; Pavlou, 2003; Teo and Liu, 2007; Kim et al., 2008), e-banking (Yousafzai et al., 2009; Luo et al., 2010), and e-government (Horst et al., 2007; Bélanger and Carter, 2008).

Through a systematic literature review, publications focused on both trust *and* risk in e-services from 2000 to 2013 was identified[8]. The number of studies is reported in Figure 2. In order to carry out the systematic literature review, a computerized search was conducted of the following electronic databases: EBSCO Business Source Premier, Science Direct, Jstor, Emerald and ABI/INFORM Global. Google scholar was also used to supplement the search. The search terms included “consumer” or “customer” or “user” or “citizen” or “individual”; “use” or “adoption” or “acceptance” or “behavioral intention”; “risk” and “trust”; and variations of “e-service” or “e-commerce” or “e-banking” or “e-government” or “e-health” or “mobile payment” or “online”. The search was further restricted to empirical studies through the use of search terms such as “survey” or “experiment” or “field study” or “correlation”. The time frame was further restricted to articles published (or in press) between January 2000 to March 2013.

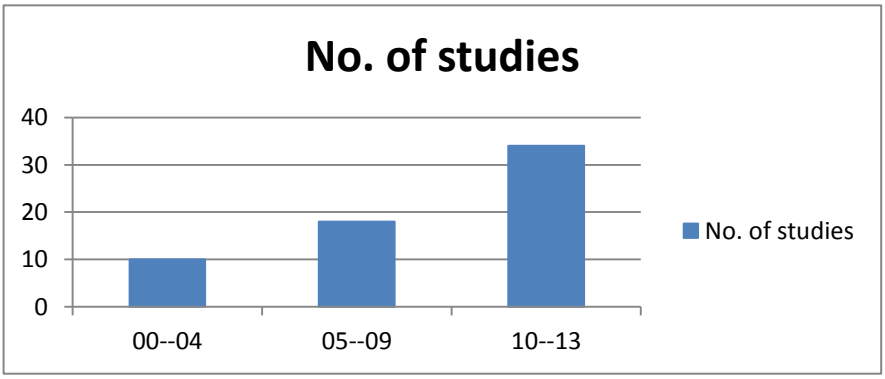


Figure 2: Number of Studies in Trust-Risk Research

Figure 2 shows that the empirical research on trust-risk is increasing year by year. This means during the two dedicates the research of trust-risk is still important to academia.

2.1.5 The Relationship between Trust and Risk Perceptions

Trust and risk perceptions are considered related. Unfortunately, prior studies have not been consistent in their treatment of the relationship between trust and risk perceptions, and the nature of the relationship remains unclear.

[8] While studies focused on either trust or risk would result in much larger number of publications, the focus here was on the subset examining both trust and risk in the same study.

Pavlou (2003) argues that trust is antecedent to risk perceptions because trust reduces the uncertainties that give rise to risk perceptions (see Figure 3). Under this perspective risk mediates the effects of trust on consumer acceptance. Others who follow this perspective include Jarvenpaa et al., (2000), Nicolaou and McKnight (2006), and Kim et al. (2008, 2009a).

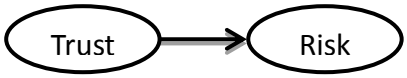


Figure 3: Trust Influences Risk Model

A second view argues that risk perceptions are antecedent to trust (see Figure 4). Proponents of this perspective argue that if the uncertainties and risk of loss are perceived to be low then there is less need to form trust perceptions (Dinev and Hart, 2006). Similarly, higher levels of risk perception will increase a consumer's need to trust (Corbitt et al., 2003). Under this perspective trust mediates the effects of risk on consumer acceptance. Others who follow this perspective include Chandra et al. (2010), Horst et al. (2007), Egea and González (2011), Liao et al. (2011), Bansal et al. (2010), and Yi et al. (2013).

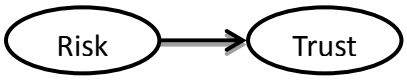


Figure 4: Risk Influences Trust Model

A third view argues that trust and risk perceptions are independent predictors of consumer acceptance of e-services (see Figure 5). For example, Verhagen et al. (2006) examined online seller trust and perceived online seller risk as independently influencing consumer attitude toward online shopping. Others who follow this perspective include Lee (2009), Izquierdo-Yusta and Galderon-Monge (2011), and Bianchi and Andrews (2012).

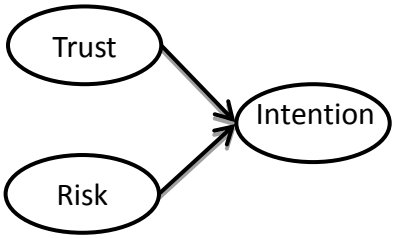


Figure 5: Trust and Risk as Independent Predictors

A fourth view argues that trust moderate the path between risk perceptions and behavioral intention, or perceived risk moderate the path between trust and behavioral intention (see Figure 6). e.g., Grazioli and Jarvenpaa (2000).

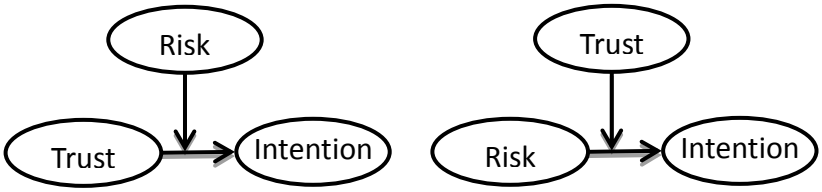


Figure 6: Risk or Trust as Moderators

In sum, previous studies of trust-risk relationship and their effects on attitude and behavioral intentions have been modeled in four ways: (1) risk as mediator of the relationship between trust and consequent consumer behavior; (2) trust as mediator of the relationship between risk and consequent consumer behavior, and (3) trust and risk as independent predictors of consumer attitudes and/or behavioral intentions; (4) risk moderates the influence of trust on consumer attitude/behavioral intention or trust moderates the influences of risk perceptions on consumer attitude/behavioral intention. More detailed discussion of the trust-risk relationship is addressed in Chapter 3 and Chapter 8.

2.1.6 Antecedents of Trust on the E-services

Given its importance to various e-services contexts, researchers have also turned their attention to examine the antecedents of trust (e.g., McKnight et al., 2002; Kim et al., 2008). These studies have highlighted the importance of antecedents such as perceived institution size and market share (Jarvenpaa et al., 2000; Teo and Liu, 2007), perceived vendor or brand reputation (Jarvenpaa et al., 2000; Pavlou, 2003; Teo and Liu, 2007; Kim et al., 2008), user's experience (Corbitt et al., 2003; Pavlou, 2003), individual propensity to trust (Pavlou and Gefen, 2004; Nicolaou and McKnight, 2006; Teo and Liu, 2007; Kim et al., 2008) and structural assurances such as third party protection (Chandra et al., 2010; Zhu et al., 2011).

There are several classifications for these and other antecedents of trust. For example, Gefen et al. (2003a) classified trust antecedents as calculative-based, institution-based (structural assurances and situational normality), and knowledge-based (familiarity). Chandra et al. (2010) classified trust antecedents in terms of the service provider’s

characteristics (e.g., perceived reputation) and technology characteristics (e.g. perceived structural assurance). A recent meta-analysis (He, 2011) systematically reviewed the antecedents of trust in e-commerce and classified them as: personal characteristics-based, knowledge-based, deterrence-based, social influence-based, technological attributes-based, vendor image-based and institution-based.

Kim et al. (2008) considered antecedents of trust in the e-commerce context and classified them as cognition-based, affect-based, experience-based and personality-oriented. Their empirical results showed that perceived privacy protection, perceived security protection and positive reputation can influence both trust and risk.

It is evident that previous research has classified the antecedents of trust differently. They have not provided an answer as to the key antecedents influencing trust in e-services.

In an effort to synthesize and extend past efforts, this study summarizes antecedents of trust into four major categories. These are: vendor and institution-based antecedents, technological-based antecedents, knowledge-based antecedents, and consumer characteristics-based antecedents (see Figure 7). These are discussed in Chapter 4.

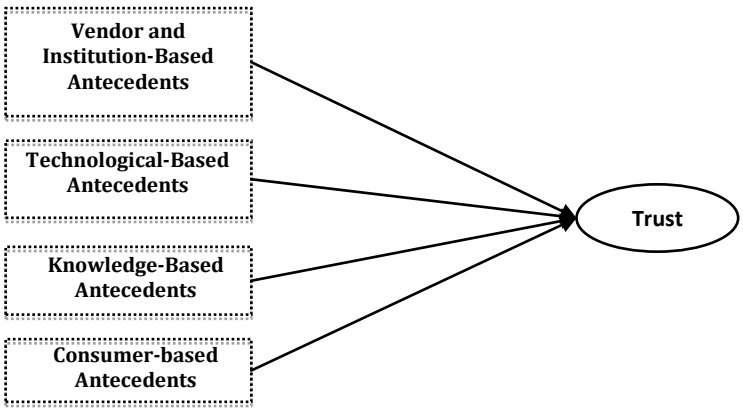


Figure 7: Summary of the Antecedents of Trust

2.1.7 Consequents of Trust and Risk on the E-services

The consequents of trust and risk (i.e., consumer acceptance) are usually conceptualized in terms of consumer attitude toward the use of the e-services, behavioral intention, and actual e-service usage behavior. This reflects the strong influence that the theory of

reasoned action has had on e-service research work. Attitudes are defined as affective responses and refer to the positive or negative feelings about performing the target behavior (Fishbein and Ajzen, 1975) for example, whether consumer enjoy or is excited when using e-services. Elsewhere attitude is considered as cognitive responses based on an evaluation e.g., whether using the e-service is beneficial or good for the consumers.

Specific behaviors and behavioral intentions examined in past e-service research include consumer loyalty (Gefen, 2002a), purchase intention (Kim et al., 2008), willingness to purchase (Kim et al., 2009a), self-disclosure (Krasnova et al., 2010), and continued use (Venkatesh et al., 2011) (see Figure 8).

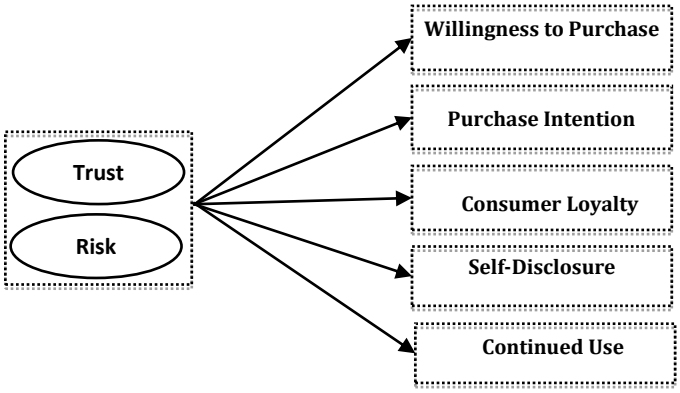


Figure 8: Summary of the Consequences of Trust and Risk

Some past studies have considered whether these effects are moderated. Past works have addressed gender, personality and institutional structures as moderators of the relationship between trust and online behavior (Gefen et al., 2008). Furthermore some studies also considered culture diversity as a moderator of the trust-risk relationship (e.g., Teo and Liu, 2007; Dinev et al., 2006).

Thus the possibility that the relationships between trust, risk and consumer acceptance are contingent on consumer characteristics and contextual factors should be recognized.

2.1.8 Research Methods Employed in Past Trust-Risk Studies

Past works have adopted various methods to examine the role of trust in e-commerce. These include systematic reviews of research on trust in e-commerce (e.g., Grabner-Kräuter and Kaluscha, 2003), and meta-analysis of antecedents of trust in e-commerce (e.g., He, 2011), cross-sectional and longitudinal survey studies designed to test

hypothesized causal models (e.g., Bhattacherjee, 2002; Venkatesh et al., 2011), experimental designs that aim to examine the role of trust in adoption of online recommendation agents (e.g., Wang and Benbasat, 2005), and longitudinal experimental scenarios (e.g., Zahedi and Song, 2008). Moreover, researchers also adopted fMRI technique to study trust in our field (e.g., Dimoka 2010; Riedl et al. 2010). However, the most common research design employed in past studies has been the cross-sectional survey.

2.1.9 Summary

Taken together the above review of the existing literature on trust and risk in e-services suggests:

(1) Previous research offers a number of perspectives on the definition and measurement of trust and risk perceptions. While there is some general agreement, conceptualization of dimensions of both trust and risk have been varied.

(2) Trust and risk are however most appropriately studied as cognitive beliefs.

(3) Trust should be considered in multi-dimensional terms, distinguishing between general trust (in the Internet and technology) and specific trust (trust in the e-service provider and trust in the website).

(4) The antecedents of trust include individual and personal-based factors, technology and knowledge related factors, and vendor and institution related factors. However, amongst these the key antecedents of trust have not yet been determined.

(5) The consequences of trust and risk include other cognitive beliefs, affective and cognitive attitudes, behavioral intentions and actual behaviors.

(6) The relationship between trust and risk has been modeled differently in past research, and the nature of their inter-relationship needs to be clarified. There is some controversy regarding causal direction e.g., whether trust beliefs influence risk perceptions, or whether risk perceptions influence trust.

(7) The relationships between trust and risk and their consequents may be moderated by factors such as culture, the type of e-services, and object of trust (e.g., trust in e-service provider or trust in platforms and technology).

(8) Most studies adopt cross-sectional research designs to test causal models and too few studies have considered the dynamic nature of trust and risk perceptions and implications for e-service usage. Thus other research designs are now needed to improve our understanding of trust and risk in e-services, including longitudinal survey studies. Moreover, given the large number of previously published studies on trust and risk in e-service, meta-analytic investigations of past research findings can provide useful guidance for future e-service researchers on how to model trust and risk, as well as provide a benchmark against which future studies can compare their effect sizes.

This study thus aims to build on the contributions and address the shortcomings summarized above by carrying out meta-analytic approaches, cross-sectional surveys and longitudinal research to answer the following research questions. (RQ1) What is the overall relationship between trust and risk perceptions in e-service? (RQ2) What is the overall relationship between consumer acceptance of e-services (reflected in their attitudes and intentions toward the use of e-services) and their trust and risk perceptions? (RQ3) What are the antecedents of trust in consumer acceptance of e-services? (RQ4) To what extent do trust and risk perceptions change over time and how do those changes influence consumer usage behaviors? The three research designs, namely meta-analytical cross-sectional and longitudinal design, are explained next.

2.2 Study Design and Research Method

2.2.1 Meta-analytic Design

To address research question RQ1-RQ3, two meta-analytical approaches were adopted to (1) examine the overall nature of trust-risk relationship and their effects on acceptance, and (2) determine the key antecedents of trust. Relationships examined in the first meta-analysis (Chapter 3) are: trust-risk, trust-attitude, trust-behavioral intention, risk-attitude, risk-behavioral intention, and attitude-behavioral intention. The antecedents of trust investigated in the second meta-analysis (Chapter 4) are based on classifications of

vendor and institution-based antecedents, technological-based antecedents, knowledge-based antecedents, and consumer characteristics-based antecedents.

2.2.2 Methodology

Meta-analysis (MA) is defined as “the statistical analysis of a large collection of analysis results for the purpose of integrating the findings” (Glass, 1976). Meta-analysis is thus an analysis of an analysis (Glass, 1976). Subsequent to King and He’s (2005) explanation of the role and methods of meta-analysis for IS research, more and more meta-analyses have been employed in IS (e.g., Schepers and Wetzels, 2007; Wu and Lederer, 2009; Joseph et al., 2007; Liang et al., 2008; He and King, 2008; Liu et al., 2011).

MA can be combined with structural equation modeling (SEM) to form MASEM. SEM is a statistical technique that can be used to examine causal connectedness (Sun and Zhang, 2006). MASEM combines the procedures of meta-analysis and structural equation modeling in a serial fashion. First, meta-analysis is used to combine quantitative evidence from prior studies to estimate both weighted mean and true-score correlations between the variables of interest (Hunter and Schmidt, 2004). A matrix of true-score correlations derived from the meta-analysis can then be applied in a structural equation modeling (SEM) analysis for testing whether a given model fits a hypothesized pattern of relationships (Viswesvaran and Ones, 1995).

In order to select the studies for this MASEM analysis, this thesis (Chapter 3 and Chapter 4) follows four steps for a systematic review of past research studies (Liberati et al., 2009).

(1) Select the relevant studies via systematic review with data sources, study selection, and inclusion and exclusion criteria clearly specified.

(2) Code the variables, correlations, reliability scores, as well as sample size, year of publication, and context of the studies.

(3) Carry out meta-analysis by reporting descriptive analysis, analysis of direct effects deriving both weighted mean and true-score correlations, and analysis of moderator effects.

(4) Use true-score correlation to do a SEM analysis.

Each of these steps is described next.

2.2.3 Study Selection

2.2.3.1 Data sources

To select as many studies as possible, the following databases were reviewed: EBSCO Business Source Premier, Science Direct, Jstor, Emerald and ABI/INFORM Global database. EBSCO is a primary business academic database; Science Direct database and other three scholar databases contained a large number of business research studies; in order to avoid the concerns of publication bias with meta-analysis (King and He, 2005; He and King, 2008) this study also considers IEEE Xplore and AIS e-library research database for selecting conference publications. Studies have to be accessible to the University of the Witwatersrand, Johannesburg library and its comprehensive electronic database subscription. “English” is the criteria for all articles and the time frame is from 2000 to 2013. Before 2000 there were studies that focused on risk in consumer behavior (e.g., Jacoby and Kaplan, 1972; Zikmund and Scot, 1973, etc) and trust in marketing (e.g., Morgan and Hunt, 1994; Mayer et al., 1995, etc). However, they are focused on “offline” consumer trust. Since Jarvenpaa et al. (2000) integrated trust and risk research in e-commerce, more and more trust and risk studies in online context emerged from 2000. Therefore, in this study, the date range from 2000 to 2013 was chosen.

2.2.3.2 Search terms

The search string plays an important role in extracting articles for consideration. In this thesis, the well-known PICOS of population, intervention, comparator, outcome and study design framework (www.ebbp.org/course_outlines/systematic_review/) used for defining the search terms were adopted. As an illustration, the following search terms for first meta-analysis were developed as:

Population = “consumer” or “customer” or “user” or “citizen” or “individual”.

And

Intervention = “e-service” or “e-commerce” or “e-banking” or “e-government” or “e-health” “mobile payment” or “online”.

And

Outcome variable = “use” or “adoption” or “acceptance” or “behavioral intention”.

And

Independent variable = “risk” AND “trust” (“risk” OR “trust”, for the second meta-analysis).

And

Study design = “survey” or “experiment” or “field study” or “correlation”.

Additional search options were specified depending on the database. For example, within EBSCO Host Business Source Complete database was selected for a search of “academic journal”, “conference paper” and “conference proceeding” “thesis” and “working paper”. Other advanced search options were set for the other databases respectively. Where possible, both abstract and/or full-text was searched.

2.2.3.3 Inclusion and exclusion

To ensure the validity of the meta-analysis, as many relevant studies as possible should be included in a meta-analysis. This thesis adopted a broad definition of e-service to include all forms of B2C electronic commerce, electronic banking, online health services, e-government, social network service, professional services such as online financial advisory and legal services, consumer-to-consumer exchanges, and mobile payment services, amongst others. Inclusion and exclusion criteria common to both meta-analyses were:

(1) The articles must focus on e-service (e.g., e-banking service, e-government service, e-commerce, e-payment, e-health, m-payment, social networking service, etc).

(2) The articles must focus on online environment.

(3) The articles must be an empirical study (in order to calculate effect sizes).

(4) The papers must report correlations matrix (in order to calculate effect sizes).

(5) The variables included both “trust” or “trust belief” AND “risk” or “perceived risk” in the same study (for the first meta-analysis).

For the second meta-analysis on antecedents of trust, studies did not have to include risk or perceived risk but they did need to examine possible antecedents of trust, e.g., “security concerns”, “privacy concerns”, “perceived reputation”, “structural assurances”, “perceived usefulness”, “perceived ease of use”, “familiarity”, and “disposition to trust” amongst others.

After the inclusion and exclusion stage, 52 studies were used for the first meta-analysis, and 59 studies for the second meta-analysis were included.

2.2.3.4 Coding

For each study, the relevant variables were identified. Each variable’s conceptual and operational definitions as well as measurement items were considered when coding. For example, variables were coded as trust if they reflected a consumer’s willingness to depend on the object of trust, such as the e-service provider, the e-service platform (e.g., website), or the communications network (e.g., Internet), based on a belief or confidence in the dependability, competence, ability, integrity, credibility and/or reliability of that trust object. Variables were coded as risk if they reflected a consumer’s subjective assessment of the potential for loss associated with using the e-service. The detailed coding rules are presented in Chapter 3 and Chapter 4.

For each included study, the following information were recorded: (1) study’s year of publication, (2) sample size, (3) the type of e-service under examination, (4) each study’s reported effect sizes (i.e., the bivariate correlations between the variables of interest), (5) in addition to the effect sizes, the reliabilities of each study’s variables were recorded using the reported Cronbach’s alpha coefficient or if not available the reported composite reliability or internal consistency scores. Based on the reported reliabilities, an average reliability score were calculated for each variable for use in subsequent analysis.

2.2.4 Meta-analytic Approach

2.2.4.1 Descriptive analysis

For each pair-wise relationship, the total number of studies; the total number of observed correlations; range of correlation; range of sample size; the cumulative sample size and the average of sample size were reported.

2.2.4.2 Analysis of direct effects

This thesis followed the methods of Hunter and Schmidt's (2004) random effects models to estimate effect sizes. First, to correct for sampling error, need calculate the bare-bones or weighted mean effect size (r_+). Second, to correct for measurement error, the true-score correlation was calculated. Third, following Hedges and Olkin's (1985) recommendation, this thesis also carried out homogeneity tests to determine whether any heterogeneity in the underlying correlations and the fail-safe test to determine the robustness of the findings by estimating the number of non-significant results or non-published studies that would be required to reduce an obtained mean effect size to a trivial level (Rosenthal, 1979). The detailed formulas are reported in Chapter 3 and Chapter 4.

2.2.4.3 Analysis of moderator effects

From the meta-analysis a Q value is derived. The Q value is based on Fisher-Z scores. This Q value is compared to a critical value, which is the X^2 for a=0.05 and k-1 degrees of freedom, where k is the number of effect sizes. If the Q value exceeds the critical value in one or more pair-wise relationships, then moderation of relationships should be considered. Five factors for the potential moderating effects were considered in this thesis. These are consumer culture e.g., Western versus Eastern; type of e-services e.g., commercial versus non-commercial; population under study e.g., general consumers versus students; year of study's publication e.g., last decade to reflect earlier stages of e-services versus the current decade; and the object of trust e.g., vendor or technology platform.

To test for moderation, bare-bones correlations (r_+) of each relationship in the subgroups defined by each moderator are compared using Fisher-Z scores. The significance of the Z score (>1.96) provides confirmation of a moderating effect.

2.2.5 SEM Analysis

The final step in the MASEM design is to test which nomological network of relationships would best be supported by the combined empirical evidence from the meta-analysis. SEM analysis uses a matrix of true-score correlations as input. Maximum likelihood estimation was used to fit the model and the harmonic mean (Harmonic Mean = $N/(1/a_1+1/a_2+1/a_3+1/a_4+.....+1/a_N)$) of the sample sizes is to be used as a conservative estimate of sample size for input into the analysis. This approach is recommended in Viswesvaran and Ones (1995). The SEM analysis was conducted using AMOS version 20. The paths were examined for their significance. The χ^2 statistics, RMSEA values and AIC values were used to determine which theoretical model provides the best fit to the data. Based on literature review, for the first MASEM the various models from the literature together with an alternative model was tested and compared. Results are reported in Chapter 3.

The second meta-analysis focused on four categories of antecedents, namely vendor and institution-based antecedents, technological-based antecedents, knowledge-based antecedents, and consumer characteristics-based antecedents using the synthesized evidence from the meta-analysis. Results are reported in Chapter 4.

2.2.6 Limitation of the Meta-analytical Studies

Some important limitations to the study are recognized. With respect to the meta-analysis, (1) only studies that report correlations and sample sizes can be included in the analysis. (2) The focus on quantitative studies' results in exclusion of qualitative studies. (3) Although several research databases have been adopted for study identification, resource constraints limit the number of research databases that can be covered and that are accessible to the researcher. (4) Development and testing of the structural model can only consider the antecedents and consequences of trust where correlations from prior studies are available. (5) By aggregating findings from across studies, meta-analytic work

loses information about the original study contexts. The detailed limitations are reported in Chapter 3 and Chapter 4.

2.3 Cross-sectional and Longitudinal Research Designs

2.3.1 Study Philosophy

Interpretivism and mixed methods (combining qualitative and quantitative methods) have emerged in the field of Information Systems (IS), however, the empirical evidence indicate that positivist research is still predominant in IS research (Orlikowski and Baroudi, 1991; Chen and Hirschheim, 2004). Positivist studies “are premised on the existence of a priori fixed relationships within phenomena which are typically investigated with structured instrumentation” (Orlikowski and Baroudi, 1991). A positivist perspective relies on correlations between variable to identify empirical regularities, infer causation, test theory, and increase predictive our understanding of phenomena (Orlikowski and Baroudi, 1991; Tsang, 2014). The dominant methods in positivist IS research is of three types: case studies, laboratory experiments, and survey research (Pinsonneault and Kraemer 1993). Case studies aim to examine a phenomenon in its natural setting, laboratory experiment aims to examine a phenomenon in a controlled setting and surveys aims to examine a phenomenon in a wide variety of natural settings (Pinsonneault and Kraemer, 1993). Among three, survey research has been most frequently adopted in IS research (Orlikowski and Baroudi, 1991; Chen and Hirschheim, 2004). Survey research is a quantitative method that produces quantitative descriptions of some aspects of the studied population, collects information by asking people structured questions, and collects information form a fraction of a population with the aim to generalize the findings.

This study follows the positivistic perspective, adopting empirically quantitative research methods. Given that this thesis aims to examine relationship between independent and dependent variables, and has a priori adopted theories such as Theory of Reasoned Action, Expectation Confirmation Theory, Extended Valence Framework and Health Belief Model as lenses through which to specify hypothesis, it is well suited to a quantitative approach employing survey methods.

2.3.2 Objectives

Consumers' perceptions of risk and trust have been considered important determinants of e-services adoption. To address RQ2, Chapter 5 and Chapter 6 presents results from two cross-sectional studies to explain user acceptance of a high-potential e-service, namely, online health information services. The motivation to adopt this context is because previous studies of e-services were mostly focused on other kinds of commercial and non-commercial contexts. The web has become one of the most important health information dissemination channel (Yi et al., 2013), and people are increasingly searching for online health information, it has become an important channel for consumers to engage in the self-management of their or their family's health (Xiao, et al., 2014; Harbour and Chowdhury, 2007). TRA is discussed in Chapter 5. EVF and HBM are discussed in Chapter 6. Chapter 5 and 6 develop and test research models that were underpinned by multiple theoretical perspectives including Theory of Reasoned Action (TRA), Health Belief Model (HBM) and Extended Valence Framework (EVF).

Moreover, because past work has not considered the dynamic nature of trust and risk perceptions, and whether early-stage trust and risk perceptions influence later-stage adoption and use a longitudinal design is also adopted. This is to address RQ4 and explain the effects of trust, perceived risk, perceived usefulness and health beliefs on user acceptance (behavioral intentions). Chapter 7 develops a model grounded in the Theory of Reasoned Action (TRA) and Expectation-Confirmation Theory (ECT), to explain how initial consumer beliefs such as risk and trust influence their beliefs, attitudes, intentions and actual behaviors toward e-services at later points in time. To test this dynamic model, a longitudinal research design is required. Through a longitudinal design the dynamic nature of the study's focal substantive constructs can be examined (Berrington et al., 2006). Moreover, Premkumar and Bhattacherjee (2008) argue that conducting a study at two different points in time can also reduce common method bias associated with cross-sectional designs. A longitudinal design requires the researcher to collect repeated measures over time from the same units of observation. Doing so in this study allows for the change in trust and risk to be described over time, as well as to estimate a causal model of how beliefs regarding trust, risk and usefulness at time 1 influence behavior and intentions at a later point in time (time 2).

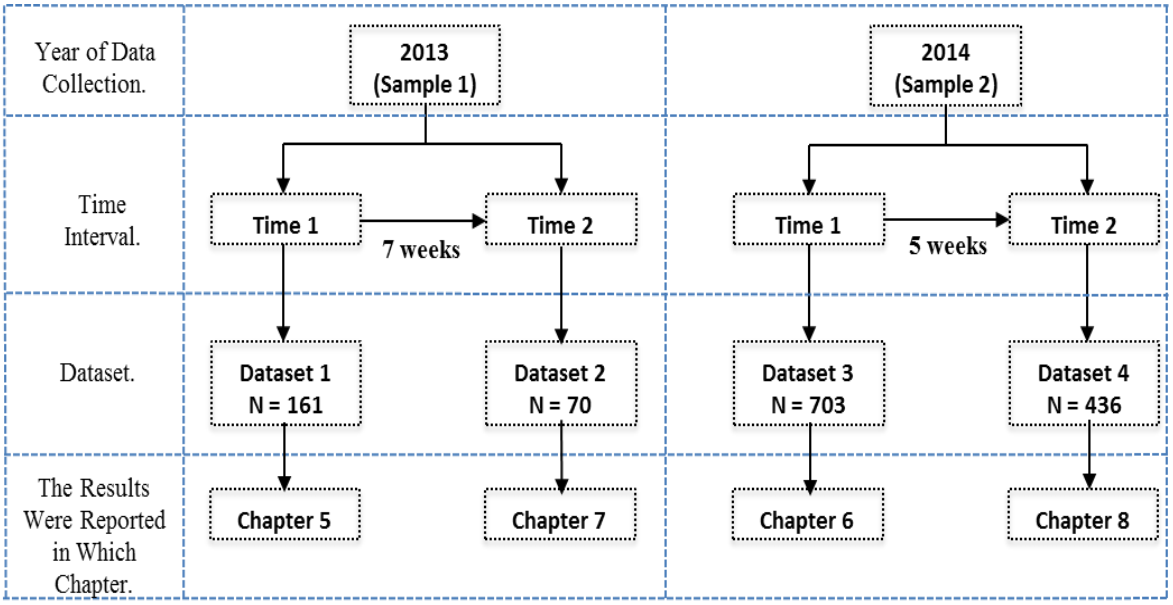


Figure 9: Longitudinal Data Collection Schedule

Chapter 8 adopts a cross-lagged design to determine which time 1 beliefs influence which time 2 beliefs. Specifically, the interested causal relationships are: trust in provider ↔ risk perceptions, trust in website ↔ risk perceptions and trust in provider ↔ trust in website. This adds further evidence for addressing RQ1. Time interval selected is seven weeks (for Chapter 7) and 5 weeks (for Chapter 8). This is because in the IT usage context, 7 weeks were considered in Bhattacherjee and Premkumar (2004) as being a good compromise for a time period for longitudinal usage studies. However, in psychology discipline, Yamasaki et al. (2006) had used 5 weeks as the time frame. Future research may consider a longer time frame. The phases of the study are described further below (Section 2.3.5), and as illustrated in Figure 9.

2.3.3 Sampling

This study was carried out a large national university in South Africa. The use of university sample is appropriate because they represent an important portion of online consumers (Kim et al., 2008). Harbour and Ghowdhury's (2007) research results show that more than 71% of the students have some experience in using the Internet for health information and therefore constitute a valid subset of the e-service user population. Following e-service researches e.g., Gefen (2000) and Kim et al. (2008), this study used of a convenience sampling of university students. Convenience sampling is a non-

probability sampling technique. Convenience sampling is associated with limitations such as generalization and inference. A review on the use of student samples in IS research indicated that if the internal system of relationships within a theory such as TRA are under examination, then using a student sample may be valid and appropriate (Compeau et al., 2012). There were two different target samples for each of the two data collection periods (2013 and 2014). For 2013, the focus was on computing students, whilst in 2014 the sample was broadened to all first year students registered in computer lab courses. More detail about the sampling is presented in Chapter 5 and Chapter 6.

2.3.4 Procedure for Data Collection

2.3.4.1 Phase 1: Data for cross-sectional and longitudinal study (t1)

Two longitudinal, multiple-phase, controlled laboratory survey designs were carried out (the first in 2013, and the second in 2014). Each consisted of two surveys i.e., four surveys in total. The approach was adopted from Zahedi and Song (2008). Each data collection was conducted in a computer laboratory environment. In phase 1 of the data collection, participants were introduced to the purpose of this study and were then given the opportunity to choose between popular health informatics websites to perform scenario-driven tasks. All of the websites are general health and wellness websites and included WebMD, MedlinePlus, Health24 and Mayoclinic. These health information websites have different features and information content. Allowing participants the opportunity to select their own website of interest increases the voluntary nature of the e-service usage process (Zahedi and Song, 2008). Participants were asked to surf their chosen health website for information on a variety of issues in a number of general health categories that include diet and nutrition, exercise, fitness, beauty and lifestyle. The use of such tasks aims to promote variability in the use and attitudes toward surfing the site (tasks are illustrated in Appendix C and D). Participants were then asked to complete the first-round questionnaire resulted in dataset 1 (2013) and dataset 3 (2014). To encourage continued participation in the study, ALL participants received a small token of appreciation at the end of the next phase of the study. Data collected from this phase was used in the cross-sectional studies reported in Chapters 5 (dataset 1) and 6 (dataset 3).

2.3.4.2 Phase 2: Data for longitudinal study (t2)

After several weeks (5 weeks, for dataset 2 or 7 weeks, for dataset 4), participants were asked to return to the laboratory. Participants were asked to complete the second round survey. The second-round survey focused on their current perceptions, beliefs and attitudes. Both two rounds questionnaires and all the tasks were approached using online questionnaire systems. The longitudinal data collection is presented in Figure 9.

2.3.5 Measurement and Operationalization

The questionnaires aim to capture the participants' trust beliefs, health beliefs, their perceptions of site usefulness and risk perceptions as well as their attitudes and future usage intentions. Demographic questions (e.g., age, gender and health information website experience) were also included. For Chapter 5, 6, 7, and 8, the questionnaire items and experimental tasks are presented from Appendix C to H. In addition, for both type surveys the questionnaires also included questions related to participant's actual use of the site in the period since phase 1 as well as their intentions toward continued usage of the site (more detailed see Chapter 5-8).

2.3.5.1 Pre-test and pilot test

In addition to the use of prior literature as a basis for ensuring content validity of the measures, pre-test involving academic experts in the field of e-services research were undertaken. Their recommendations helped refine the instruments. Pilot-tests were also undertaken to determine if the survey instruments were understandable for participants and whether there are any ambiguous or confusing measurement items in the questionnaires, as well as to ensure that the survey items are appropriate in the online heath information context. This is important to ensuring the face validity of the measurement items. Pilot-testing was carried out using a convenience sample of students drawn from the same population as the main study. Their responses helped determine the reliability of the measures, and any additional comments were taken into account prior to finalization of the instrument.

2.3.6 Ethical Considerations

Because primary data from consumers is being collected, ethics considerations are important. First, participation of respondents in this study should be entirely voluntary and they may refuse to answer any questions or withdraw from the study at any stage. Second, information collected for this study will be kept confidential, and only the researcher and supervisor will have access to the data. Student responses are only used for the purposes of this study. Data collected will not be made available to any other party and will be destroyed once the research is complete. After t1 and t2 data from each of the two data collection process were matched in the survey system, it was de-identified (data is matched on the system by student number). Anonymity is therefore retained in the storage and reporting of the results. Furthermore, results are only reported in the aggregate. Third, potential respondents were first informed of the purpose of this study. If they consented to participate, they were told that they will receive a small token of appreciation for their time. Ethical clearances were approved unconditionally by the Wits University Human Research Ethics Committee (Non-Medical). Protocol Number is: **H13/07/25** (Appendix A). This study also received permission from registrar to survey students (Appendix B).

2.3.7 Analysis Approach

In each chapter where data is analysed, the following general approach is adopted. Measurement model is tested by examining construct validity (convergent validity and discriminant validity) and reliability before proceeding to test the proposed dynamic and cross-lagged trust-risk model. Reliability is assessed by examining the internal consistency of the scale items as given by the Cronbach's alpha coefficient and Fornell and Larcker's composite reliability measure popularly implemented with PLS. Confirmatory factor analysis is used to ensure convergent validity and discriminant validity. Measurement items should low highly onto theoretical defined constructs and have low loadings on constructs they are not intended to measure. Average variance extracted (AVE) values should be greater than 0.5 to indicate that a construct explains a majority of the variance in its underlying items. For discriminat validity, square roots of average variance extracted values should be larger than the inter-construct correlations (Chin, 1998). Then, for structural model, there are two kinds of widely used SEM

techniques. One is component based SEM (e.g., PLS), another is covariance based SEM (e.g., AMOS and LISREL). SEM techniques not only can analyze structural model but also can assess the measurement model. Chapter 5 and Chapter 6 cross-sectional models and the dynamic model (Chapter 7, Figure 25) are each estimated using component based SEM implemented in Smart-PLS software package (version 2.0 M3) (Ringle et al., 2005). The cross-lagged models (Figure 29 to 31) were tested using covariance based SEM implemented in AMOS 22.0 version.

2.3.8 Limitations of the Longitudinal Investigations

With respect to the longitudinal study the following limitations are also recognized: (1) due to the difficultly in carrying out longitudinal studies in the field, the sample is drawn from a university population. This is a recognized threat to external validity of the findings and may limit the generalizability of the conclusions to other populations. The use of online health information services as a context for study is important due to its recent growth as a high-potential area for e-services and one in which the salience of trust and risk perceptions is likely to be highly significant. It is recognized that results of the dynamic model test may not generalize beyond this particular e-service context. (2) Longitudinal research designs can potentially reduce the validity of the findings over time (Stratford et al., 1999). (3) Other threats to internal validity may arise from history and maturation effects (Bhattacherjee and Premkumar, 2004). The detailed limitations were reported in Chapter 7 and Chapter 8.

2.3.9 Conclusion

This chapter presented the review of trust and risk perceptions in e-services. More specifically, it includes: the relationships between trust and risk perceptions, antecedents of trust, moderators of the trust, risk acceptance relationship, and the research methods that employed in past trust-risk studies. Based on literature review, the research on trust and risk in consumer acceptance of e-services remains fragmented and the posited research models are contradictory. The next chapter, Chapter 3 employs a meta-analysis to address this problem.

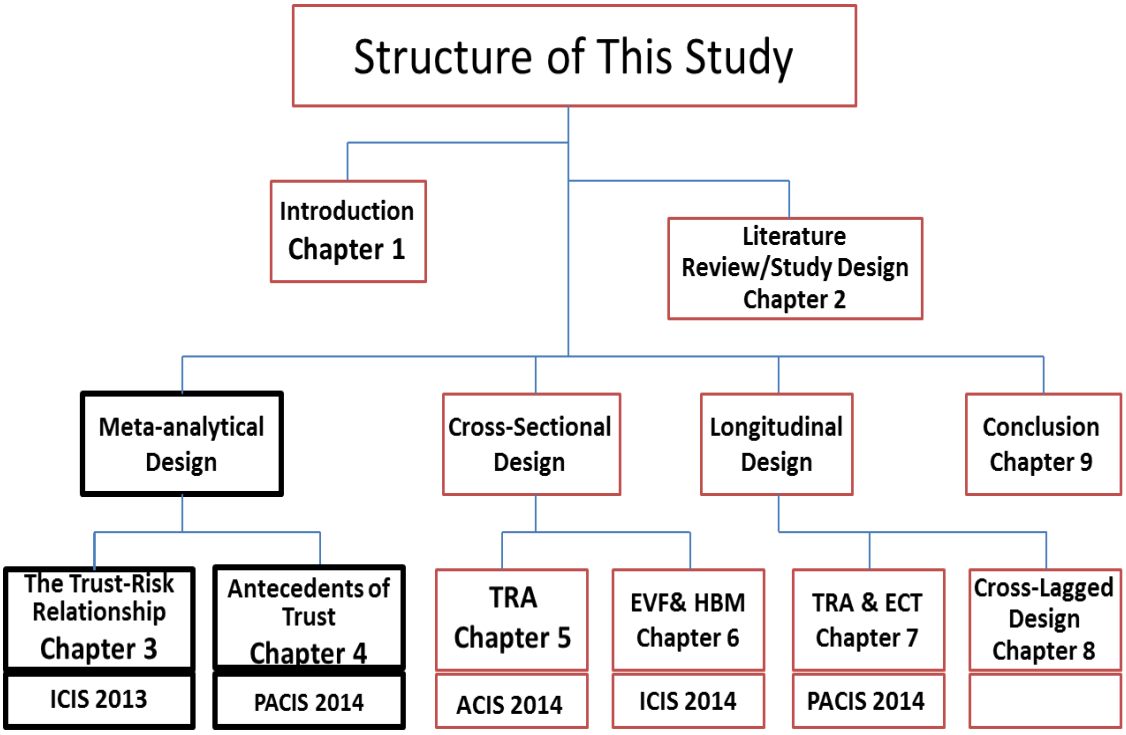


Figure 10: Meta-Analytical Studies

Chapter 1 and Chapter 2 described the problems of trust and risk perceptions in e-services. More specifically, these problems included: the relationships between trust and risk perceptions, antecedents of trust, moderators of the trust, risk acceptance relationship, and the research methods that employed in past trust-risk studies. Then, the theories and models underpinning this thesis were introduced.

Based on literature review, the research on trust and risk in consumer acceptance of e-services remains fragmented and the posited research models are contradictory. The next chapter, Chapter 3 employs a meta-analysis to address this problem, and address RQ1 and RQ2.

Understanding the antecedents of consumer trust was identified earlier as being of both academic and practical interest. Research into these antecedents has however been disconnected, and has not been integrated to provide an answer as to which are the most significant antecedents of trust. Chapter 4 therefore employs a second meta-analysis to address this problem (RQ3).

CHAPTER 3: TRUST AND RISK IN CONSUMER ACCEPTANCE OF E-SERVICES: A META-ANALYSIS AND A TEST OF COMPETING MODELS

This chapter has been published as: Mou, J., and Cohen, J.F. 2013. "Trust and Risk in Consumer Acceptance of e-Services: A Meta-Analysis and a Test of Competing Models," *Proceedings of the 34th International Conference on Information Systems (ICIS), Milan, Italy.*

3.1 Introduction

As discussed previously, e-services offer the promise of increased convenience, lower-cost of transacting, increased consumer choice and greater accessibility by eliminating space and time constraints (de Ruyter et al., 2001; Rust and Kannan, 2003).

Despite this potential, uncertainty and fears of opportunism still characterize the online context and varying degrees of consumer acceptance and engagement in the use of e-services has been observed. The technology mediated nature of e-service creates a temporal and physical distance between the service consumer and the service provider. The inability to interact with the service provider means that consumers cannot rely on visual and physical clues to reassure themselves of the bona fides of the provider (Harridge-March, 2006). This increases the ease with which online vendors can take advantage of their anonymity to engage in opportunistic behaviors such as misrepresentation, unfair pricing, conveying inaccurate information, violating privacy, failing to adhere to obligations to process transactions completely and accurately, or mishandling consumer information (Gefen et al., 2003a; Kim et al., 2008). There is added uncertainty associated with the use of an open and global Internet infrastructure, which may not function predictably and may fail to keep information safe (Pavlou, 2003; Pavlou and Gefen, 2004).

The uncertainty and opportunism inherent in e-services results in increased perceptions of risk in electronic exchange relationships and elevates the need for trust (Pavlou, 2003). Consequently, consumer perceptions of risk and their trust beliefs are considered amongst the most important psychological states influencing their online behaviors

(Pavlou and Gefen, 2002; Pavlou, 2003; Kim et al., 2008). Over 50 empirical studies have explored the effects of trust and risk perceptions on consumer acceptance of e-services. Unfortunately, despite this effort, the field is fragmented and the posited research models are contradictory. As will be illustrate below, the nature of relationships between trust, risk and consumer acceptance of e-services is a source of confusion for researchers and is a research problem in need of attention (see also Gefen et al., 2003b).

This chapter aims to address this problem through a meta-analytic investigation of the effects of trust and risk on consumer acceptance of e-service. Furthermore, to identify which of a multitude of competing nomological networks is best supported by the empirical evidence, the data from the meta-analysis is used to test and compare various models relating trust, risk and consumer acceptance. The research questions guiding the investigation in this chapter are:

CH3RQ1. What is the overall relationship between trust and risk perceptions in e-service?

CH3RQ2. What is the overall relationship between consumer attitudes and intentions toward the use of e-services and their trust and risk perceptions?

CH3RQ3. To what extent are these relationships moderated by factors such as culture, type of e-service, object of trust, sampling strategy and year of publication?

CH3RQ4. Which nomological network of relationships is best supported by the combined empirical evidence?

Managing consumer trust and perceptions of online risk are considered critical to the continued development and success of the online service environment (Pavlou, 2003). Moreover, the efforts of e-service providers to mitigate risk perceptions and build trust are hampered by a lack of understanding of how trust and risk perceptions interact and how they come to influence online behavior. This chapter's results will thus help e-service providers determine the relative emphasis they need to place on strategies for risk mitigation versus strategies for trust-building. Moreover, the contradictory interpretations of the trust-risk relationship and the lack of consensus regarding their individual and joint effects on online consumer behavior limit the field's ability to develop a coherent and cumulative body of e-service research. This chapter effort to improve understanding of the trust-risk relationship and their effects on consumer acceptance is thus of theoretical importance.

The next section of this chapter discusses the roles of trust and risk in e-services and their importance to consumer acceptance. To illustrate the inconsistencies in past research work, various models of the effects of trust and risk and their effects on consumer acceptance of e-services are then presented. The chapter then discusses the research methodology, presents results of the meta-analysis, and tests of competing structural models. This chapter concludes with a discussion of the findings and their implications.

3.2 Theoretical Background

3.2.1 Trust, Risk and Consumer Acceptance of e-Services

Trust is important to all forms of social exchange and buyer-seller transactions, and reflects a consumer's belief that favorable conditions exist to facilitate transaction success (Pavlou and Gefen, 2002). Trust allows the consumer to accept vulnerability because of an expectation that it can rely on the other party not to behave opportunistically (Bart et al., 2005). Trust stems from a consumer's confidence in the ability, benevolence, competence, honesty, integrity, and predictability of not only the exchange partner but also in the structures facilitating the exchange (McKnight et al., 1998; Gefen, 2002a; Bhattacherjee, 2002; McKnight et al., 2002). Trust in the e-service context has thus been considered in relation to multiple objects of trust, including the e-service provider (Pavlou and Gefen, 2004), the e-service web site or platform as well as the enabling technologies or infrastructure e.g., the Internet (Bart et al., 2005). For example, Thatcher et al. (2013) distinguished trust as general trust and specific trust in the B2C e-commerce context. General trust includes trust in IT infrastructure and trust in institutional mechanisms; specific trust includes trust in merchant and trust in website. Taken together, trust in the e-service context can thus be defined as a consumer's confidence in and willingness to depend on 1) the e-service provider's reliability, good intentions, and ability to deliver on expectations; 2) the product or delivered service to meet the consumer's needs; 3) the e-service website or platform to perform the required functions; and 4) the integrity and dependability of the enabling technological environment (Bhattacherjee, 2002; Pavlou, 2003; Bart et al., 2005; Ribbink et al., 2004; Harridge-March, 2006).

The uncertainties of transacting online are also argued to increase perceptions of risk. Perceived risk in e-services is the consumer's subject belief about the potential for something to go wrong when undertaking service transactions online, and the probability of suffering a loss if it does (Garbarino and Strahilevitz, 2004). Individual consumers will have differing beliefs about the inherent risks involved in the use of e-services but the two most prominent are perceived financial and privacy related risks (Pavlou, 2003; Bart et al., 2005; Kim et al., 2008). Financial risks include monetary losses whilst transacting online. Financial losses may result from the duplication of an online transaction due to technology error, the misuse of the consumer's credit card data, the purchase of a defective product or a service that is not performed as expected, and problems experienced in shipping and/or delivery. Consumers may also risk having their time wasted in following up unreliable service providers, correcting errors, seeking compensation, or otherwise unnecessarily having to access customer support services. Privacy risks result from submission of confidential information including credit card data, address and telephone details, employment and tax-related data, or health and medical data that may subsequently be exposed. Garbarino and Strahilevitz (2004) found consumers rated loss of privacy as the risk most likely to occur, whilst financial risk, due to unauthorized use of credit card data, as having the most serious consequences.

Over 50 empirical studies have explored trust and risk as determinants of consumer acceptance of e-service. These past studies typically draw on technology acceptance and consumer behavior literature to define e-service acceptance as the consumer's attitude and/or behavioral intention toward the use of the e-service. Attitudes are an overall evaluative response, including both cognitive and affective components, toward the use of an e-service, whilst behavioral intentions refer to consumer willingness or intention to use, participate, share information or transact with the e-service provider. Past studies also draw on social exchange theory to underpin the importance of trust to exchange relations, and the theories of reasoned action and planned behavior to define trust and risk as salient behavioral beliefs capable of influencing consumer attitudes and behavioral intentions. However, despite this common theoretical grounding, the trust-risk relationship and their effects on attitude and behavioral intentions have been modeled differently across studies. These differences are discussed next.

First, two perspectives on the trust-risk relationship have emerged in the e-services literature. The first views trust as a solution to the uncertainty and risk present in online

transactions (Pavlou, 2003; Kim et al., 2008). This view considers trust to lower the perceived risks of e-service. The second perspective argues that the need for a consumer to form a trusting belief is based on that consumer's perceived level of risk (Dinev and Hart, 2006) i.e., a lower perceived level of risk leads to higher levels of trust.

Second, the effects of risk and trust on consumer acceptance have been modeled differently in past work. For example, Jarvenpaa et al. (2000) model the effects of trust on consumer purchase intentions in online shopping as being fully mediated by attitude and risk perceptions, and include an additional direct effect of perceived risk on intention. Others however attempt a more parsimonious model by omitting attitude and consider trust's effect on intention as only partially mediated by perceived risk (e.g., Pavlou, 2003; Pavlou and Gefen, 2005; Nicolaou and McKnight, 2006; Kim et al., 2008 and Kim et al., 2009a). van der Heijden (2003) recognizes the effect of trust on perceived risk but considers attitude to mediate both their effects on intention.

Those who consider risk as antecedent to trust have modeled trust as partially mediating (e.g., Dinev and Hart, 2006), or fully mediating (e.g., Li et al., 2007; Chandra et al., 2010) the risk-intention relationship. Others (e.g., Horst et al., 2007) model the effects of trust and risk as fully mediated by other cognitions such as perceived usefulness. Still further, some consider no inter-relationship between trust and risk and view them as independent predictors of attitude (e.g., Verhagen et al., 2006; Bianchi and Andrews, 2012), intention (e.g., Song, 2010), or a combination of attitude and intention (e.g., Lee, 2009; Izquierdo-Yusta and Galderon-Monge, 2011). Figure 11 reflects some of these inconsistent ways in which the trust-risk relationship and their effects on consumer acceptance have been modeled in past research.

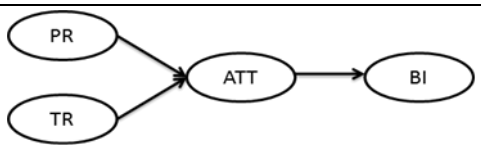
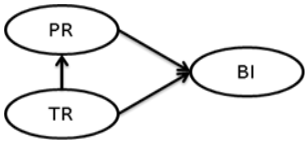
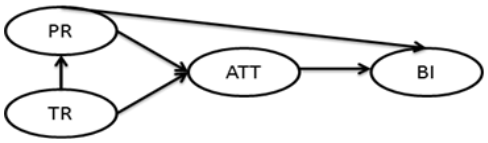
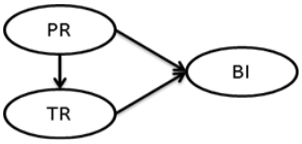
Trust and Risk as Independent Predictors	 The Bianchi and Andrews (2012) model. Variations of this model include Lee (2009), Izquierdo-Yusta and Galderon-Monge (2011) and others.
Risk as Mediator	 Pavlou (2003) and others models risk as partially mediating the effects of trust on intention.  Jarvenpaa et al. (2000) incorporates attitude and models a direct effect between risk and intention.
Trust as Mediator	 Dinev and Hart (2006) model trust as partially mediated the effects of risk.  Li et al. (2007) and Chandra et al. (2010) model trust as fully mediated the effects of risk perception.

Figure 11: Trust and Risk in E-Service Acceptance as Modeled in Past Research

The review of the field suggests that while past studies have contributed much to our understanding of trust and risk in e-services, the literature is characterized by competing perspectives that have led to a confusing number of research models being postulated. In addition, the effect sizes reported in past work have varied, and the sources of this heterogeneity have not been uncovered. As a result, the field lacks a general conclusion about the trust-risk relationship and it is not clear which between the two has the stronger average effect on consumer acceptance. Significant heterogeneity in reported effect sizes could indicate that trust and risk perceptions have different effects on consumer acceptance depending on factors such as the type of e-service or the characteristics of the consumer population. It is also not clear which of the competing logics linking trust and risk to e-service acceptance is best supported by the available evidence. The

divergent perspectives highlighted a decade ago in Gefen (2003b) are becoming even more pronounced, the efforts of e-service researchers remain uncoordinated and a more complete theory of online consumer behavior still eludes the field. Therefore this chapter intents to combine evidence from multiple studies to determine the average strength of the relationship between trust and risk perceptions (CH3RQ1) and their relationship with consumer acceptance variables (CH3RQ2), to examine a set of factors that might explain any heterogeneity in the effect sizes reported in past studies (CH3RQ3), and to determine which of the competing nomological models best fits the combined data (CH3RQ4). The approach is discussed next.

3.3 Research Methodology

3.3.1 Meta-Analytic Structural Equation Modeling

As discussed in the previous chapters, to address the fragmented and contradictory nature of the field and the research questions posed in the introduction, this chapter adopted a meta-analytic structural equation modeling (MASEM) approach. MASEM combines the procedures of meta-analysis and structural equation modeling in a step-wise fashion. First, meta-analysis is used to combine quantitative evidence from prior studies and to estimate both weighted mean and true-score correlations between the variables of interest (Hunter and Schmidt, 2004). Cumulating the available evidence from across a number of studies allows for a general conclusion to be reached about the relationships between trust and risk, and their consequent effects on consumer attitudes and intentions toward e-services posed by CH3RQ1 and CH3RQ2. Moreover, meta-analytic techniques can identify heterogeneity in effect sizes across studies. This allows for subsequent examination of the influence of moderators that may account for observed inconsistencies in the effect sizes reported by prior studies. Accounting for any observed heterogeneity through examination of moderators addresses CH3RQ3. Furthermore, a matrix of true-score correlations derived from a meta-analysis can then be applied in a structural equation modeling (SEM) analysis for testing whether a given model fits a hypothesized pattern of relationships (Viswesvaran and Ones, 1995). This will allow for the CH3RQ4 to be addressed by testing which of a number of competing models (Figure 11) best fits the combined data. In the following sections data sources and criteria for

inclusion of studies are discussed in the meta-analysis. Then procedures for data coding and analysis are discuss before presenting the results.

3.3.2 Identifying the Studies

To ensure the validity of the meta-analysis, this chapter sought to include as many studies as possible where trust and risk perceptions were both treated explicitly in investigations of e-service acceptance.

A broad definition of e-service is adopted to include all forms of B2C electronic commerce, electronic banking, online health services, e-government, professional services such as online financial advisory and legal services, consumer-to-consumer exchanges, and mobile payment services, amongst others.

A computerized search of the following electronic databases was conducted: EBSCO Business Source Premier, Science Direct, Jstor, Emerald and ABI/INFORM Global. Search terms included “consumer” or “customer” or “user” or “citizen” or “individual”; “use” or “adoption” or “acceptance” or “behavioral intention”; “risk” and “trust”; and variations of “e-service” or “e-commerce” or “e-banking” or “e-government” or “e-health” or “mobile payment” or “online”. The search was further restricted to empirical studies through the use of search terms such as “survey” or “experiment” or “field study” or “correlation”. The time frame was further restricted to articles published (or in press) between January 2000 to March 2013. Prior to 2000 research on consumer behaviors was mostly focused on off-line transactions. Jarvenpaa et al. (2000) was the first empirical study integrating trust and risk research in e-commerce and paved the way for the subsequent trust and risk studies to be reviewed here. English was the language criterion for all articles. To avoid the concerns of publication bias with meta-analysis (King and He, 2005; He and King, 2008) conference publications were considered via a search of IEEE Xplore and the AIS e-library.

All the studies had to be accessible through the university’s library system and its comprehensive electronic database subscription. Articles were required to include examination of both trust *and* risk. Papers that focused on only one of trust or risk were excluded (e.g., Ba and Pavlou, 2002). Papers that did not focus on trust and risk in online services were excluded. For example, Kerler and Killough (2009) studied trust and

perceived risk but not in an online environment. Papers not reporting on results of an empirical study were excluded (e.g., Gefen, et al., 2003b; Yousafzai et al., 2003; Corritoro et al., 2003; Taleghani et al., 2011). Papers that did not report correlations were excluded. For example, van der Heijden et al. (2003) and Verhagen et al. (2006) provided only SEM estimation results. Furthermore, papers where queries regarding the reported correlation matrix were not able to resolve by corresponding the authors were excluded prior to submission (e.g., Bélanger and Carter, 2008; Song, 2010). Finally, a total of 52 published studies remained for the purposes of the MASEM analysis (43 journal articles, 8 proceedings papers and 1 dissertation).

For Chapter 3, the study selection process is illustrated in Figure 12.

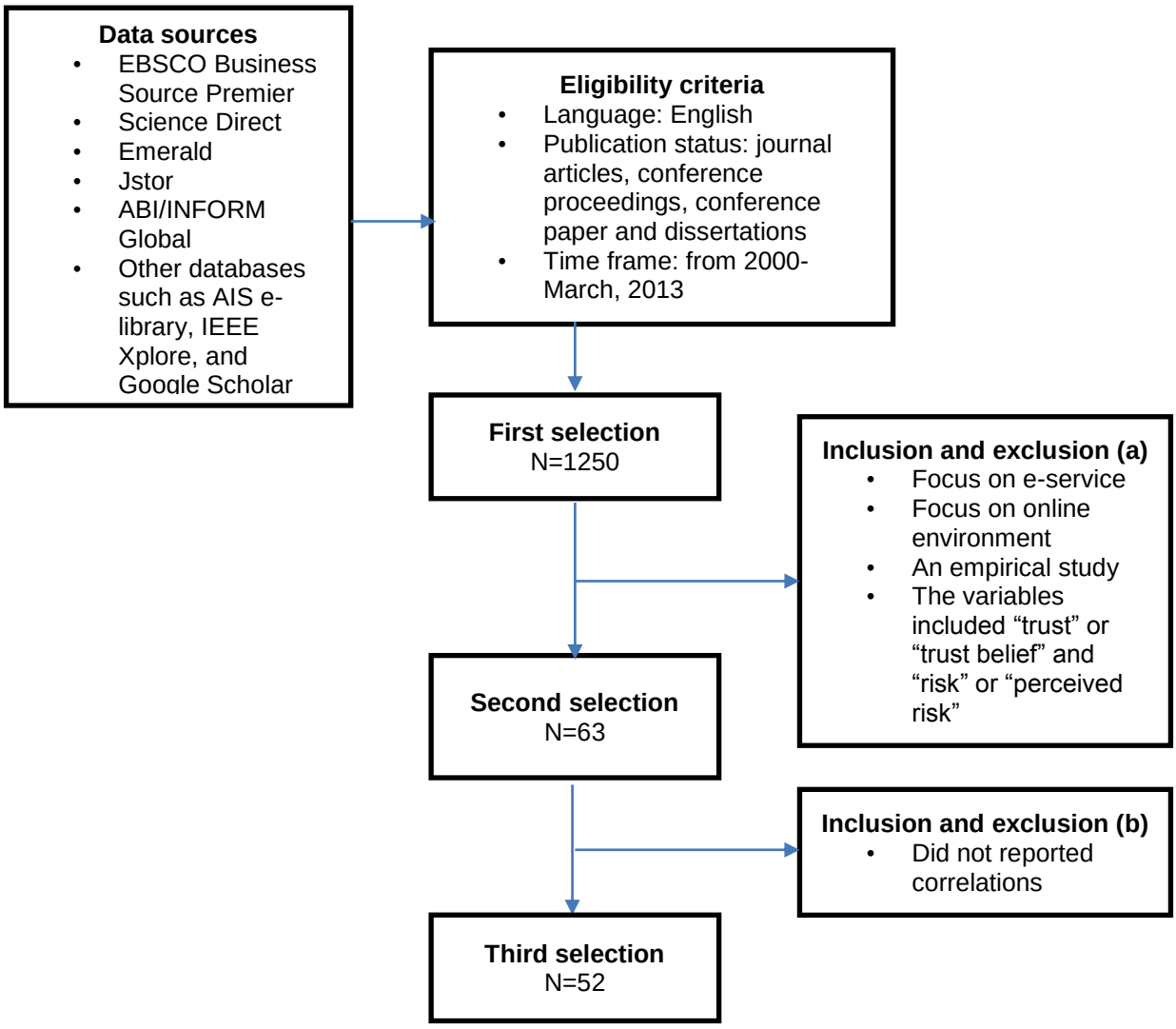


Figure 12: Study Selection Process

3.3.3 Coding the Studies

Each article or publication was examined to extract data required for the meta-analysis. The author and supervisor of this article independently coded the studies [9] and discussions were held to resolve any disagreement. Information on each study's year of publication and sample size were collected. Almost half the studies were published in the last 3 to 4 years - 28 were published from 2000 to 2009, and 24 were published between 2010 and March 2013.

Years	Last decade: 2000 (1); 2001 (2); 2002 (2); 2003 (3); 2004 (2); 2005 (2); 2006 (7); 2007 (3); 2008 (2); 2009 (4). Current decade: 2013 (3); 2012 (4); 2011 (10); 2010 (7).	
Publication types	Publication	No of articles
	Information Systems Research	6
	Decision Support Systems	6
	Information and Management	3
	Journal of the Association for Information Systems	2
	Journal of Internet Commerce	2
	Electronic Commerce Research and Applications	2
	Computers in Human Behavior	2
	Other AIS basket journals namely EJIS, CAIS, JIT	3
	Other journals	17
	Conference Proceedings	8
	PHD dissertation	1
E-service intervention	Commercial based e-services: e-commerce (15); Internet store (9); e-shopping (6); e-banking (6). Non-commercial based e-services: e-government (4); online legal services (1); Internet user (1); peer-to-peer sharing (1); wi-fi hotspots (1); location-based services (1); healthcare (3); information disclosure (1); social networking (3).	
Country*	Western: USA (25); UK (1); Australia (2); Canada (1); New Zealand (1); The Netherlands (3); Spain (1); Chile (1); Greece (1); Dutch (1); Italy (1); Germany (1). Eastern: China (5); Taiwan (4); Singapore (3); Hong Kong (1); Jordan (1); India (1); Malaysia (1); Korea (1); Iran (1).	
Object of Trust#	Trust in provider: store (6); online provider (8); vendor (11); retailer (4). Trust in platform and technology: Internet (1); technology media (4); website (10); e-services (6). Mixed trust variable (10). Note that studies with a focus on multiple objects of trust were excluded from the moderator tests.	
* > 52 due to some studies examining more than one consumer population # > 52 due to some studies examining more than one object of consumer trust		

Table 5: Summary of Studies Included in Meta-Analysis for Chapter 3

[9] The use of two coders help to increase reliability of the coding, and can provide a check on the coding and effect size calculations.

Articles were classified based on the type of e-service under examination. These were classified as commercial based e-services such as e-commerce, Internet store, e-shopping, and e-banking. Non-commerce based e-services such as e-government, healthcare and social networking services (SNS). Based on the consumer population under examination, studies were classified into Western or Eastern culture groups. Furthermore, it was identified whether studies employed convenience sampling through the use of student samples. The studies are summarized in Table 5. The constructs employed in these studies was examined and the conceptual and operational definitions considered in order confirming their consistency with our constructs of trust, perceived risk, attitude and behavioral intention.

Variables were coded as trust if they reflected a consumer's willingness to depend on the object of trust, such as the e-service provider, the e-service platform (e.g., website), or the communications network (e.g., Internet), based on a belief or confidence in the dependability, competence, ability, integrity, credibility and/or reliability of that trust object. Variables such as vendor reputation, third party assurances, vendor policies, service quality, or consumer propensity to trust were not coded as trust since past work has shown them to be antecedents of trust beliefs. The object of trust under study (i.e., trust in the e-service vendor versus trust in the e-service platform) was noted for use in subsequent testing.

Variables were coded as risk if they reflected a consumer's subjective assessment of the potential for loss associated with using the e-service. Variables reflecting consumer perceptions of mechanisms in place for security and information safeguarding were not coded as a risk perception as they have been defined by past work as determinants of risk perception.

Despite conceptual distinctions having been made in the literature (e.g., McAllister, 1995) with regards to cognitive and affective dimensions of both trust and risk, it was found that all extracted studies sufficiently met definitions of cognitive based trust and risk perceptions.

Variables were coded as attitude if they reflected a consumer's overall evaluative judgment regarding the e-service and variables were coded as behavioral intention if they reflected intentions to use or participate in an e-service. These included for example,

purchase intentions, adoption intentions, willingness to disclose information, and intention to transact.

Each study's reported effect sizes (i.e., the correlations between the six variables of interest) were then independently recorded. These were then cross-checked for agreement. In certain cases, squared correlations needed to be transformed (e.g., Cho, 2006). In one instance (Malhotra et al., 2004), the SEM path result was used to infer a positive rather than negative correlation between trust and behavioral intention. In one study, only a subset of the correlations related to the use of a health e-service site was included rather than correlations relating to more general Internet use such as email (Zimmer et al., 2010). In one further study (Luo et al., 2010) only the overall risk variable was coded rather than its underling components.

In addition to the effect sizes, the reliabilities of each study's variables was coded using the reported Cronbach's alpha coefficient or if not available the reported composite reliability or internal consistency scores. Based on the reported reliabilities, an average reliability score for each variable was calculated for use in subsequent analysis.

3.4 Meta-Analytic Approach

This study followed the methods of Hunter and Schmidt's (2004) random effects models to estimate effect sizes between the variables of interest. First, to correct for sampling error, the bare-bones or weighted mean effect size (r_+) was calculated. This approach weights each study's correlation by the number of observations in that study according to the formula:

$$r_+ = \frac{\sum_{i=1}^{k} N_i r_i}{\sum_{i=1}^{k} N_i}$$

Where N_i is the sample size of each study and r_i is the observed correlation value of each study.

Second, to correct for measurement error, the true-score correlation (r_c) was calculated using the following formula:

$$r_c = \frac{r_{xy}}{\sqrt{r_{xx}}\sqrt{r_{yy}}}$$

Where r_{xy} is the average observed correlation across the studies, r_{xx} is the average of the reported reliability estimates for the independent variable, and r_{yy} is the average of the reported reliability estimates for the dependent variable.

Third, following Hedges and Olkin's (1994) recommendation, homogeneity tests was also carried out to determine whether there is any heterogeneity in the underlying correlations. Variance in the underlying correlations may suggest the presence of moderating variables. First, 95% credibility intervals were calculated (Hunter and Schmidt, 2004). If the intervals are sufficiently large then the presence of moderators should be expected. To do homogeneity test, the Fisher Z transformation was carried out by using the formula:

$$Z_{r_i} = \frac{1}{2}\log_e\left(\frac{1+r_i}{1-r_i}\right)$$

Then Homogeneity Q was calculated by using the formula:

$$Q = \sum_{i=1}^{k}(w_i)(\bar{z}_r)^2$$

Where

$$\bar{z}_r = \frac{\sum_{i=1}^{k} w_i z_{r_i}}{\sum_{i=1}^{k} w_i} = \frac{\sum_{i=1}^{k}(N_i - 3)z_{r_i}}{\sum_{i=1}^{k}(N_i - 3)}$$

If Q exceeds the critical value, moderating effects should be suspected (Schepers and Wetzels, 2007).

Finally, the fail-safe N test is used to test the robustness of the findings by estimating the number of non-significant results or non-published studies that would be required to reduce an obtained mean effect size to a trivial level (Rosenthal, 1979). To do the fail-safe N test, first r was transformed to Cohen's d value, and then Orwin's formula was adopted to calculate the fail-safe N. A general rule of thumb is that the fail safe N value should exceed 5K+10 (where K is the number of observed correlations).

3.5 Results

3.5.1 Descriptive Analysis

The descriptive statistics of the meta-analysis are presented in Table 6. For each pair-wise relationship, the total number of studies, the total number of observed correlations, and range of correlation, range of sample size, the cumulative sample size and the average of sample size are reported. Because some publications reported results from tests on more than one sample or had more than one object of trust, risk or behavior under examination, the number of available pair-wise correlations could exceed the number of publications.

Pair-wise relationship	No of studies	No of correlations (K)	Correlations			Range of sample size		Total N	Ave N
			Lower	Upper	Ave	Lower	Upper		
PR-TR	52	60	-0.810	0.260	-0.377	52	1381	21696	362
TR-ATT	14	18	0.096	0.744	0.508	145	1381	7955	442
PR-ATT	14	18	-0.722	0.000	-0.422	145	1381	7955	442
TR-BI	46	55	0.000	0.789	0.455	52	1381	20900	380
PR-BI	46	53	-0.780	-0.002	-0.384	52	1381	19679	371
ATT-BI	14	17	0.316	0.844	0.570	145	1381	7768	457
TR: Trust; PR: Perceived risk; ATT: Attitude; BI: Behavioral Intention; N: sample size; Ave: average.									

Table 6: Descriptive Statistics for Chapter 3

The correlations for TR-PR range from -0.810 to 0.260 and the average correlation is -0.377, for TR-ATT from 0.096 to 0.744 and the average correlation is 0.508, for PR-ATT from -0.722 to 0.000 and the average correlation is -0.422, for TR-BI from 0.000 to 0.789 and the average correlations is 0.455, for PR-BI from -0.780 to -0.002 and the average correlation is -0.384, the correlation of ATT-BI is in the range from 0.316 to 0.844 and the average correlation is 0.570. Following Parboteeah et al's. (2009) approach, Meng et al's. (1992) Z-test was used to test if TR-ATT (0.508) and PR-ATT (-0.422) are significantly

different. The results show that the relationship between TR and ATT was observed to be stronger ($p<0.05$) than the relationship between PR and ATT.

3.5.2 Meta-Analysis of Effect Sizes

To answer CH3RQ1 and CH3RQ2 on the overall relationship between trust and risk perceptions in e-service and the overall relationship between consumer attitudes and intentions toward the use of e-services and their trust and risk perceptions, Table 7 reports the meta-analysis of the effect sizes, including both the bare-bones effect corrected for sampling error, and the true-score effect corrected for measurement error. 95% confidence intervals for each bare-bones correlation reveal no intervals containing zero. Thus all 6 correlations are significant. Both r_+ and r_c suggest the correlations between the variables of interest are moderate to strong. The calculated effect sizes show that trust and risk are related but that trust has on average a stronger correlation with both attitude and behavioral intention than risk perception. Each fail-safe N statistic was greater than $5K + 10$. Thus all pair-wise correlations pass the fail-safe test and the results are considered robust to publication bias.

95% credibility intervals are however sufficiently large. Thus suggesting the underlying studies are not homogenous and the presence of moderators is expected. This is explored next in an effort to answer CH3RQ3.

Pair-wise relation-ship	r_+	r_c	Var r_+	Var r_c	SD(r_c)	95% Confidence interval		95% Credibility interval		Fail-safe N	Result
						Lower limit	Upper limit	Lower limit	Upper limit	(Nfs 0.05)	
PR-TR	-0.356	-0.435	0.046	0.043	0.230	-0.410	-0.302	-0.040	-0.829	416	Sig
TR-ATT	0.578	0.582	0.035	0.041	0.225	0.492	0.665	0.192	0.972	232	Sig
PR-ATT	-0.413	-0.482	0.034	0.041	0.226	-0.498	-0.327	-0.092	-0.872	148	Sig
TR-BI	0.467	0.519	0.023	0.025	0.169	0.427	0.507	0.222	0.816	519	Sig
PR-BI	-0.369	-0.437	0.038	0.039	0.218	-0.422	-0.317	-0.059	-0.814	381	Sig
ATT-BI	0.596	0.644	0.022	0.023	0.162	0.526	0.666	0.355	0.933	227	Sig

r_+: Bare-bones effect size; r_c: true-score correlation; SD(r_c) Standard deviation of r_c; Sig: Significant; Var: Variance.

Table 7: Meta-Analysis Results for Chapter 3

3.5.3 Moderator Analysis

In addition to the large credibility intervals (Table 7), Table 8 shows that Q values exceed the critical value in all pair-wise relationships, and the potential for the relationships to be moderated was therefore considered. To address CH3RQ3, five factors for their potential moderating effects are examined.

First, convenience sampling in e-services research is prevalent. Of the 60 observed correlations between trust and risk, 42 were based on data collected from student samples. Opponents of the use of student samples would argue the limitations to generalizability that may result, whilst proponents might suggest that because general theories of behavior and internal systems of relationships are under examination, the use of student samples is valid and appropriate (Compeau et al., 2012). It was therefore decided to follow other meta-analytic studies (e.g., Schepers and Wetzels, 2007) to determine whether the use of a student sample moderated the calculated effect sizes.

Second, it is necessary to consider whether the effects of trust and risk perceptions on online behavior are culture bound. Gefen et al. (2005) examined whether the role of trust in an e-service differed across US and South African citizens, Teo and Liu (2007) compared US, Singapore and China to determine whether effects of trust were universal across the cultural contexts, whilst Park et al. (2012) examined whether relationships between trust and online behavior differ between US and Korean consumers. The potential moderating effects of culture was examined by classifying consumer populations as Western (e.g., USA; UK; Australia; Canada; New Zealand; The Netherlands; Spain etc.) and Eastern (e.g., China; Taiwan; Singapore; Hong Kong; India; Pakistan and Indonesia etc.).

Third, it is necessary to consider whether the type of e-service could moderate the effect sizes. The definition of e-service extends across a wide range of online exchanges including commercial based transactions between business and consumers and non-commercial services such as healthcare, social networking and those enabled by e-government systems. It was examined whether type of e-service (commercial versus non-commercial) influences the strength of effects.

Fourth, the meta-analysis extends from the year 2000 to present. Over that time period, consumers have had an opportunity, on average, to become more experienced and

familiar with transacting online. This has led some to question whether trust and risk may still be relevant in online consumer behaviors. In at least one study, online habit and routine use had only a small moderating effect on the link between trust and online consumer intentions (Chiu et al., 2012) - suggesting that trust retains a significant direct effect even for more experienced e-service users and over repeated interactions with e-service providers. On the other hand, one study suggested that familiarity may simply increase trust perceptions but not moderate the effect of trust (Bhattacherjee, 2002). Studies carried out in the last decade (2000-2009) were therefore compared with those carried out from 2010 to 2013 to determine whether effect sizes have weakened as a result of any average increase in consumer familiarity and experience with e-service transactions.

	PR-TR	TR-ATT	PR-ATT	TR-BI	PR-BI	ATT-BI
Q	1501	469	424	730	1139	414
Critical value	77.93	27.59	27.59	72.15	69.83	26.30
Student	-0.37	0.62	-0.45	0.47	-0.39	0.64
Non-student	-0.34	0.48	-0.33	0.47	-0.32	0.50
Z-value	**-2.30**	**8.03**	**-5.61**	0.08	**-5.08**	**8.24**
Western	-0.37	0.55	-0.45	0.46	-0.38	0.56
Eastern	-0.34	0.62	-0.38	0.47	-0.35	0.64
Z-value	**-2.08**	**-4.78**	**-3.86**	-1.01	**-2.86**	**-5.36**
Commercial	-0.36	0.62	-0.44	0.46	-0.38	0.59
Non-commercial	-0.33	0.40	-0.31	0.48	-0.40	0.61
Z-value	**-2.22**	**10.81**	**-5.62**	-1.41	**-2.43**	-1.12
Last decade	-0.36	0.64	-0.46	0.46	-0.38	0.65
Current decade	-0.35	0.47	-0.34	0.47	-0.35	0.51
Z-value	-0.83	**10.61**	**-5.96**	-0.91	**-2.35**	**9.35**
Trust in e-service vendor/provider (k=29)	-0.43	0.66		0.47		
Trust in platforms and technology (k=21)	-0.24	0.37	-	0.48	-	-
Z-value	**-14.37**	**13.77**		-0.85		

Table 8: Moderator Analysis for Chapter 3

Fifth, it is acknowledged that the varying perspectives have been taken in the literature on the object of trust that is most relevant to online consumer behaviors i.e., whether trust in

the e-service provider or trust in the e-service website or platform exerts the stronger effect. The analysis therefore compared whether effect sizes are dependent on the object of trust under study.

Table 8 shows the bare-bones correlation (r_+) of each relationship in the subgroups, and the Fisher Z scores for comparing correlations between the subgroups. The significance of the Z score (>1.96) provides confirmation of a moderating effect. A number of significant moderated effects were found. These are discussed after addressing CH3RQ4.

3.5.4 SEM Analysis

The final research question (CH3RQ4) considers which nomological network of relationships (see Figure 11) would best be supported by the combined empirical evidence from the meta-analysis. To answer this question, a SEM analysis using a matrix of true-score correlations was carried out. Maximum likelihood was used to fit the model and the harmonic mean of the sample sizes was used as a conservative estimate of sample size (n=221) for input into the analysis. This approach is recommended in Viswesvaran and Ones (1995). The SEM analysis was conducted using AMOS version 20. Table 9 shows the results of SEM analysis of the competing models. In all the models, the paths are significant. The significance of the χ^2 statistics results from the relatively large sample size and the RMSEA values are high given the low degrees of freedom. Some of the models, e.g., Pavlou and Dinev, were just-identified. An additional model (see Figure 13) was tested, which recognizes the relative importance of trust over risk and it is considered to have the best overall fit. The implications are discussed next.

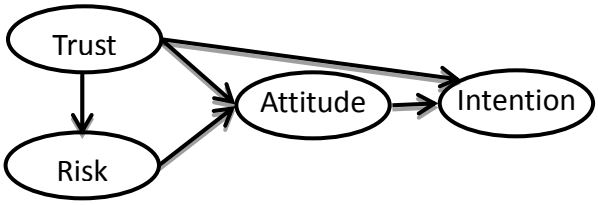


Figure 13: The Proposed Trust-Risk Model

Model	χ2	p	df	AIC	GFI	RMSEA	AGFI	NFI	CFI
Bianchi and Andrews (2012)	63.03	0.000	3	77.034	0.876	0.302	0.806	0.588	0.786
Dinev et al. (2006)	0.000	-	0	12.000	1.000	0.443	-	1.000	1.000
Gefen et al. (2003a)[a]	46.15	0.000	1	56.148	0.888	0.453	0.328	0.652	0.651
Gefen et al. (2003b)[b]	39.65	0.000	1	49.650	0.901	0.419	0.406	0.701	0.701
Izquierdo-Yusta and Galderon-Monge (2011)	101.58	0.000	2	117.581	0.844	0.476	0.220	0.655	0.655
Jarvenpaa et al. (2000)	8.90	0.003	1	26.895	0.981	0.189	0.806	0.970	0.973
Lee (2009)	50.89	0.000	2	66.886	0.906	0.333	0.531	0.827	0.831
Li et al. (2007)	17.23	0.000	1	27.228	0.952	0.272	0.713	0.870	0.875
Pavlou (2003)	0.000	-	0	12.000	1.000	0.443	-	1.000	1.000
Song (2010)	159.75	0.000	3	173.746	0.725	0.487	0.082	0.458	0.457
Van der Heijden et al. (2003)	16.89	0.000	2	32.886	0.964	0.184	0.822	0.943	0.948
Verhagen et al. (2006)	46.15	0.000	1	56.148	0.888	0.453	0.328	0.711	0.712
Additional proposed model[c]	4.74	0.030	1	22.738	0.989	0.130	0.895	0.984	0.987
a: TR->BI and PR->BI b: TR->PR and PR->BI c: TR->PR, TR->ATT, PR->ATT, ATT->BI, TR->BI									

Table 9: Results of Structural Equation Modeling Analyses Testing Different Models

3.6 Discussion

Over 50 empirical studies have explored the effects of trust and risk perceptions on consumer acceptance of e-services. However, the relationship between trust and risk and their effects on consumer acceptance has received inconsistent treatment in the literature. This has left a number of unanswered questions with regards to the overall relationship between trust and risk and the manner in which they come to influence acceptance. In an effort to address these questions, this chapter presents results of a meta-analysis that was carried out in an effort to synthesize the available correlational evidence on the trust-risk relationship and their effects on consumer attitudes and intentions toward the use of e-services.

Results show that the mean corrected correlations between the variables are all significant. This confirms the importance of trust and risk perceptions to the study of online consumer behavior. Trust and risk are found to be related and they are both salient beliefs influencing consumer acceptance of e-services. The question as to which of the

two beliefs has a larger average effect size has been resolved by analysis. By cumulating evidence from past studies, it was found that trust has (on average) a stronger relationship with both attitude ($p<0.05$) and intention ($p<0.001$) than does risk perception. This suggests trust may be the more relevant of the two variables in providing explanations of online behavior. Interestingly, the relationship between trust and attitude is stronger than the average relationship between perceived usefulness and user attitudes reported in prior meta-analytic studies of the popular technology acceptance model (Zhang et al., 2012; Yousafzai et al., 2007; Schapers and Wetzels, 2007). The effect of trust on behavioral intention is stronger than the effect of perceived usefulness on intention reported in at least one prior meta-analytic review (Zhang et al., 2012) although slightly lower than that same relationship reported elsewhere (Yousafzai et al., 2007; Schapers and Wetzels, 2007). From a theoretical standpoint the importance of both trust and risk constructs, and their explanatory power in the e-services context has been confirmed and their roles within the study of e-service acceptance deserves continued exploration.

The data from the meta-analysis was used to test a number of competing models found in the literature. SEM analysis has provided some useful insights into the interrelationships between the variables of interest, which to date have been modeled inconsistently in the literature. The $\chi 2$ statistics, RMSEA values and AIC values were used to determine which theoretical model provides the best fit to the data. Structural equation models must be overidentified, a just-identified model provides only a trivial indication of fit and cannot be adequately evaluated (Holbert and Stephenson, 2002； Lei and Wu, 2007). Thus the analyzed models, the Jarvenpaa and van der Heijden models fit the data quite well. Both models incorporate attitude and recognize the effects of trust on risk. However, a better fit model could be obtained by including a direct effect of trust on behavior and eliminating the direct effect of risk. This model recognizes the relatively more important role of trust in consumer acceptance shown by the meta-analysis. Models that present trust merely as antecedent to risk and attitudes are of poorer fit. Moreover, models that position risk as a determinant of trust only, or that consider trust and risk as independent predictors are of poorer fit. This suggests that the synthesized evidence as it relates to trust and risk best fits the causal logic discussed in Pavlou (2003). This logic describes trust as reducing behavioral uncertainty and related risk perceptions. When consumers have greater trust, they can rely on the service provider not to behave opportunistically and can depend on the provider to take steps to reduce the risks associated with the e-service infrastructure.

Trust thus attenuates the perceived risks associated with e-services (Pavlou, 2003). However, the best fit model identified that trust also retains a strong direct effect on behavioral intention. Thus risk only partially mediates the effects of trust. Risk reduction may not be the only mechanism through which trust influences online behavior. Identifying the other mechanisms responsible for translating the effects of trust into increased acceptance would be a useful avenue for future research.

The meta-analysis did however reveal significant heterogeneity in the effect sizes reported by prior studies. It was examined whether moderators may play a role in explaining differences in the magnitudes of effect sizes. First, it was found that studies involving the use of students are prone to reporting higher than average correlations. One explanation might be that student respondents are more prone to certain methods biases that can artificially inflate correlations such as social desirability biases. Researchers should thus be cautious in generalizing results from studies involving student populations.

The effects of trust on behavior do not seem to differ between Eastern and Western contexts. However, perceptions of risk are more strongly correlated with attitudes and behaviors amongst Western consumers, while trust is more important to the formation of attitudes amongst Eastern cultures. This can be explained with reference to the more collectivist orientation of Eastern cultures. Trust reflects a willingness to rely on others not to behave opportunistically, and a willingness to be vulnerable. However, in collectivist cultures there is a tendency not to want to transact with unfamiliar parties, and where out-groups are treated with greater suspicion. This is likely to elevate the importance of trust to attitude formation (Gefen and Heart, 2006). Weber and Hsee (1998) offer an explanation for the relatively more important role of risk perceptions to behavior in Western contexts by suggesting that persons in individualist cultures, such as the US, are expected to be more self-reliant and to personally bear the possible adverse consequences of making a risky decision. Thus they often lack the possible support that could cushion losses more common amongst socially-collectivist cultures.

High trust and low risk perceptions are more important to forming positive attitudes toward commercial than non-commercial e-services. Online commercial interactions are often conducted with less familiar providers, and the perceived financial risks associated with uncertain transactions are more immediately evident. This is likely to be important to attitude formation. On the other hand, attitudes toward e-service use in non-commercial settings appear to be driven less by uncertainties and fears of opportunism and may be

influenced by other motivations. Uncovering determinants of attitude toward non-commercial e-services is a useful avenue for future research.

Interestingly, the relationship between trust and risk and their associations with behavior have not changed much over the years. E-service use may not have yet become a sufficient enough consumer habit (Chiu et al., 2012) for these relationships to be weakened. The uncertainties that create a need for trust and which increase risk perceptions continue to remain important to the explanations of behavioral intentions.

Finally, one of the most important findings from the moderation analysis is determining that service provider or vendor based trust is more important than platform and technology based trust to consumer attitude and risk perceptions. This suggests that consumers are more confident in e-service infrastructures and are likely to place more emphasis on their perceptions of the e-service vendor when forming attitudes and considering risks. This finding is somewhat consistent with Harridge-March's (2006) suggestion that due to the growth in the Internet and the number of transactions taking place online, that the object of trust is shifting away from trust in the enabling mechanisms and channels toward trust in the e-service provider. Importantly, however, trust in both the e-service provider and the e-service platforms are important when it comes to behavioral intentions.

Taken together, the meta-analysis of effect sizes and the moderator findings suggest that the continued development of e-services needs to focus on developing a climate of trust. Trust directly and through its effects on risk perceptions are important to ensuring consumers are at ease in disclosing information and undertaking transactions. Despite some observed heterogeneity, the effects of trust on behavioral intentions are not moderated by any of the factors considered and this requires attention in future research. Moreover, the effects of trust are only partially mediated by risk. Future research needs to continue previous efforts (e.g., Gefen, 2003a; Kim et al., 2009a; Lu et al., 2011) to uncover these additional mechanisms responsible for translating trust into increased acceptance.

3.6.1 Contributions

This chapter has contributed to research on e-services in a number of ways. This is the first study to use a meta-analysis to examine the effects of both trust and risk on consumer acceptance and in so doing shed light on their relative importance to consumer attitudes and intentions. By integrating the available evidence from prior studies, results provide a benchmark against which future studies can compare their effect sizes. Furthermore, it compared competing nomological models found in the literature and in so doing improved our understanding of how trust and risk are related and how they combine to influence consumer acceptance. By examining the heterogeneity of effect sizes, this chapter has identified important moderating effects. In particular, different objects of trust have different effects on acceptance and culture has an important influence on the relative effects of trust and risk. Trust and risk perceptions showed relatively consistent effect sizes with attitude and intention in both commercial and non-commercial e-service contexts. Moreover, the effects of trust and risk on behavior remain just as relevant today as they did in the early days of e-service. From a practical perspective, it highlights for e-service providers the importance of focusing on vendor-related trust which may have increased payoffs for consumer acceptance than technology platform trust alone. They will need to convince consumers of their capabilities and good intentions. In addition to trust building, e-service providers in Western consumer populations need to also focus on improving attitudes through additional risk reduction mechanisms whilst those in Eastern contexts should focus on changing trust attitudes through implementation of trust-building mechanisms relevant to more collectivist cultural contexts.

3.6.2 Limitations and Future Research

As in all meta-analyses, findings are influenced by the underlying methods used in the primary empirical studies. Moreover, by aggregating findings from across studies, meta-analytic work loses information about the original study contexts. It was not possible to incorporate certain studies due to unresolved questions about reported values. Only past studies that incorporated both trust and risk perceptions were analyzed. The number of studies analyzed for pair-wise relationships between trust and attitude, trust and intention, risk and attitude and risk and intention, would have been much greater had studies that

reported on either trust or risk but not both been included. Certain moderators were found to be important and future research may wish to further explore those findings. For example, alternative classifications of culture rather than the more basic Western/Eastern distinction may reveal additional insights into the moderating effects of culture. Future research needs to account for the possible causes of heterogeneity in the trust-intention relationship not uncovered here. Moreover, identifying the additional mechanisms through which trust influences acceptance deserves attention. Lastly, this chapter's meta-analysis focused on cognitive based trust and coded all relevant dimensions such as ability, honesty, integrity as trust. Chapter 6 however will empirically examine the different dimensions of trust.

3.6.3 Conclusion

This chapter carried out a meta-analytic assessment of the effects of trust and risk perceptions on consumer acceptance of e-services. Results showed that trust and risk are significantly related but, between the two, trust is relatively more important to consumer acceptance and its effects on acceptance are only partially mediated by risk perceptions. Moreover, trust in the e-service provider and the e-service platforms are important when it comes to behavioral intentions. Through the test of competing causal models, the chapter was also able to resolve the inconsistent treatment of trust and risk perceptions in past e-services research. Findings provide useful guidance for future e-service researchers on how to model trust and risk.

The next chapter aims to address RQ3, namely what are the antecedents of trust in consumer acceptance of e-services? It adopted a meta-analytical investigation of the antecedents of trust in e-service provider.

CHAPTER 4: ANTECEDENTS OF TRUST IN ELECTRONIC-SERVICE PROVIDERS: RESULTS FROM A META-ANALYSIS

The earlier version of this chapter has been published as: Mou, J., and Cohen, J.F. 2014. "Trust in Electronic-Service Providers: A Meta-Analysis of Antecedents," Proceedings of the 18th Pacific Asia Conference on Information Systems (PACIS), ChengDu, China.

4.1 Introduction

With the development of the Internet and mobile device technology, the delivery of services has changed from face-to-face to electronic exchange or e-service. E-service allows consumer to interact with service providers without the constraints of time and space (Beldad et al., 2010).

Despite this potential, trust still considered as the most important psychological states influencing online consumer behaviors. Without trust, consumers are less likely to engage in e-service usage and therefore the economic potential of e-services is lessened (Walczuch and Lundgren, 2004). Moreover, the potential benefits of non-commercial e-services, such as e-government or consumer e-health services, are also likely to go unrealized (Bélanger and Carter, 2008; Yi et al., 2013).

Given the importance of trust beliefs to so many e-service contexts, researchers have unsurprisingly turned their attention to examining the antecedents of consumers' trust beliefs (e.g., McKnight et al., 2002; Gefen et al., 2003a; Kim et al., 2008). These studies have highlighted the importance of antecedents such as perceived institution size and market share of the online vendor (Jarvenpaa et al., 2000; Teo and Liu, 2007), perceived vendor or brand reputation (Jarvenpaa et al., 2000; Pavlou, 2003; Teo and Liu, 2007; Kim et al., 2008), the role of structural assurances (Chandra et al., 2010; Zhu et al., 2011), and even individual factors such as propensity to trust (Pavlou and Gefen, 2004; Nicolaou and McKnight, 2006; Teo and Liu, 2007; Kim et al., 2008). However, these efforts have been disconnected and have not been integrated so as to provide an answer as to which are the most important antecedents of trust. Previous studies summarizing the antecedents of trust are mostly literature reviews (e.g., Grabner-Kräuter and Kaluscha,

2003; Walczuch and Lundgren, 2004; Wareham et al., 2005; Beatty et al., 2011), which have not provided aggregate effect sizes so as to determine the most significant factors. Where meta-analytic studies into trust have been carried out, those have mostly focused on the context of e-commerce (e.g., He, 2011), rather than the broader domain of e-services that include both commercial and non-commercial contexts. Moreover, they have not addressed the contradictory findings regarding the antecedents of trust. For example, the effects of consumer familiarity with the online vendor has been found an important antecedent of trust in one study (Gefen, 2000; Gefen et al., 2003a) whilst not significant in another (Cho et al., 2007). Moreover, privacy concern was significantly correlated with trust in Chiu et al. (2009) but not in Bansal et al. (2010). Explanations for such variations in previously reported effect sizes have not been adequately examined. Thus existing efforts fail to provide us insights into those antecedents that are universal across e-service contexts and those that might be relatively more or less important depending on the type of e-service. Other potential moderators such as culture and population under study might impact the relative effects of previously examined antecedents of trust.

The purpose of this chapter is therefore to contribute to the e-service literature by comprehensively identifying and classifying the antecedents of trust in e-services, and thereafter identify which antecedents are important to form consumer trust. As per Chapter 3, it adopts a broad definition of e-services so as to include both commercial (e.g., e-shopping and e-banking) and non-commercial (e.g., e-health and e-government) e-services. Because there may be sufficient differences in correlations across studies, it is also important to determine the extent to which these effects are moderated by factors such as culture, type of e-service and sampling strategy. Specifically, the following research questions for this chapter are posed:

CH4RQ1: What are the key antecedents of trust in the e-service context?

CH4RQ2: To what extent are these antecedents moderated by factors such as culture, type of e-service, and sampling strategy?

To answer these questions this chapter adopts a meta-analytic approach to determine bare-bone effect sizes (corrected sampling error), true-score effect sizes (corrected measurement error), and homogeneity tests for determining potential for moderating effects.

Results have implications for both research and practice in a number of ways. First, the study classifies the antecedents of trust into vendor and institution-based; technological-based; knowledge-based and consumer-based, which can provide a useful framework for future research. Second, the study can help researchers better understand which antecedents are important to form consumer trust in the e-service context. By comparing the intensity of effect sizes and moderation effects, results will also reveal important factors on which e-service providers may wish to concentrate their trust building efforts. Online providers will thus be better positioned to establish their online service offerings and build better e-service promotion strategies across different context and consumer cultures.

In the next section, e-services and prior research on trust in e-services is discussed. A classification of the antecedents of trust and a research model that underpins the meta-analytic investigation is presented. Next, the methodology and approach to the meta-analysis are outlined. At last, results are presented and the chapter concludes with a discussion and implications.

4.2 Antecedents of Trust in e-Service Provider

As discussed in earlier chapter, researches have distinguished between trust in the website interface (e.g., Dinev and Hart, 2006; Liao et al., 2011) and trust in the e-service provider (e.g., Gefen, 2002b; Pavlou and Gefen, 2004; Nicolaou and McKnight, 2006; Kim et al., 2008, 2009a). Trust in the website interface implies Internet websites are a secure and reliable environment from which to access the service and exchange information with others (Liao et al., 2011). Trust in the e-service provider is defined as the consumer's belief in the integrity, ability and benevolence of the vendor (Rotter, 1967; Morgan and Hunt, 1994; Bhattacherjee, 2002; Pavlou and Gefen, 2002) and their willingness to be vulnerable to actions taken by the vendor based on their feelings of confidence and assurance (Gefen, 2000). The previous chapter found that trust in the e-service provider is the more important (proximal) determinant of consumer acceptance of an e-service than trust in the website platform. Consequently, this chapter focuses on the antecedents of consumers' trust beliefs in the e-service provider.

Past researchers have classified the antecedents of trust in a number of ways. Unfortunately, there is no generally agreed classification framework. However, there are

some common categories that can be discerned which input into the framework. Initially, Gefen et al. (2003a) classified trust antecedents as calculative-based, institution-based (structural assurances and situational normality), and knowledge-based (familiarity). Later, Kim et al. (2008) classified the antecedents of trust in the e-commerce context as cognition-based, affect-based, experience-based and personality-oriented. He (2011) systematically reviewed the antecedents of trust in e-commerce and classified them as: personal characteristics-based, knowledge-based, deterrence-based, social influence-based, technological attributes-based, vendor image-based and institution-based.

Common to all these previous classifications are a focus on the inclusion of vendor related factors such as reputation and vendor size, technology related factors such as perceived usefulness and perceived ease of use, individual consumer such as disposition to trust, and knowledge or experience related factors such as familiarity. Consequently, four categories of antecedents have been identified, which are labeled as vendor and institution-based antecedents, technological-based antecedents, knowledge-based antecedents, and consumer characteristics-based.

Based on above discussion, the four categories representing the antecedents of trust that will be investigated in this meta-analysis are presented in Figure 14 together with the potential moderators of their links with trust. These are discussed next.

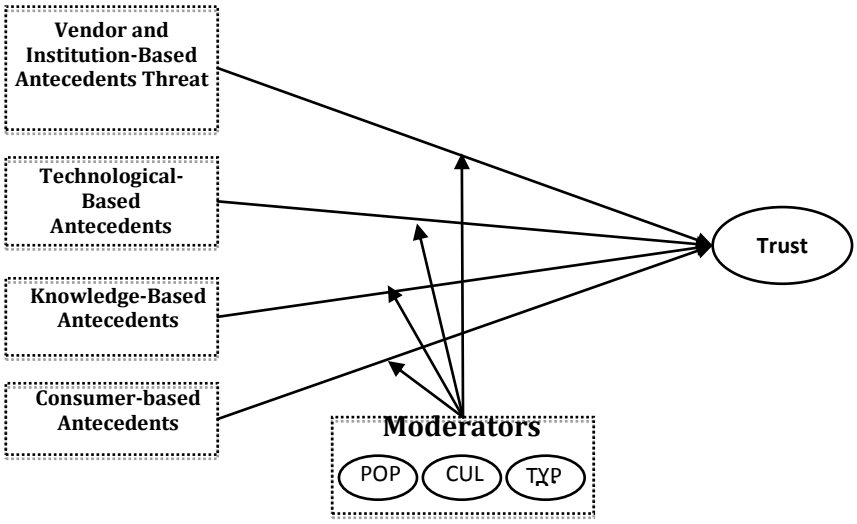


Figure 14: Antecedents of Trust Model (POP: Population under study; CUL: Culture; TYP: Type of e-service)

4.2.1 Vendor and Institution-Based Antecedents

In the field of e-commerce, past works have identified vendor and institution-based factors as important determinants of trust for new consumers (He, 2011; Koufaris and Hamptom-Sosa, 2004). Amongst these, vendor size, vendor reputation, and vendor's ability for customization, along with institutional influences such as perceived privacy protection, perceived security protection, perceived structural assurances, situational normality, service quality and perceived risk have been subject to the most attention.

Vendor reputation refers to the consumer's belief that the vendor's website, or e-service provider, or brand has a good public image, and it is popular for consumers (Pavlou, 2003; Kim et al., 2008). Good reputation can create trust in e-commerce and increase consumers' beliefs about vendor competence, benevolence, and integrity (McKnight et al., 2002). Kim et al. (2008) found that vendor reputation positively affected trust in online shopping.

Perceived size of the vendor refers to consumers' perception of physical size of the vendor e.g., number of employees or market share (Kim and Park, 2013). Perceived size can influence trust because larger institutions are considered more capable of reliably facilitating online transactions (Kim and Park, 2013). Past studies have therefore considered perceived size as an antecedent of trust (e.g., Koufaris and Hampton-Sosa, 2004; Teo and Liu, 2007; Kim and Park, 2013).

Customization refers to the e-service provider's ability to implement a strategy to supply personalized services or products to their consumers (Srinivasn et al., 2002; Komiak and Benbasat, 2006). Some researchers (Koufaris and Hampton-Sosa, 2004; Komiak and Benbasat, 2006) considered that such customization offerings can promote trust. This is because the perception of a provider's willingness to customize a service offering provides a basis for a belief in the provider's competence and integrity.

E-service providers often collect customer's personal and/or financial information during transactions (Hagel and Rayport, 1997). For trust to materialize, a consumer should have a strong perception that security controls have been implemented by the vendor to ensure a safe online transaction environment (Kim et al., 2008). Moreover, loss of privacy is one of the major concerns in online transacting (Malhotra et al., 2004). If an e-vendor can protect consumer's privacy, this can also improve consumer trust. Thus *perceived*

privacy protection and *perceived security protection* are important institutional-based antecedents

Perceived structural assurances refer to a consumer's assessment that transaction success is likely due to the existence of safety nets such as legal recourse, guarantees, and regulations that exist to protect the consumer (Gefen et al., 2003a). According to this view, if a website or e-service transaction platform is considered to be underpinned by such assurances then trust is more likely.

Situational normality refers to consumers' perception of the e-service transaction process as being normal (i.e. akin to a real world encounter) (Gefen et al., 2003a). If consumer perceives the transaction as being normal, they will feel more comfortable engaging in the transaction and hence demonstrate increased trust beliefs (Walczuch and Lundgren, 2004).

Service quality refers to quality of the service or support that the consumer received from the service provider, such as the service's responsiveness, accuracy (Petter et al., 2013). Moreover, when consumers interact with an e-service provider, high service quality can also increase consumer trust (Zhou, 2011).

Trust and *perceived risk* are related to one another. One view is that risk perceptions are antecedent to trust because if the uncertainties and risk of loss are perceived to be low then there is less need to form trust perceptions (Dinev and Hart, 2006). Similarly, higher levels of risk perception will increase a consumer's need to trust (Corbitt et al., 2003).

4.2.2 Technological-Based Antecedents

Based on past trust research (Gefen et al., 2003a; Pavlou, 2003; Zhou, 2011), this study identified four technological-based antecedents. These are: perceived usefulness, perceived ease of use, information quality, and system quality.

The technology acceptance model (TAM) identifies two primaly technology-based beliefs as relevant to individual user attitude and technology usage intentions (Davis et al., 1989). These are *Perceived usefulness* (PU) and *Perceived Ease of Use* (PEOU) in the context of e-services acceptance. PU refers to the degree to which a consumer believes that using the e-service would enhance his/her performance or effectiveness. Perceived ease

of use (PEOU) refers to consumers' perceptions on whether the e-service is easy/difficult or flexible to use and interact with. When online consumers think e-service interaction media is easy to use and useful, they are more likely to trust the e-service provider (Koufaris and Hampton-Sosa, 2004). Moreover, Chen and Barnes (2007) argue that useful and easily understood information on web sites can lift the degree of online trust. Prior empirical studies support a link between PU, PEOU and trust (Gefen et al., 2003a; Pavlou, 2003; Wang and Benbasat, 2005). Therefore, it is expected that PU and PEOU would impact on trust beliefs.

Information quality and *system quality* are major components of the IS Success model (DeLone and McLean, 2003). Information quality refers to the desirable characteristics of the systems outputs such as information accuracy, currency, timeliness and sufficiency (Petter et al., 2013). Systems quality refers to the desirable technical and operational characteristics of an information system such as systems' functionality, response time, navigation ease, among others (Petter et al., 2013). Information quality and system quality are important to determine satisfaction in e-services context (Xu et al. 2013). In this chapter, information quality and systems quality are considered as technological-based antecedents of trust. Beldad et al. (2010) argue that accurate, current and complete information can increase consumers' trust beliefs when they are transacting online. McKnight et al. (2002) argue that in initial trust building stage, high quality web site (i.e., system quality) can lead consumers' towards high trusting beliefs.

4.2.3 Consumer Characteristics-Based antecedents

Individual characteristics as antecedents of technology usage behaviors have been widely studied in the field of information systems (e.g., Lewis et al., 2003). Amongst these, a consumer's *disposition to trust* (DTT) is considered to play an important role when a consumer is interacting with an unfamiliar party (e.g. the e-service vendor) and it also can provide a necessary background for the formation of trust-building (Gefen, 2000). Disposition to trust will be important to how consumers build interpersonal relationships (McKnight et al., 2004).

4.2.4 Knowledge-Based Antecedents

One of the reasons trust becomes an issue in e-service is because consumers may have little prior experience with the e-vendor (McKnight et al., 2002). Based on previous research, Personal *familiarity* with the provider has been identified as the most relevant knowledge-based antecedents (e.g., Gefen et al., 2003a; He, 2011). Whilst the e-service provider's reputation is a market-based signal, such as a good public image and popularity amongst consumers, familiarity is based on an individual consumer's past personal interactions with the vendor. Familiarity created through an interactive process where consumers and providers can get to know each other so as to better predict each other's behaviors (Lu et al., 2011). Familiarity can reduce uncertainty and simplify interpersonal relationships (Gefen, 2000). Consumers learn to use particular interfaces and transact through the website or similar platforms, and they use these interactions to accumulate knowledge of the provider. This increased familiarity with both the e-service platform and the e-service provider can increase trust beliefs (Gefen et al., 2003a).

The 15 antecedents of trust identified for this meta-analysis are summarized as: Reputation (REP), Security Protection (SEC), Privacy Protection (PRC), Structural Assurance (STA), Situational Normality (NOR), Size (SIZ), Customization (CUS), Service Quality (SEQ), Perceived Risk (PR), Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Information Quality (INQ), System Quality (SYQ), Familiarity (FAM), and Disposition to Trust (DTT).

4.2.5 Moderators of the Links between Trust and Its Antecedents

Variation in the size of the effects between the above discussed antecedents and trust is observed in past studies. Understanding the causes of such variation (or lack of homogeneity in effect sizes) is important to any meta-analysis. Past meta-analyses of technology acceptance model and IS continuance model (Schepers and Wetzels, 2007; Islam and Mäntymäki, 2011) have considered the culture (Western versus Eastern) and population under study (student sample versus non-student sample) as potentially important moderators. For example, in Eastern cultures people may rely more on familiarity when building trust whilst in Western cultures people may rely more on privacy protection and risk perceptions when building trust.

E-services are both commercial (e.g., online shopping) and non-commercial (e.g., e-government) in nature. The previous chapters considered that the type of e-service might be an important moderator between consumer trust and acceptance. Trust was found more strongly associated with acceptance of commercial e-services. Trust antecedents such as perceived risk, security, and reputation may have greater salience in contexts where financial loss may occur. Perceived usefulness, system quality and information quality may have greater importance to trust in other e-service contexts such as where performance and time loss may occur. Moreover, in contexts with a single provider (e.g. e-government) then trust may have less to do with factors such as reputation and more to do with factors such as privacy.

Numerous e-service studies have been carried out using student samples, and as per the previous chapter it remains an empirical question as to whether differences in average observed effects sizes exist across student and non-student consumer samples.

4.3 Research Methodology

Meta-analysis is defined as “the statistical analysis of a large collection of analysis results for the purpose of integrating the findings” (Glass, 1976). Through synthesizing prior empirical findings, it allows us to understand which antecedents of trust are most important in e-service and thereby address the first research question (CH4RQ1). Meta-analytic techniques can identify heterogeneity in effect sizes across studies. This allows for subsequent examination of the influence of moderators that may account for observed inconsistencies in the effect sizes reported by prior studies. Accounting for any observed heterogeneity through examination of moderators addresses the second research question (CH4RQ2). In the following sections data sources and criteria for inclusion of studies in the meta-analysis are discussed. Then procedures for data coding and analysis are discussed before presenting the results.

4.3.1 Identifying the Studies

To ensure the validity of the meta-analysis, as many studies as possible need to be included. Based on the definition of e-service, adopted for this thesis, B2C, C2C electronic commerce, electronic banking, online health services, e-government, online

financial advisory service, and mobile payment services, amongst others were coded. In order to select the related studies for this meta-analysis, four phases were followed to ensure a systematic review of prior published studies (Liberati et al., 2009). Firstly, the data sources to use in this systematic review were decided. A computerized search was conducted of the following electronic databases: EBSCO Business Source Premier, Science Direct, Jstor, Emerald and ABI/INFORM Global. To avoid the concerns of publication bias with meta-analysis (King and He, 2005), conference publications were identified via a manual search of IEEE Xplore and the AIS e-library.

Secondly, the search terms for study selection were specified. Search terms included "consumer" or "customer" or "user" or "citizen" or "individual"; "use" or "adoption" or "acceptance" or "behavioral intention"; and "trust"; and variations of "e-service" or "e-commerce" or "e-banking" or "e-government" or "e-health" or "mobile payment" or "online". The inclusion of search terms such as "use" and "adoption" was because of the importance of trust to consumer adoption and use of e-services, and to ensure identification of papers with a focus on trust in the context of e-service use and adoption.

Thirdly, to judge which articles to include the inclusion and exclusion criteria were specified. the time frame was further restricted to articles published (or in press) between January, 2000 to December, 2013. Prior to 2000 research on consumer behaviors was mostly focused on off-line transactions. All the studies had to be accessible through the university's library system and its comprehensive electronic database subscription. The articles must focus on e-service in an online environment (e.g., e-banking service, e-government service, etc). The articles must be an empirical study. The articles must report correlations and sample size. The studies must include variables reflecting "trust" or "trust belief" and one or more of the antecedents of trust discussed above. Based on these inclusion and exclusion criteria, articles not reporting on results of an empirical study or papers that did not report correlations were excluded (e.g., Kim et al., 2009b). Furthermore, the papers where it was not possible to resolve queries regarding the reported correlation matrix were also excluded. In total, 59 published studies (see Appendix I) that were extracted via the research process met the inclusion/exclusion criteria and were therefore identified for inclusion in the meta-analysis.

The coding of the constructs for this meta-analysis is explained next.

4.3.2 Coding the studies

Each article was examined to extract data required for the meta-analysis. The author of this thesis and the study supervisor independently coded the studies and discussions were held to resolve any disagreement. As explained in the previous chapter, the use of at least two independent coders is important because the second coder can increase reliability of the coding, and can provide a check on the coding and effect size calculations.

Information on each study's sample size, inter-construct correlations and construct reliability coefficients were collected. 34 studies were published in the last decade. 25 studies were published in the current decade. Articles based on the type of e-service under examination (e.g., commercial versus non-commercial) was classified.

Years	Last decade: 2000 (1); 2001 (1); 2002 (2); 2003 (3); 2004 (3); 2005 (3); 2006 (4); 2007 (6); 2008 (3); 2009 (8). Current decade: 2013 (6); 2012 (4); 2011 (7); 2010 (8).	
Publication types	Publication	No of articles
	Decision Support Systems	5
	MIS Quarterly	3
	Online Information Review	2
	Information Systems Research	2
	Managing Service Quality	2
	Asia Pacific Journal of Marketing and Logistics	2
	e-Service Journal	2
	European Journal of Information Systems	2
	Journal of Management Information Systems	2
	Journal of the Association for Information Systems	2
	OMEGA	2
	Other journals	24
	Conference Proceedings	8
	Unpublished Manuscript	1
E-service intervention	Commercial based e-services: e-commerce (32); e-banking (7); social commerce (2); mobile commerce (2) e-customer service (1); e-return service (1); web-based recommendation agents (1). Non-commercial based e-services: e-government (1); Internet (1); peer-to-peer sharing (1); location-based services (2); e-health (4); social networking (2); wi-fi hotspots (1); new technology (1).	
Culture*	Western: USA (31); UK (4); Australia (1); Canada (2); New Zealand (2); The Spain (1); Greece (1); Italy (1); Germany (1); Ireland (1); European (1); Qatar (1). Eastern: China (8); Taiwan (6); Singapore (3); India (1); Malaysia (3); Korea (7). Mixed: Malaysia and Qatar (1).	

Table 10: Summary of Studies Included in Meta-Analysis for Chapter 4

Notes: * > 59 due to some studies examining more than one consumer population, which were analyzed as independent samples.

Based on the different culture dimensions (e.g., collectivism versus individualism) as identified in Hofstede and Hofstede (2005), the studies were classified into Western or Eastern culture groups. Western culture groups were considered those high on individualism, whilst Eastern culture were high in collectivism. High power-distance countries were Eastern and low power-distance is classified as Western. In classifying the culture dimensions, reference was made to Shao et al. (2013). Furthermore, it was identified whether studies employed convenience sampling through the use of student samples. Journal, authors and published date of the articles were also recoded. The studies are summarized in Table 10.

The conceptual and operational definitions of variables were considered to confirm consistency between the constructs employed in the study and its definitions of trust in e-service provider and the definitions of the antecedents of trust. Variables were coded as trust if they reflected a consumer's willingness to depend on the e-service provider based on a belief or confidence in the competence, ability, integrity, benevolence, credibility and/or reliability of the e-service provider. Only cognitive trusts i.e., trust as belief was considered. Emotional or affect-based trust was not considered in this meta-analysis (e.g., Komiak and Benbasat, 2006). The antecedents of trust followed the coding rules below.

4.3.2.1 Reputation (REP)

Variables were coded as REP if they reflected the consumer's belief that the vendor's website, or e-service provider, or brand has a good public image, and it is popular or has been known for a long time (Pavlou, 2003; Kim et al., 2008).

4.3.2.2 Security protection (SEC)

Variables were coded as SEC if they reflected a consumer or user's subjective assessment of the degree of vendor's security protection when they use e-service where such protection is implemented by the vendor and via the e-service platform (Kim et al. 2008), e.g. Internet environment security, perceived security, security protection and security concerns.

4.3.2.3 Privacy protection (PRC)

Variables were coded as PRC if they reflected a consumer or user's perceptions of personal information protection (Kim et al. 2008), e.g. protections against unauthorized access to, or secondary use of consumer data.

4.3.2.4 Structural assurance (STA)

Variables were coded as STA if they reflected whether the e-service vendor providers assurances for a safe transaction environment including statements of guarantees and the use of reputable transaction systems (Gefen et al., 2003a). Similar terms are technology assurance and organizational structure assurance.

4.3.2.5 Situational normality (NOR)

Variables were coded as NOR if they refer to an assessment that the e-service based interaction is typical of service in an offline context (Gefen et al. 2003a).

4.3.2.6 Size (SIZ)

Variables were coded as SIZ if they reflected the consumers' perception of physical size of the vendor or their market share (Kim and Park, 2013).

4.3.2.7 Customization (CUS)

Variables were coded as CUS if they reflect the e-service provider's ability to implement a strategy to supply personalized services to their consumers, e.g., perceived personalization (Komiak and Benbasat, 2006).

4.3.2.8 Service quality (SEQ)

Variables were coded as SEQ if they reflected whether the e-service provider is considered responsive and professional in dealing with consumers (Petter et al., 2013).

4.3.2.9 Perceived risk (PR)

Variables were coded as risk if they reflected a consumer's overall subjective assessment of the potential for loss associated with using the e-service (Pavlou, 2003).

4.3.2.10 Perceived ease of use (PEOU)

Variables were coded as PEOU if they reflected consumer perceptions on whether the e-service is easy/difficult or flexible to use and interact with (Pavlou, 2003).

4.3.2.11 Perceived usefulness (PU)

Variables were coded as PU if they reflected the degree to which a consumer believes that using the e-service would enhance his/her performance or effectiveness (Pavlou, 2003). These performance benefits could include convenience, cost savings, effectiveness, and time savings.

4.3.2.12 Information quality (INQ)

Variables were coded as INQ if they reflected whether the e-service vendor can provide sufficient, accurate, timely and comprehensive information outputs (Kim et al., 2008; Petter et al., 2013).

4.3.2.13 System quality (SYQ)

Variables were coded as SYQ if they reflected whether e-service website or platform has a good layout, speed of navigation and availability (up and running) (Petter et al., 2013).

4.3.2.14 Familiarity (FAM)

Variables were coded as FAM if they reflected a knowledge-based familiarity i.e., the extent to which the consumer is familiar with or has experience with the e-service, or e-vendor (Gefen et al., 2003a).

4.3.2.15 Disposition to trust (DTT)

Variables were coded as DTT if they reflected a consumer's general tendency (personality-based) to believe in or trust other people (Kim et al., 2008), e.g. trust propensity, trust stance, dispositional trust or propensity to trust.

The definitions of antecedents for coding see Table 11.

Variable	Definition for coding	Example items
Reputation	Variables were coded as REP if they reflected the consumer's belief that the vendor's website, or e-service provider, or brand has a good public image, and it is popular or has been known for a long time (Pavlou, 2003; Kim et al., 2008).	This website is well known (Kim et al., 2008).
Security protection	Variables were coded as SEC if they reflected a consumer or user's subjective assessment of the degree of vendor's security protection when they use e-service where such protection is implemented by the vendor and via the e-service platform (Kim et al. 2008).	I feel secure about the electronic payment systems of this Web vendor (Kim et al., 2008).
Privacy protection	Variables were coded as PRC if they reflected a consumer or user's perceptions of personal information protection (Kim et al. 2008).	This Web vendor will share my personal information with other entities without my authorization (Kim et al., 2008).
Structural assurance	Variables were coded as STA if they reflected whether the e-service vendor providers assurances for a safe transaction environment including statements of guarantees and the use of reputable transaction systems (Gefen et al., 2003a).	I feel safe conducting business with the online vendor because of its statements of guarantees (Genfen et al., 2003a).
Situational normality	Variables were coded as NOR if they refer to an assessment that the e-service based interaction is typical of service in an offline context (Gefen et al. 2003a).	The nature of the interaction with the Web site is typical of other similar type Web sites.
Size	Variables were coded as SIZ if they reflected the consumers' perception of physical size of the vendor or their market share (Kim and Park, 2013).	This e-commerce firm is a very large company (Kim and Park, 2013).
Customization	Variables were coded as CUS if they reflect the e-service provider's ability to implement a strategy to supply personalized services to their consumers, e.g., perceived personalization (Komiak and Benbasat, 2006).	This site provides me with information and products according to my preferences (Kassim and Ismail, 2009)
Service quality	Variables were coded as SEQ if they reflected whether the e-service provider is considered responsive and professional in dealing with consumers (Petter et al., 2013).	PChome provides me with convenient options for returning products (Fang et al., 2011).
Perceived risk	Variables were coded as risk if they reflected a consumer's overall subjective assessment of the potential for loss associated with using the	Purchasing from this Website would involve more financial risk (Kim et al., 2008).

	e-service (Pavlou, 2003).	
Perceived ease of use	Variables were coded as PEOU if they reflected consumer perceptions on whether the e-service is easy/difficult or flexible to use and interact with (Pavlou, 2003).	I find this retailer's Web site easy to use (Pavlou, 2003).
Information quality	Variables were coded as INQ if they reflected whether the e-service vendor can provide sufficient, accurate, timely and comprehensive information outputs (Kim et al., 2008; Petter et al., 2013).	This Website provides timely information on the item (Kim et al., 2008).
System quality	Variables were coded as SYQ if they reflected whether e-service website or platform has a good layout, speed of navigation and availability (up and running) (Petter et al., 2013).	The PChome Web site has a simple layout for its contents (Fang et al., 2011).
Familiarity	Variables were coded as FAM if they reflected a knowledge-based familiarity i.e., the extent to which the consumer is familiar with or has experience with the e-service, or e-vendor (Gefen et al., 2003a).	I am familiar with buying products from this site (Kim et al., 2008).
Disposition to trust	Variables were coded as DTT if they reflected a consumer's general tendency (personality-based) to believe in or trust other people (Kim et al., 2008).	I generally trust other people (Kim et al., 2008).

Table 11: Definition of antecedents for coding

4.3.3 Recording Effect Sizes

The two coders independently coded each study's reported effect sizes (i.e., the correlations). These were then cross-checked for agreement. In certain cases, where only inter-item correlations were reported (e.g., Gefen, 2000; Bhattacherjee, 2002), the inter-construct correlations was calculated as the average of the respective inter-item correlations. The direction of correlations were reversed in those cases where measurement items were phrased in the negative e.g. to reflect privacy concerns and security concerns as opposed to perceived privacy protection and perceived security protection.

In addition to the effect sizes, the reliabilities of each study's variables were coded using the reported Cronbach's alpha coefficient or if not available the reported composite reliability or internal consistency scores. Based on the reported reliabilities across all the studies, an average reliability score for each variable was calculated for use in subsequent analysis.

4.3.4 Meta-Analytic Approach

This study followed the same methods of Hunter and Schmidt's (2004) random effects models to estimate effect sizes. As reported in Chapter 3, section 3.4. Briefly, this involved calculating weighted mean effect size (r_+), true-score correlations (r_c), homogeneity test by Fisher Z transformation and calculating of Q value. Finally, the fail-safe N test is used to test the robustness of the findings.

4.4 Results

CH4RQ1: What are the key antecedents of trust in the e-service context?

The descriptive statistics and meta-analysis results are presented in Tables 12 through 14. For each antecedent, the total number of studies is reported with the total number of observed correlations, and range of correlation, average correlation, and range of sample size, the total sample size and the average of sample size. Because some publications reported results from tests on more than one sample under examination, the number of available pair-wise correlations could exceed the number of publications. Then, the r_+, r_c, the variance of r_+ and r_c, standard deviation of r_c, and 95% confidence and credibility interval of r+ were calculated. A fail-safe N test helped further evaluate the significance of each antecedent of trust. To do the fail-safe N test, r was first transformed to Cohen's d value, and then Orwin's formula was adopted to calculate the fail-safe N.

The meta-analysis results for the vendor and institution-based antecedents (Table 12) indicate that none of the 95% confidence intervals contain zero, hence, all the antecedents have a significant correlation with trust. This indicates that all of the vendor and institution-based antecedents are important to consumer trust in e-services context. Among them, REP (r_+ =0.586) has the strongest effects size on trust. STA, NOR and SEQ also showed high correlations with trust in provider in e-service context. However, PRC (r_+ =0.238) has the weakest effects size on trust. Variables such as SIZ (r_+ =0.305), CUS (r_+ =0.361) and SEC (r_+ =0.372) have medium effects on trust. The 95% credibility intervals (Hunter and Schmidt, 2004) were calculated. If the intervals are sufficiently large or include zero, then the presence of moderators should be expected. All of nine antecedents have a large credibility interval. So, this requires further moderator analysis, which is presented below. All the antecedents passed the fail-safe N test as the fail safe N values exceed 5k+10, which indicate the number of additional studies with non-

significant findings that would be required before the average effect size could be considered non-significant. The values reported here provide additional confidence in the overall significance of these effect sizes.

		Vendor and Institution-Based Antecedents of Trust								
		REP	SEC	PRC	STA	NOR	SIZ	CUS	SEQ	PR
No of studies		9	10	18	14	8	3	5	6	22
No of correlations		13	12	20	19	10	5	6	6	26
Total sample size		5780	3580	6956	6297	3884	3589	1265	1498	10230
Average sample size		445	298	348	331	388	718	211	250	393
Range of sample size	Lower	52	52	52	76	76	305	100	160	52
	Upper	1381	452	889	910	910	1381	357	360	1381
Correlations	Lower	0.250	0.110	0.010	0.200	0.180	0.100	0.158	0.189	-0.080
	Upper	0.691	0.689	0.700	0.872	0.815	0.370	0.520	0.760	-0.810
	Average	0.512	0.407	0.293	0.534	0.442	0.279	0.375	0.489	-0.374
r_+		0.586	0.372	0.238	0.577	0.472	0.305	0.361	0.506	-0.401
r_c		0.584	0.462	0.334	0.597	0.519	0.332	0.434	0.554	-0.425
Var r_+		0.020	0.029	0.053	0.040	0.033	0.009	0.021	0.050	0.041
Var r_c		0.024	0.034	0.066	0.051	0.043	0.011	0.024	0.060	0.050
SD(r_c)		0.156	0.184	0.256	0.225	0.206	0.105	0.155	0.246	0.022
95% Confidence interval (r_+)	Lower	0.508	0.276	0.133	0.384	0.331	0.239	0.241	0.329	-0.478
	Upper	0.665	0.468	0.343	0.635	0.614	0.371	0.482	0.683	-0.324
95% Credibility interval (r_+)	Lower	0.311	0.054	-0.222	0.166	0.032	0.174	0.090	0.083	-0.781
	Upper	0.862	0.670	0.698	0.853	0.912	0.436	0.632	0.930	-0.021
Fail-safe N (0.05)		297	202	225	461	187	53	87	129	393
Result		sig	sig	sig	sig	sig	sig	sig	sig	sig

Table 12: Vendor and Institution-Based Antecedents of Trust (Sig: Significant; Var: Variance; SD(r_c): Standard deviation of r_c)

The meta-analysis results of technological-based antecedents (PU, PEOU, INQ and SYQ) (Table 13) indicate that all of four antecedents have significant and strong effects on trust (r_+ ranged from 0.409 to 0.532). Among them, 27 correlations between PEOU and TR, 22 correlations between PU and TR were obtained. However, only 9 correlations between SYQ and TR were obtained. All the true-score correlations are larger than 0.4. These findings suggest that trust has important inter-relationships with both TAM (PU and PEOU) and IS Success models (INQ and SYQ). This suggests they can be usefully examined together with trust in the e-service context. However, comparing the lower and upper correlation reveals large difference in the correlations across studies. The large credibility intervals indicate that potential moderators may exist.

		Technological-Based				Knowledge-Based	Consumer-Based
		PU	PEOU	INQ	SYQ	FAM	DTT
No of studies		17	22	7	7	11	15
No of correlations		22	27	10	9	18	20
Total sample size		7028	8318	3575	3511	7975	5837
Average sample size		319	308	358	390	443	292
Range of sample size	Lower	52	52	215	158	122	76
	Upper	910	910	452	910	1381	910
Correlations	Lower	0.090	0.064	0.100	0.180	0.14	0.100
	Upper	0.738	0.704	0.820	0.682	0.567	0.690
	Average	0.496	0.445	0.430	0.480	0.369	0.344
r_+		0.532	0.487	0.409	0.491	0.372	0.351
r_c		0.562	0.507	0.507	0.544	0.399	0.400
Var r_+		0.030	0.034	0.039	0.032	0.022	0.015
Var r_c		0.036	0.041	0.050	0.038	0.025	0.017
SD(r_c)		0.190	0.202	0.224	0.195	0.158	0.130
95% Confidence interval (r_+)	Lower	0.461	0.421	0.294	0.363	0.271	0.314
	Upper	0.603	0.554	0.525	0.619	0.431	0.431
95% Credibility interval (r_+)	Lower	0.209	0.152	0.055	0.114	0.008	0.139
	Upper	0.855	0.822	0.764	0.868	0.694	0.606
Fail-safe N (0.05)		481	510	181	188	273	268
Result		sig	sig	sig	sig	sig	sig

Table 13: Technological, Knowledge and Consumer-Based Antecedents of Trust

Knowledge-based antecedent (FAM) and consumer-based antecedent (DTT) (Table 13) are also confirmed as having significiant correlations with trust in the e-service context. Both FAM and DTT have similar effect sizes on trust. For FAM, the true-score correlation is 0.399, and for DTT, the true score-correlation is 0.400. Results indicated that both FAM and DTT are important to trust beliefs in the e-services context. But credibilty intervals suggest they may be relatively more important in some contexts than in others. Consequently moderating effects are explored next.

CH4RQ2: To what extent are these antecedents moderated by factors such as culture, type of e-service, and sampling strategy?

The results of testing for moderation effects are reported in Table 14. In addition to the large credibility intervals (Table 12-13), Table 14 shows that Q values exceed the critical value for all antecedents, confirming the need for moderators to be examined. Three moderators were considered for their potential moderating effects, namely culture of consumer population (Western versus Eastern), sampling strategy (student versus non-student sample), and type of e-service (commercial versus non-commercial). In one study (Kassim and Abdullah, 2010), two different cultures sample were pooled in one data set

and, hence, it was excluded it from moderator analysis. Where no studies existed in certain cases (e.g., no non-commercial e-service contexts examining correlations between vendor size and trust), moderator effects are not reported.

	Q	Critical Value	Sampling Strategy			Culture			Type of E-service		
			S	NS	Z	W	E	Z	C	NC	Z
REP	173.0	21.03	0.592	0.384	**9.002**	0.486	0.571	**-4.490**	0.555	0.369	**6.007**
SEC	145.4	19.68	0.393	0.437	-1.532	0.359	0.494	**-4.333**	0.382	0.689	**-5.556**
PRC	554.6	30.14	0.288	0.301	-0.583	0.263	0.461	**-6.039**	0.265	0.344	**-2.788**
STA	1052.6	28.87	0.444	0.728	**-17.58**	0.376	0.649	**-14.51**	0.558	0.441	**4.744**
NOR	472.1	16.92	0.428	0.498	**-2.661**	0.408	0.464	**-2.112**	0.460	0.400	**1.98**
SIZ	20.1	9.49	0.309	0.235	1.87	0.193	0.337	**-3.947**	0.279	-	-
CUS	226.1	11.07	0.500	0.312	**2.926**	0.346	-	-	0.375	-	-
SEQ	151.3	11.07	0.587	0.470	1.932	0.352	0.755	**-10.38**	0.489	-	-
PR	705.7	37.65	-0.377	-0.374	-0.161	-0.358	-0.401	**2.571**	-0.393	-0.345	**-2.337**
PU	218.0	39.67	0.503	0.488	0.826	0.393	0.599	**-10.83**	0.535	0.250	**6.954**
PEOU	392.6	38.89	0.455	0.435	1.09	0.341	0.538	**-10.23**	0.474	0.08	**7.205**
INQ	251.4	16.92	0.369	0.490	**-4.406**	0.298	0.601	**-10.42**	0.386	0.820	**-12.37**
SYQ	223.9	15.51	0.400	0.641	**-9.837**	0.406	0.573	**-6.544**	0.469	0.574	-1.761
FAM	167.0	27.59	0.339	0.364	-0.961	0.272	0.452	**-7.931**	0.332	0.571	**-2.580**
DTT	317.8	30.14	0.358	0.387	-1.466	0.327	0.455	**-6.760**	0.380	0.317	1.897

Table 14 : Moderator Analysis (S: Student; NS: Non-student; Z: Z-value; W: Western; E: Eastern; C: Commercial-based e-service; NC: Non-commercial-based e-service)

Table 14 shows that culture was found to moderate all the effect sizes. This finding confirms the important influence of culture in e-services research (Benbasat et al., 2008). In all cases, studies classified as having been carried out in Eastern cultures reported stronger effect sizes than those carried out in Western cultures. The moderation effects of sampling strategy (student sample versus non-student sample) was significant for REP, STA, NOR, CUS, INQ and SYQ. Type of e-service (commercial versus non-commercial) moderated all the effect sizes except for SYQ and DTT with certain antecedents more important to trust in commerical and others more important in non-commercial contexts. Specifically, REP, STA, PU and PEOU are important to trust in commercial contexts, while SEC, PRC, INQ, and FAM are more important to trust in non-commercial contexts.

4.5 Discussion

This study aimed to synthesize past empirical findings of the antecedents of trust in e-service context through a meta-analysis of 59 empirical studies. The antecedents of trust were classified as: vendor and institution-based; technological-based; knowledge-based

and consumer-based. The study also attempted to identify the potential moderators that may influence the effects sizes across studies. Sampling strategy (student sample versus non-student sample), culture (Western versus Eastern) and type of e-service (commercial e-service versus non-commercial e-service) were considered. Data was collected via scholarly databases. The study results in several important findings.

Firstly, the meta-analysis results of vendor and institution-based antecedents indicated that all of the antecedents are significantly related to consumer trust in the e-service context. Among the investigated factors, structural assurance (r_+ =0.577), vendor reputation (r_+ =0.586), service quality (r_+ =0.506) normality (r_+ =0.472) and perceived risk (r_+ =-0.401) have stronger effects (above 0.400) than others antecedents on trust. These findings are consistent with prior meta-analysis of trust in e-commerce (e.g., He, 2011). Vendor size (r_+ =0.305) and privacy protection (r_+ =0.238) were found having the lowest effects on trust in this category.

Secondly, prior studies have shown trust is positively associated with perceived usefulness and perceived ease of use (e.g., Pavlou, 2003; Gefen et al., 2003a). The meta-analysis of technological-based antecedents revealed that all the four factors are strongly correlated with trust (effect sizes above 0.400). Trust has strong links with all the TAM and IS Success model variables suggesting that trust can be usefully integrated into those theories in future explanations of e-service use and satisfaction.

Thirdly, past studies addressed that knowledge and consumer-based antecedents are important to form consumer trust in various e-services (e.g., Gefen et al., 2003; Kim et al., 2008). The meta-analysis results confirmed that familiarity and disposition to trust are important to form trust. However, the effect sizes of familiarity (r_+ =0.372) and disposition to trust (r_+ =0.351) are lower, suggesting they may be less important for trust than technological based antecedents. Overall, both vendor and technology based antecedents have been found more important to trust than consumer or knowledge-based factors.

Fourthly, interestingly, most of the effect sizes had large credibility intervals. Furthermore, homogeneity Q value is larger than critical value in the study. All these indicated that potential moderators existed and should be investigated. To address the potential moderators, sampling strategy, culture and type of e-service were considered as the moderators. Through the moderator analysis, it was found that culture moderated the effects of all the antecedents of trust. This finding confirms suggestions made elsewhere

(Benbasat et al., 2008). In particular, the effect sizes were stronger in Eastern than Western contexts for all antecedents examined. This suggests that trust building may be especially difficult in Eastern contexts where reputation and familiarity are important alongside issued of security, privacy and technology factors. Type of e-service moderated all of the vendor and institution-based antecedents where the salience in commercial e-service contexts was most important. Antecedents such as familiarity, information quality and security were however mostly important for non-commercial contexts. Thus consideration of the e-service context is important to study design and the relative importance of certain variables in the e-service context under study must be considered in future research.

There were few differences across student versus non-student samples with reputation more important to students, whilst structure assurances, information quality and system quality were more important to non-students.

4.6 Implications and Conclusion

4.6.1 Implications for Research

This chapter has several valuable implications for researchers. First, it has confirmed that trust has a number of antecedents, and has presented both aggregate effect sizes as well as considered the potential for moderating effects. The classification of antecedents of trust into vendor and institution-based; technological-based; knowledge-based and consumer-based may also provide a useful framework for future research.

Second, a base from which to report effect sizes for various antecedents of trust has been established which provide a benchmark against which future studies can compare their effect sizes. This can also help researchers to better understand which antecedents are important to form consumer trust in e-service context. For instance, factors such as structural assurance, reputation, perceived usefulness, and perceived ease of use, system quality and service quality are particularly important to associate with trust. Moreover, trust has strong links with all the TAM and IS Success model variables, researchers may therefore wish to integrate those theories into future explanations of e-service use and satisfaction.

Third, by examining the heterogeneity of effects sizes, important moderating effects were identified. The moderator analysis also revealed an important implication for researchers. In particular, the specific selection of antecedents should take the culture context into account, and classify the commercial and non-commercial nature of the e-service. Based on their classification determine which antecedents are most important for inclusion. For example, the meta-analysis found that perceived privacy protection and vendor size have lesser effects on trust. Studies of non-commercial e-services should pay particular attention to information quality. This may be especially relevant to non-commercial services such as online information providers.

4.6.2 Implications for Practice

This chapter also has several important practical implications. First, it provided insights into the relative importance of different antecedents of trust which can be useful for guiding practitioners to focus on trust-building mechanisms. With this understanding, practitioners will be better positioned to establish their online service offerings. In particular, the importance of factors such as system, information and service quality was confirmed, as well as those such as vendor reputation, and situational normality. All of these factors are within the vendor's control and can be manipulated through interventions so as to improve consumer trust. For example, e-service providers should consider whether their online transaction platform is stable, reliable and dependable (SYQ), work on their public image (REP), make sure that their transaction platform is flexible to interact with and easy to operate (PEOU), and make sure whether their e-service can improve consumer's performance and enhance their effectiveness (PU). Moreover, e-vendors should provide on-time services and prompt response to user's questions or problems (SEQ). The nature of the interaction with the transaction platform should appear typical of other similar transaction platforms (FAM), as well as make sure users can feel safe when conducting business with the online vendor because of its statements of guarantees and ethics charter (STA). More specifically, e-service providers have struggled to identify where to focus priorities and build a successful online presence. On the one hand they could focus on investing resources into underlying technologies such as to improve system quality. They could focus on website navigation, look and feel, and

on user experiences to improve ease of use. They could also invest resources into developing their brand and public image and thus their reputation. Results reported here provide guidance by finding that reputation is most important to building online consumer trust. High system quality, for example, without a good reputation will not likely increase e-service market share.

Second, results confirmed that all the antecedents were moderated by culture. This is particularly important to global firms. The practitioners may build different e-service promotion strategies across different cultures/countries. For instance, in Eastern culture, the antecedents of trust revealed stronger effects sizes than Western culture particularly with regards to all technological-based antecedents and some vendor factors. This suggests that e-service providers should pay more attention on their trust building strategy in Eastern culture around those factors.

4.6.3 Limitations and Future Research

Some important limitations to the study are recognized. First, only studies that reported correlations and sample sizes can be included in the analysis. Second, the focus on quantitative studies results in the exclusion of qualitative studies that may provide useful insights into trust building amongst consumers. Third, although several research databases were reviewed for relevant studies, resource constraints limit the number of research databases that can be covered and that are accessible to the researcher. Fourth, by aggregating findings from across studies, meta-analytic work loses information about the original study contexts. Meta-analyses have also been criticized for mixing “apples” and “oranges”. This is because a meta-analytic study may mix studies with different characteristics. To avoid this problem, two researchers (author and supervisor) of this study separately coded all of the 59 studies to ensure correspondence with the definitions of e-service and the conceptualization of the variables under study and any disagreements were resolved with discussions. Moreover, moderator analysis attempted to account for some of the contextual differences across studies. Fifth, e-services that are both commercial and non-commercial were considered. Future research may draw on other typologies to organize the e-service context. Sixth, the studies included in meta-analysis were carried out in many disciplines e.g., information systems and marketing. This results in a rich sample set, which on the one hand provides the opportunity to

contribute a synthesized analysis, but on the other hand lose the context information which may weaken the credibility of findings. The moderator analysis provides only a partially contextualized view of the relationships under study. Finally due to the lack of sufficient studies exploring correlations between trust and other variables, it was not possible to include all possible antecedents, such as third party seals, past experience, and self-efficacy. A meta-analysis of the relationships between consumer trust and these variables deserve further consideration in future research once a sufficient number of such correlations have been observed.

4.6.4 Conclusion

This chapter reported on a meta-analysis of the antecedents of consumer trust in e-services context. The antecedents of trust in e-service were synthesized using 59 previously published studies. The findings showed that structural assurance, reputation, perceived usefulness, system quality and services quality demonstrate the strongest effect sizes on trust. Explanations for identified heterogeneity in effect sizes were considered through moderator analysis. It was found that cultural context of the study moderated all the effect sizes with relationships strongest in Eastern contexts. Certain effect sizes were also moderated by factors such as the type of e-service and the use of student samples.

The next section of this thesis presents two cross-sectional studies into trust and risk in the online health information context.

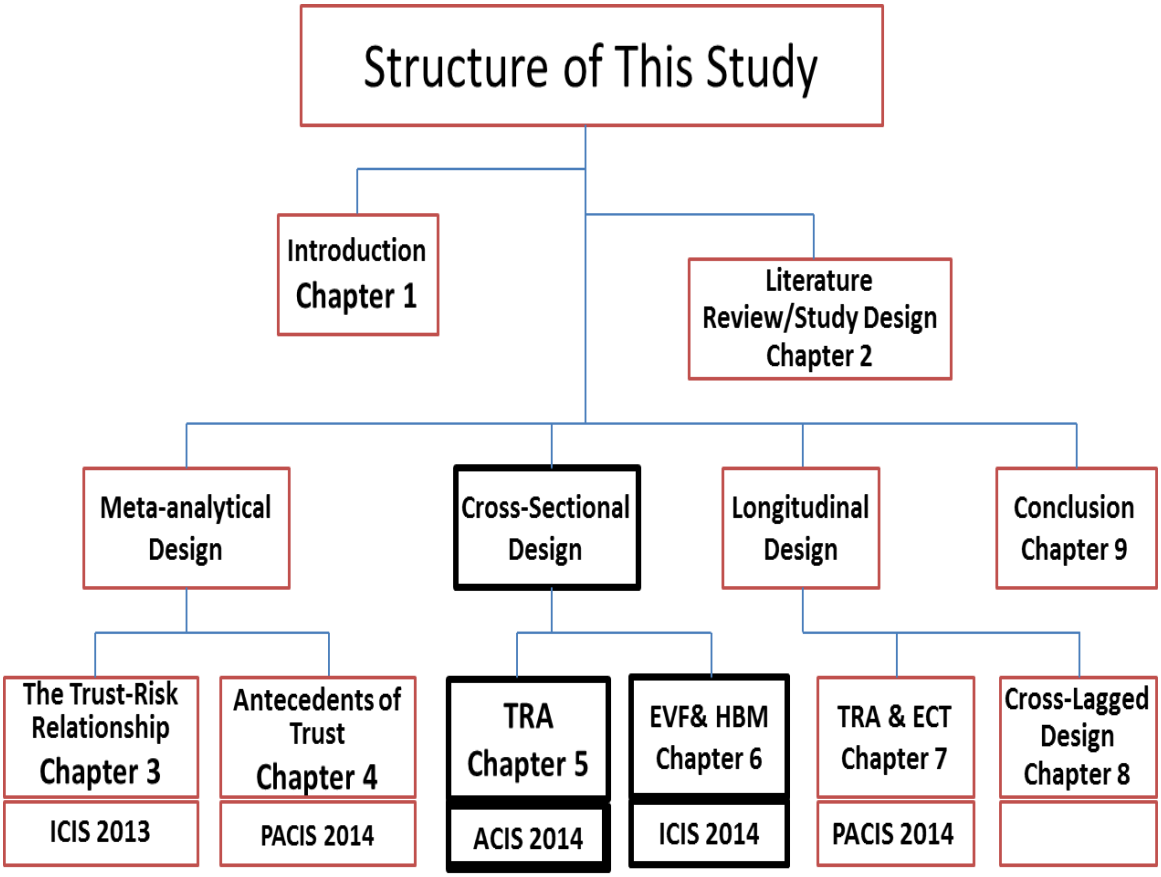


Figure 15: Cross-Sectional Studies

The previous two chapters adopted meta-analytic designs to address the effects of trust and risk perceptions on consumer acceptance of e-services, and the antecedents of consumer trust in e-services.

Use of online health information services may however be a special case of e-service acceptance that needs to be understood. This is because usage involves decision making processes for health behaviors that are likely subject to mechanisms rather than those associated with typical consumer contexts or other task-oriented IS. Consequently, consumer engagement with online health services might best be understood as simultaneously a health-related behavior and an e-service usage behavior. Therefore to better understand variations in the use of such services the following chapters consider the Theory of Reasoned Action (Chapter 5), and the Health Belief Model, together with the Extended Valence Framework (EVF) (Chapter 6) to study online health information service adoption.

CHAPTER 5: TRUST, RISK AND PERCEIVED USEFULNESS IN CONSUMER ACCEPTANCE OF ONLINE HEALTH SERVICES

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5.1 Introduction

The Web is developing into an important health information dissemination channel (Yi et al., 2013). Online health information services such as WebMD, Mayoclinic and Medlineplus offer consumers the promise of increased convenience and greater access to information for engaging in self-management of their health (Harbour and Chowdhury, 2007; Xiao et al., 2014). By facilitating self-diagnosis, they can save unnecessary trips to the doctor’s office whilst also encouraging early intervention by recommending consumers to seek health professional advice (Lanseng and Andreassen, 2007). They also allow consumers to obtain insights into treatment options, and empower them to obtain information on health conditions about which they may feel uncomfortable interacting face-to-face with a health practitioner (Hadwich et al., 2010; Xiao et al., 2014). Online health services also help to extend the reach of health services into remote communities, and may play an important role in improving the quality and decreasing the overall costs of healthcare delivery (Hadwich et al., 2010). These and other potential benefits cannot however materialize unless online health services are accepted and used by healthcare consumers.

As in other e-service context, trust may be an important factors influencing consumer acceptance of online health services. Within this context, trust is important to reducing consumer perceptions of risks and enhancing perceptions of information credibility and usefulness (Bansal et al., 2010; Yi et al., 2013; Xiao et al., 2014). More specifically, three trust dimensions are considered important. These are trust in the online service provider, trust in the e-service platform or website, and trust in the institutional structures of the Internet (Gefen, 2002b; Gefen et al., 2003a; Dinev and Hart, 2006). Performance-based

risk, i.e., the online service not performing as expected and therefore failing to deliver the desired benefits (Featherman and Pavlou, 2003), may be particularly relevant in the online health context. For example, the delivery of inferior or inaccurate information may compromise the health of consumers. Trust can also ensure the online health service is judged as more useful and convenient (Lanseng and Andreassen, 2007).

Empirical studies of how multiple trust dimensions influence perceptions of both risk and usefulness in the online health information context are however lacking. Although Lanseng and Andreassen (2007) examined trust and usefulness in online self-diagnoses, they did not examine multi-dimensions of trust, and did not consider how trust and risk are related. Although, Bansal et al. (2010) considered how trust and risk influence consumer online health information behavior, they did not consider the effects of perceived usefulness. Yi et al., (2013) considered the antecedents of trust and the relationship with risk in web-based health information, however their study did not consider how trust, risk and perceived usefulness influence behavior. Moreover, while Xiao et al. (2014) considered informational trust as a salient determinant of online health information seeking behavior, they did not consider the role of perceived usefulness or risk. Thus understanding the combined effects of multiple dimensions of trust, perceived risk and perceived usefulness in consumer acceptance of online health information services is a research problem in need of attention.

Consequently, the following research questions are posed for this chapter:

CH5RQ1: To what extent does trust in the e-service provider, trust in the website, and trust in the institutional structures of the Internet influence consumer acceptance of online health information services?

CH5RQ2: To what extent are the effects of trust on consumer acceptance mediated by the perceived risks as well as the perceived usefulness of online heath information?

CH5RQ3: Which of trust, risk and usefulness are the more salient determinants of consumer acceptance of online health information services?

To address these questions, this study develops a research model of the effects of trust, perceived risk and perceived usefulness on consumer acceptance of online health information services. This chapter treatments of trust beliefs as multi-dimensional consisting of three components, namely trust in provider, trust in website and trust in institutional structures, constitutes a unique contribution over prior works which examine only one of these components or treat the multiple components separately. The model

was tested using data collected from a sample of undergraduate students using an experimental scenarios approach combined with a questionnaire survey (as explained in 2.3)

Results of this chapter will shed light on the perceptions and attitudes of consumers towards this high-potential digital health initiative. Moreover, this study provides an opportunity to extend theories of trust and risk in consumer acceptance of e-service into the online health information context. In the next section, the theoretical underpinning and proposed research model are presented and prior research on trust, risk and perceived usefulness in e-services adoption is reviewed. Next, the research methodology, and approach are outlined. The chapter concludes with research results, discussion and implications.

5.2 Theoretical underpinning and research model

The attitude and behavioral intention literature has underpinned a number of investigation into e-service acceptance (e.g., Hansen et al., 2004; Yousafzai et al., 2010). In the past three decades, various theoretical models of attitude and behavioral intention have been proposed. Among them, the theory of reasoned action (TRA), the theory of planned behavior (TPB) and technology acceptance model (TAM) have frequently been applied to provide an understanding of e-services adoption (e.g., Featherman and Pavlou, 2003; Leonard et al., 2004; Yousafzai et al., 2010).

The TRA (Ajzen and Fishbein, 1980) in particular has been well established in social psychology discipline and is the most widely used theories for explaining individual behavior. Fishbein and Ajzen (1975) argued that TRA is concerned with rational, volitional and systematic behavior. It predicates a belief–attitude–intention–behavior model. According to the TRA, actual behavior is influenced by behavioral intention, while behavioral intention is determined by attitude and subjective norm. Subjective norm is defined as "the person's perception that most people who are important to him think he should or should not perform the behavior in question", and attitude is defined as "an individual's positive or negative feelings (evaluative affect) about performing the target behavior" whilst intention refer to an antecedents of individual behavioral (Fishbein and Ajzen 1975). The TRA model shows as Figure 16.

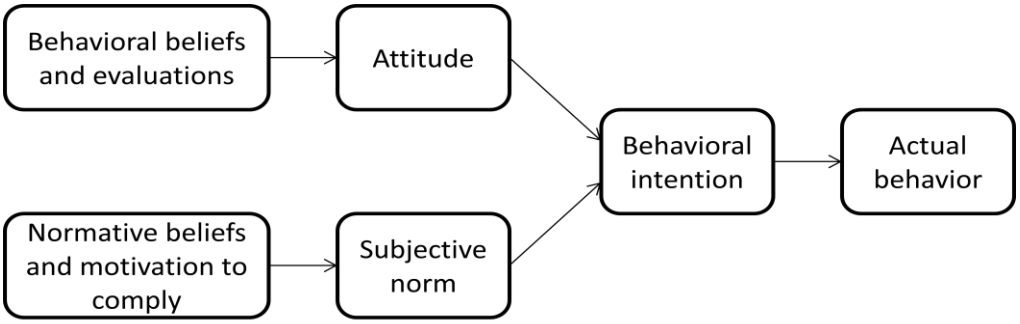


Figure 16: The Theory of Reasoned Action (Fishbein and Ajzen, 1975)

Furthermore, behavioral beliefs are proposed to influence attitude and normative beliefs to influence subjective norm. TRA does not however specify the specific behavioral beliefs that come to influence attitudes or intentions. Consequently, researchers drawing on TRA are required to identify the beliefs considered appropriate to employ in their specific research context (Davis et al., 1989; Yousafzai et al., 2010).

The TRA has been adopted in IS research to examine technology acceptance where acceptance is typically examined through the TRA constructs of attitude and behavioral intention. Drawing on TRA, it is therefore defined consumer acceptance of online health information services as the consumer's attitude and behavioral intention towards the use of the e-service. Attitude is defined as the individual consumer's overall evaluation that using an online health service would be positive and appropriate (Hsu et al., 2006), whilst behavioral intention is defined as the consumer's intention to use or continue to use the site to obtain health information in the future (Bhattacherjee and Premkumar, 2004).

Figure 17 depicts the study's research model with attitude and behavioral intention modeled as the two acceptance constructs. The model identifies trust, risk and perceived usefulness as the behavioral beliefs that can influence e-services acceptance. Trust plays an important role in exchange relationships between organizations and their customers (Corbitt et al., 2003; Teo and Liu, 2007). The importance of trust in consumer acceptance of e-service is increasingly being recognized (Grabner-Kräuter and Kaluscha, 2003), and multiple dimensions of trust have been identified. Pavlou (2003) for example considered both trust in a specific party (i.e., Web retailer) and trust in the integrity of the transaction medium (i.e., trust in the Web infrastructure). Thatcher et al. (2013) more recently argued that technology and institutional mechanisms play an active role in shaping online transactions. Thus both general trust in Internet infrastructure and in institutional mechanisms and specific trust in the online merchant and website are important to

consumers. Others too have distinguished between trust in the e-service provider (e.g., Gefen, 2002b; Pavlou and Gefen, 2004; Nicolaou and McKnight, 2006), trust in the website interface through which consumers access the online services (e.g., Dinev and Hart, 2006; Liao et al., 2011), and trust in institutional structures of the Internet which provides the interaction environment for the provision of e-services (Gefen et al., 2003a). Taken together, the model depicts consumer trust in the e-service provider, the website platform, and the institutional structures of the Internet as three important dimensions of the trust construct that have implications for consumer acceptance. The research model therefore depicts trust as a higher-order construct reflected by these three first-order dimensions.

Risk perceptions are an additional barrier to consumer online decision making (Kim et al., 2008). The model includes risk perceptions defined as consumer's belief about the potential performance loss when undertaking online health service interactions. Past e-services research suggests that trust beliefs and risk perceptions have both direct and indirect effects on consumer acceptance of e-services in numerous commercial (e.g., e-shopping) and non-commercial (e.g., e-government) online services (Mou and Cohen, 2013). In particular, trust is theorized to attenuate the perceived risks associated with the use of e-services (Pavlou, 2003; Liao et al., 2011; Bélanger and Carter, 2008).

In addition, an individual's perception of the expected benefits or usefulness of technology is one of the primary beliefs influencing acceptance in offline (Davis et al., 1989) and online e-services contexts (Chandra et al., 2010). Therefore, consumer perceptions of usefulness are modeled as an alternative mechanism through which trust influences acceptance (Gefen et al., 2003a). Although Chapter 4 identified PU as an antecedent of trust, there is an alternative argument that perceived usefulness partially mediates the effects of trust on consumer acceptance of e-services (Gefen et al., 2003a). Consequently, the logic proposed by that argument is considered in the development of this chapter's research model. The model's hypotheses are presented next.

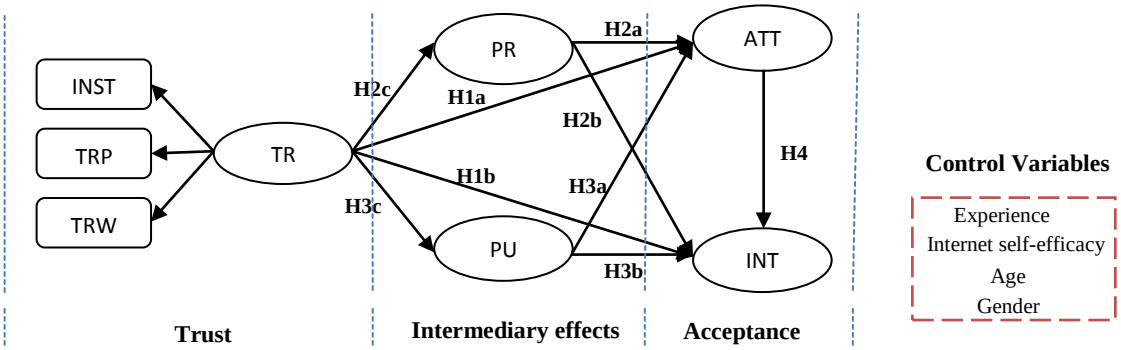


Figure 17: Research Model for Chapter 5. (INST: Trust in institutional structures; TRP: Trust in provider; TRW: Trust in website; TR: Trust; PR: Perceived risk; PU: Perceived usefulness; ATT: Attitude; INT: Behavioral intention).

5.2.1 Consumer Trust and Online Health Information Service Acceptance

Trust in the e-service provider is defined as the consumer's confidence in the integrity and dependability of the provider (Rotter, 1967; Bhattacherjee, 2002; Pavlou and Gefen, 2002). It is a belief that the other party will behave in a socially responsible manner, and will fulfil expectations (Pavlou, 2003). Trust allows consumers to be vulnerable to actions taken (or information provided) by the vendor based on these trust beliefs (Gefen, 2000). Past studies have found trust important to consumer behavior (Gefen et al., 2003a; Kim et al., 2008). A trusted e-service provider is more likely to be perceived as offering accurate and useful information that is in the best interests of the consumer. Pavlou (2003) argues that trust creates positive attitudes toward a service provider, reduces uncertainty and provides expectation for a satisfactory transaction experience.

Trust in the website is based on its reliability and ability to meet the consumer's needs of functionality (McKnight and Thatcher, 2006). A website's features and functions play an important role in mitigating transaction uncertainty (Thatcher et al., 2013). Thatcher et al. (2013) argue that the website serves as a representation of the 'unobservable' e-service provider, and consumers form perceptions of trust based on cues from the website interface. The website enables transactions to occur and must be seen to reliably and consistently help the consumer easily locate and search for required information and ensure they can complete necessary transactions (Thatcher et al., 2013). A trusted website interface is thus important to creating positive perceptions and usage intentions.

Trust in the institutional mechanisms concerns whether the Internet is perceived to be a reliable and safe environment in which to exchange information and transact with others (Gefen et al., 2003a). Institutional-based trust reflects the consumers belief as to whether within the online context there are enough regulations to protect consumer's rights (e.g., legal structures), sufficient assurances and statements of guarantees such as the use of third-party seals, as well as enough technological safeguards (e.g., encryption) to make the transaction environment safe (Thatcher et al., 2013). Moreover, Chau et al. (2011) argue that institutional-based trust affect consumer's attitude towards the trusting target. Trust in such institutional mechanisms is needed to reduce overall uncertainties associated with using the Internet to engage with service providers and to provide an overall feeling of confidence that the Internet is a protected environment.

Taken together, all three dimensions of trust (trust in provider, trust in website, and trust in institutional mechanisms) are considered important to reducing the complexities and uncertainties associated with the use of online health information services and promoting consumer acceptance. It is therefore hypothesized that:

Hypothesis 1a: Trust has a positive effect on consumer attitudes toward online health information services.

Hypothesis 1b: Trust has a positive effect on consumer behavioral intentions toward online health information services.

5.2.2 Risk and Online Health Information Service Acceptance

Garbarino and Strahilevitz (2004) define perceived risk as the potential for loss and the seriousness of the outcome if loss was to occur. In the e-service context, consumers face numerous performance, financial, privacy, and even psychological risks (Featherman and Pavlou, 2003). Reducing risk perceptions is thus considered essential to the success of e-services (Jarvenpaa et al., 2000). When consumers interact with the health websites, they stand a risk of loss resulting from use of poor quality health information (Yi et al., 2013). Because consumers usually obtain online health information to make health behavior decisions for themselves and/or their family, they are likely to be particularly concerned about this performance based risk. If consumers perceive a risk of obtaining inferior and inaccurate information that may cause them to experience negative health

related outcomes they are less likely to accept and use of online health services. It can therefore be hypothesized that:

Hypothesis 2a: Risk perceptions have a negative effect on consumer attitudes toward online health information services.

Hypothesis 2b: Risk perceptions have a negative effect on consumer behavioral intentions toward online health information services.

Pavlou (2003) argued that trust reduces the uncertainties that give rise to risk perceptions. Xiao et al. (2014) argue that trust can attenuate perceived risk by reducing the complexity and uncertainty of online health information seeking. Because the perceived risk of loss is likely to be lower when interacting with a trusted provider through a reliable website interface in a safeguarded online environment, it can be hypothesize that:

Hypothesis 2c: Trust lowers the perceived risks associated with using online health information.

5.2.3 Perceived Usefulness and Online Health Information Service Acceptance

Perceived usefulness (PU) has been identified as a central behavioral belief in technology acceptance (Davis et al., 1989), and online consumer behavior (Gefen et al., 2003a). In the e-service context, PU refers to the degree to which a consumer believes that using the e-service would enhance his/her performance or effectiveness. Lanseng and Andreassen's (2007) definition of PU in the online health information context, and Lim et al. (2011) are draw on to define PU as a consumer's belief that an online health service will enhance their effectiveness in self-management of their health. Consumers are more likely to accept the use of an online health service if it is perceived to be of benefit and is performance enhancing. It is therefore hypothesized that:

Hypothesis 3a: Perceived usefulness has a positive effect on consumer attitudes toward online health information services.

Hypothesis 3b: Perceived usefulness has a positive effect on consumer behavioral intentions toward online health information services.

Consumers are however likely to perceive the potential for benefits only if the online provider is trusted as a reliable and competent provider of health information, and if the

website is reliable in facilitating the desired goals of searching for and obtaining health information. Empirical studies have found perceived usefulness to partially mediate the effects of trust on consumer acceptance of e-services (Gefen et al., 2003a). Therefore it can also be hypothesized that:

Hypothesis 3c: Trust has a positive effect on the perceived usefulness of online health information.

5.2.4 Attitudes and Behavioral Intention

The attitude-behavior relationship is central in TRA theory where behavioral intentions are theorized to result from positive attitudes towards performing the behavior (Hansen et al., 2004). A consumer's positive or negative feeling towards using e-services is thus expected to influence his/her behavioral intentions. The attitude-behavior relationship has been empirically examined in e-health context (e.g., Lanseng and Andreassen, 2007). It is therefore hypothesized that:

Hypothesis 4: Consumer attitude toward online health information services has a positive effect on behavioral intentions.

5.2.5 Control Variables

Figure 17 identifies Internet self-efficacy (ISE), Age, Gender, and online health service experience as controls. Consumers who have higher Internet self-efficacy are more likely to engage with online services (Dabholkar and Bagozzi, 2002). Younger consumers are also considered to have more positive attitudes toward using new technologies (Morris and Venkatesh, 2000). Ybarra and Suman (2008) suggest that gender and age differences may shape online health service adoption. Shim et al. (2001) found that prior experience with e-services predicts consumer online behavior. Consumers who have not used online health information before may have a lower likelihood of future acceptance.

5.3 Research methodology

5.3.1 Study Design

This chapter uses dataset 1 to test the research model. The dataset was derived from a laboratory-based, experimental scenarios research design was carried out at out a large national university in South Africa. This was described in section 2.3. Undergraduate students who are registered in computing related courses were invited to take part. The use of a university student sample is appropriate because they represent an important portion of online consumers (Kim et al., 2008). Moreover, prior studies suggest that university students are the primary population using the Internet to acquire health information (Bansal et al., 2010; Li et al., 2014; McKinley and Ruppel, 2014). Furthermore, a review on the use of student samples in information systems research indicated that when theories are under examination, using a student sample is valid and appropriate (Compeau et al., 2012). All these suggest that the use of a university population is appropriate for the study.

The design involves a first step where participants gain experience in the use of the online services by completing a number of assigned tasks, and a second phase for completing a survey questionnaire. Before starting step 1, a short training session was carried out to teach participants how to access the online tasks and questionnaire.

In step 1, participants were introduced to the purpose of this study and were given the opportunity to choose between four popular online health information services. The four online health information websites were general medical, health and wellness sites accessible to consumers with optional registration. Allowing participants the opportunity to select their own health information website increased the voluntary nature of the e-service usage process (Zahedi and Song, 2008). Participants were asked to browse their chosen health website for information on a variety of issues in a number of general health categories that included diet and nutrition, exercise and fitness, and were asked to complete specific tasks (available from the authors on request) related to the search for health information. The tasks were adopted and redesigned from van Deursen's (2012) study. The use of tasks aims to provide them with some experiences and exposure to their chosen health information website and promote variability in the use and attitudes toward using the site.

In step 2, which immediately followed step 1, participants were asked to complete an online questionnaire. The questionnaire aimed to capture the participants' trust beliefs, their perceptions of site usefulness and risk as well as their attitudes and future usage intentions. Demographic questions (e.g., age, gender and health information website experience) were also asked. The task exercises and survey were administered through the university's e-learning system.

5.3.2 Measurement Instrument

Constructs were mostly operationalized based on previously validated instruments. All items measured using a seven-point Likert-scale with anchors from "strongly disagree" to "strongly agree". The example questionnaire items are presented in Table 15 below and the full questionnaire and measurement items are shown in Appendix E. The questionnaire was pre-tested using a convenience sample of senior students to determine if there are any ambiguous or confusing measurement items.

Constructs	Operationalization	Example Items
Trust in institutional structures (INST)	5-item scale modified based on McKnight et al. (2002) and Gefen et al. (2003).	This site has enough safeguards to make me feel comfortable using it to obtain personal health information.
Trust in provider (TRP)	4-item scale modified based on Pavlou and Genfen (2004).	This website information provider is in general trustworthy.
Trust in website (TRW)	5-item scale modified based on McKnight and Thatcher (2006).	I think this website is very reliable.
Perceived usefulness (PU)	4-item scale modified based on Bhattacherjee and Premkumar (2004).	Using this website can be of benefit to me in managing my health.
Perceived risk (PR)	4-item scale modified based on Corbitt et al. (2003).	Using this website to obtain health care advice is risky because the health information may be inferior.
Attitude (ATT)	4-item scale modified based on Hsu et al. (2006).	I think using online health websites are good for me.
Behavior intention (INT)	8-item scale modified based on Bhattacherjee and Premkumar (2004) and Kim et al. (2009).	I intend to continue using/use this website to obtain health information.

Table 15: Questionnaire Items for Chapter 5

5.4 Empirical Results

5.4.1 Participants

A total of 248 students registered for the undergraduate computing courses were invited to participate. A total of 169 (response rate=68.1%) students participated in the study. Given the high response rate, non-response bias is not considered a threat for the study. However, eight responses were eliminated as they were missing a large number of data values. The final sample thus consisted of 161 observations with sufficient data for meaningful statistical analysis. Table 16 presents a description of the sample profile of the dataset.

Demographics	Category	Frequency	Percentage (%)
Gender	Male	103	63.98
	Female	58	36.02
Internet experience (years)	1-3	14	8.70
	4-6	18	11.18
	7-9	37	22.98
	>9	91	56.52
	Missing	1	0.62
Online health information experience	Yes	83	51.55
	No	75	46.58
	Missing	3	1.86
Age	18-19	55	34.16
	20-22	86	53.42
	23-25	14	8.70
	> 25	6	3.72
Choice of online health information service provider	WebMD	55	34.16
	Health24	72	44.72
	Mayoclinic	4	2.48
	MedlinePlus	28	17.39
	Missing	2	1.24

Table 16: Respondent Profile for Chapter 5

As the study was conducted at university, the respondents aged between 18 and 22 (87.58%). Among them, 63.98% were male and 36.02% were female. Among the respondents, most of the subjects have more than 7 years Internet experience (79%) and 52% indicated that they had used an online health information site before. All the subjects indicated that they have used other types of e-services in the past including online shopping, Internet banking, mobile banking, and social networking services. Because participants were allowed to choose between four online health information providers for

carrying out the tasks and gaining familiarity with the online health service context, an ANOVA test determined if trust, risk and usefulness beliefs, and the acceptance scores were independent of the choice of provider. Results indicated that there were no significant differences along the items measuring trust, risk, usefulness, and attitude or intention variables.

5.4.2 Measurement Model Evaluation

An initial principal components (PCA) analysis was carried out to confirm the unidimensionality of the measures and to eliminate any inappropriate items. One TRW3 item was removed at this point because of high cross-loadings. Thereafter, the measurement model was analyzed through a confirmatory factor analysis using SmartPLS software package (version 2.0 M3) (Ringle et al., 2005).

The constructs in the research model were evaluated in terms of convergent validity, discriminant validity, and reliability. The items loaded onto their expected theoretical constructs. Convergent and discriminant validities were evaluated by using factor item loadings and average variance extracted (AVE) (Gefen et al., 2000). The standardized loadings of the measurement items, AVE, composite reliability (CR) and Cronbach's alpha value are reported in Table 18. The values of the loadings range from 0.724 to 0.944, which are above the recommended value of 0.70. None of the items exhibited high cross-loadings on factors they were not intended to measure. The values of composite reliability range from 0.873 to .966, which are above the acceptable value of 0.70. The lowest AVE value is 0.632, which is above the recommend threshold of 0.50, thus, the convergent validity is confirmed. For the discriminant validity, the square root of AVE of each construct is larger than the inter-construct correlations (see Table 17), and thus discriminant validity is confirmed.

	Mean (sd)	ATT	INT	PR	PU	INST	TRP	TRW
ATT	5.1 (1.2)	**.894**						
INT	4.4 (1.4)	.470	**.883**					
PR	4.0 (1.1)	-.242	-.232	**.870**				
PU	5.6 (1.0)	.413	.388	-.203	**.862**			
INST	4.5 (1.1)	.482	.435	-.286	.283	**.815**		
TRP	5.2 (.93)	.292	.343	-.233	.365	.499	**.915**	
TRW	5.3 (.97)	.246	.332	-.264	.558	.361	.476	**.795**

Table 17: Construct Correlations for Chapter 5 (Diagonal bold values are square root of AVE)

Factor	Item	Standard loading	AVE	CR	Alpha value
INST	INST1	.792	.665	.908	.874
	INST2	.815			
	INST3	.852			
	INST4	.758			
	INST5	.856			
INT	INT1	.869	.780	.966	.960
	INT2	.892			
	INT3	.898			
	INT4	.824			
	INT5	.875			
	INT6	.902			
	INT7	.904			
	INT8	.897			
ATT	AT1	.882	.799	.941	.916
	AT2	.944			
	AT3	.893			
	AT4	.854			
PU	PU1	.849	.743	.920	.885
	PU2	.872			
	PU3	.866			
	PU4	.861			
TRW	TRW1	.851	.632	.873	.814
	TRW2	.845			
	TRW4	.724			
	TRW5	.752			
PR	PR1	.867	.756	.925	.893
	PR2	.896			
	PR3	.865			
	PR4	.850			
TRP	TRP1	.929	.837	.954	.935
	TRP2	.902			
	TRP3	.910			
	TRP4	.919			

Table 18: Results of Reliability and Validity Analysis for Chapter 5

5.4.3 Results of Hypothesis Testing

The PLS tests of the structural model are reported in Figure 18. Trust was modeled as a second-order factor with the latent factor scores for the first order dimensions (trust in the institutional structures, trust in provider, and trust in website) modeled as reflective manifest indicators. The AVE for this second-order trust construct is 0.628. Bootstrap re-sampling (300 re-samples) was used to produce t-values for determining significance of paths. The R^2 value for consumer intention to use online health information service in the future is 0.344, which means the model explains 34.4% of variance. The analysis

controlled for the effects of online health information experience, Internet self-efficacy, age and gender for attitude and behavioral intention. Amongst the controls, only the effect of online health information experience on attitude was significant.

As seen from Figure 18 trust as a higher-order factor has a significant direct effect on consumer attitude and behavioral intention to adopt online health information services. Hence, H1a (path coefficient of 0.208, p<0.05) and H1b (path coefficient of 0.263, p<0.01) are supported. This finding supports the view that trust is important to consumer acceptance of online health services. As predicted by TRA, attitude has a positive effect on intention, thus supporting H4 (path coefficient of 0.261, p<0.05). Consumer trust has a strongly significant negative effect on perceived risk i.e., trust attenuates risk perceptions, hence, H2c (path coefficient of -0.344, p<0.001) is supported. However, perceived risk has no significant influence on consumer attitude or consumer intention. H2a and H2b are thus rejected and consumer acceptance is not found to be a function of the risks that online health information may be inaccurate or inferior. Results confirm that trust has a significant effect on perceived usefulness, which in turn has a significant effect on consumer attitude. However, perceived usefulness has no direct effect on consumer intention. Hence, H3c (path coefficient of 0.513, p<0.001) and H3a (path coefficient of 0.287, p<0.01) are supported. However H3b is rejected. Table 19 summarises the results of hypothesis testing.

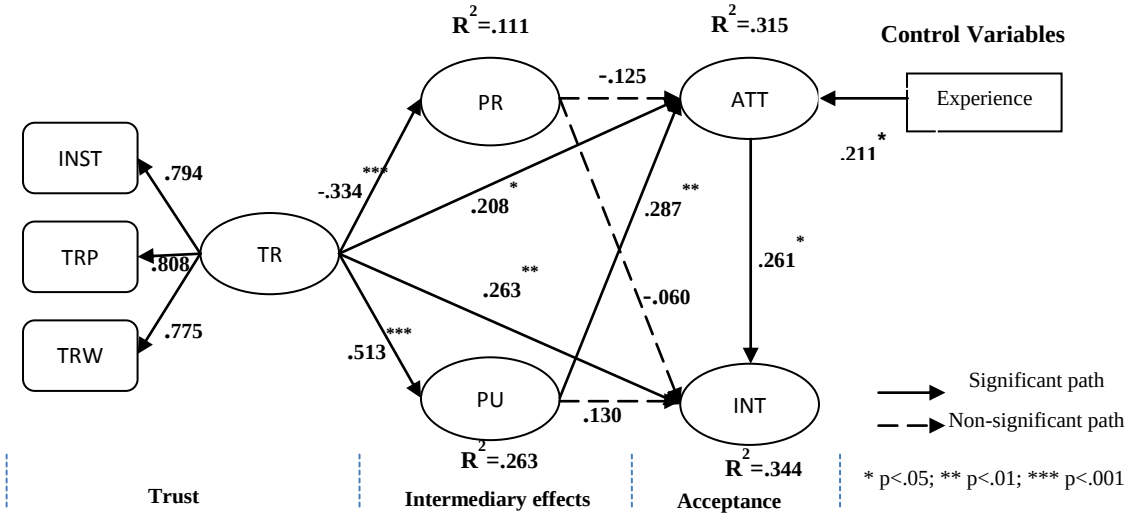


Figure 18: PLS test of research model (non-significant controls omitted from figure to improve readability).

Moreover, the mediating effect of perceived usefulness on the link between trust and attitude, the mediating effect of attitude on the link between trust and intention, and the mediating effect of attitude on the link between perceived usefulness and intention were also subjected to a Sobel test. The Sobel test provides us with a more direct test of these mediating effects suggested by the research model. Support for the importance of perceived usefulness as an explanatory variable for the effects of trust on attitude is confirmed by a significant Sobel statistic (2.315, $p<0.05$). Support for attitude as an explanatory variable for the effects of trust on intention is confirmed by a significant Sobel statistic (2.884, $p<0.01$). Finally, support for the importance of attitude as an explanatory variable for the effects of perceived usefulness on intention is confirmed by a significant Sobel statistic (3.073, $p<0.01$).

Hypothesis (path)	Path coefficient	t-Value	Supported
H1a	.208	1.979*	Yes
H1b	.263	2.766**	Yes
H2a	-.125	1.405	No
H2b	-.060	.620	No
H2c	-.334	3.424***	Yes
H3a	.287	2.324*	Yes
H3b	.130	1.163	No
H3c	.513	6.885***	Yes
H4	.261	2.117*	Yes

Table 19: Summary of Results for Chapter 5 (p<.05; ** p<.01; *** p<.001)*

5.5 Discussion

This chapter aimed to determine the extent to which trust, risk and perceived usefulness influence consumer acceptance of an emerging e-service which is regarded as having high potential, namely online health information services. To do so, a TRA-grounded research model was developed and empirically tested. Data was collected in a laboratory setting from a sample of university students.

Results have shed light on the general perceptions and attitudes of the sampled consumers towards this high-potential area of e-service. Attitudes and intentions are still evolving as only 30% of respondents indicated they had strong intentions to continue to use the online information service for obtaining health related information. Determining the factors that influence acceptance is therefore important to more widespread adoption and to ensure the potential benefits of such services can materialize.

The study confirmed that trust can be modeled as a higher-order construct consisting of three dimensions, namely trust in institutional structures, trust in provider and trust in the website platform. Results showed that together these trust dimensions are important to influencing consumer attitudes and intentions towards the use of online health services. This confirms that consumers must have a basis on which to form a positive expectation for a satisfactory service experience (Pavlou, 2003). Trust in a dependable, reliable and honest provider allows the consumer to accept the necessary vulnerability required to engage in e-service usage. Furthermore, a website's features and performance play an important role in mitigating uncertainty and acting as a proxy for the unobservable provider. Moreover, consumers must have positive perceptions of the overall institutional environment of the Internet and that if contains the necessary safeguards to protect consumers (Thatcher et al., 2013).

Trust was also important to perceived usefulness, which was found to partially mediate the effects of trust on consumer acceptance via attitudes toward e-services. This confirms the links between trust and usefulness as suggested elsewhere (e.g., Gefen et al., 2003a). Although, results did not confirm a direct relationship between perceived usefulness and intention, findings are consistent with the belief-attitude-behavior process defined within TRA. First, online health information seekers evaluate whether the information could be beneficial for improving their performance in self-management of health, this will lead them to form positive or negative attitudes, which in turn translate into willingness to accept.

Results also confirmed prior e-commerce studies (e.g., Jarvenpaa et al., 2000; Pavlou, 2003) in finding that trust is important to reducing perceptions of risk in the online health service context. However, it was found that consumer acceptance in the online health information context is not directly a function of the risks that online health information may be inaccurate or inferior. This lack of support for H2a and H2b is surprising given arguments that risk perceptions are a barrier to consumers' online activities (Kim et al., 2008; Lee, 2009; Pavlou, 2003; Yousafzai et al., 2009; Jarvenpaa et al., 2000).

One explanation for the finding is that privacy or security related risks may be more important than performance-based risks. This is because consumers still have an opportunity to exercise judgment and discretion and to engage with other sources for verification before acting upon online health information. Therefore the risks of immediate loss by simply retrieving information are not sufficiently high to deter usage. Findings

might also be explained by the possibility that younger online consumers (who constituted the study sample) may be less risk averse than older consumers (Udo et al., 2010). These consumers may therefore be willing to trade-off the risks of poor information against the convenience and potential benefits of accessing health information online. Results show the average risk scores as lower than the average usefulness scores. These young consumers may therefore be more interested in the performance benefits of using a trusted online service than the potential adverse consequences of seeking information online. This relationship between risk and acceptance in the online health services context deserves further consideration in future research.

An examination of the total effects confirms that whilst perceived usefulness has a large direct effect on attitude, trust is the more salient determinant of usage intentions.

5.6 Conclusion

The primary contribution of this study has been the identification of specific beliefs, namely trust, risk, and perceived usefulness, and their integration into a TRA model for predicting consumer acceptance of online health services. Results confirm the importance of trust in the belief-attitude-acceptance structure and the role of trust in e-service acceptance. Moreover, it has been shown that trust is not only salient in commercial e-service contexts but also extends to in the non-commercial online health services context. The finding that trust can be reliably modeled as a higher-order construct reflected by trust in provider, trust in website and trust in institutional structures can help future researchers to more comprehensively capture trust in the e-service context. This provided a new insight into the multidimensional nature of trust. From a practical perspective, it is necessary to focus on all three components as they address complementary trust perceptions in the e-service context. Consumers base their trust on whether the e-vendor is dependable and honest, the website is reliable and has the functionality needed, and institutional safeguards (e.g., statements of guarantees, encryption and legal structures) exist to make it safe to obtain health information online. Trust is the foundation on which subsequent usefulness perceptions and behavioral intentions are formed.

It was also found that perceptions of usefulness partially mediate the effects of trust on consumer attitudes. This implies that consumers value information that will help them

improve their performance in managing their health. Whilst these perceptions are important to creating a positive attitude towards the use of the site, results show that intentions to actually engage in the use of the service are largely reliant on trust.

Results of the study can help focus practitioner attention on determining the mechanisms required for trust-building and for improving consumer acceptance through demonstration of the usefulness of health information provided. The importance of three dimensions of trust in this study namely, trust in institutional structures, trust in provider and trust in website can help practitioners better understand the formation of trust. Practitioners need to ensure that they increase trust by building their reputation as a reliable, competent provider of health information, ensuring their website platforms are dependable and perform reliably, and promoting institutional trust by provision of assurances and support of technologies designed to safeguard consumer interactions with their site.

It is important to note some limitations. First, the sample is drawn from a university population and while they are an important consumer group, findings may not necessarily generalize to broader consumer populations. Second, some of the tasks may not be applicable to all participants and may have created bias in their perceptions (Lanseng and Andreassen, 2007). Third, data was also cross-sectional and therefore causal inferences can only be made with reference to theory. Future studies should adopt longitudinal designs and consider the temporal changes in trust beliefs and risk perceptions as well as in consumer attitudes and intentions towards online health services. This is achieved in part in later chapters of this thesis. Moreover, future research should consider privacy related risks that may be salient in health service context (Angst and Agarwal, 2009).

In the next chapter, this thesis presents a second cross-sectional study that draws on the Health Belief Model and Extended Valence Framework to further understanding of how trust comes to influence acceptance of online health information services.

CHAPTER 6: TRUST, RISK BARRIERS AND HEALTH BELIEFS IN CONSUMER ACCEPTANCE OF ONLINE HEALTH SERVICES

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6.1 Introduction

Online health information services have the potential to improve consumer engagement in the self-management of their and their family's health (Harbour and Chowdhury, 2007; Song and Zahedi, 2007; Yi et al., 2013). Online health information services such as WebMD, Health24 and MedlinePlus offer consumers the promise of a) increased convenience and greater access to information for engaging in self-management of their health, b) reducing uncertainty regarding health status, and c) constructing a social and personal sense of health (Cotton and Gaupta, 2004; Harbour and Chowdhury, 2007; Xiao et al., 2014). They advantage consumers by overcoming the geographic, temporal and cost limitations associated with traditional health information channels (Harbour and Chowdhury, 2007; Xiao et al., 2014). They also offer an opportunity for consumers to gain access to different perspectives on health conditions, and to be more informed about and take a more active role in their heath (Rains, 2007). One study suggests that online health information seeking is as important as e-services such as e-shopping for young population (ages 18-34) (Fox, 2011), whilst in the context of this study, South Africa, the use of online health services is still emerging relative to other e-services (de Lanerolle, 2012). However, there are still problems associated with these services that may influence consumer acceptance and usage. For example, one study argues that much of the health-related information found online is inaccurate or misleading to health-information seekers (Abbasi et al., 2012). The trustworthiness and expertise of information providers has often been questioned (Dutta-Bergman, 2003; Lemire et al., 2008), and the computer-mediated nature of the services may bring about added anxiety

and concerns over the misuse of personal health information (Beldad et al., 2010; Bansal et al., 2010). It is therefore not surprising that consumers may remain hesitant to use online health information services.

If online health information services are going to provide intended benefits then understanding variations in the acceptance and use of these services is a research problem in need of attention. Chapter 5 began to address this by considering the relevance of trust, perceived risk and perceived usefulness. The use of online health information services may however be a special case of e-service acceptance that needs to be understood. This is because usage involves decision making processes for health behaviors that are likely subject to mechanisms rather than those associated with typical consumer contexts (Sun et al., 2013) or other task-oriented IS (Kim and Chang, 2007). For example, the quality of one's current health, or the risks of becoming ill or exacerbating a condition may be important to predicting acceptance of health information services (Rains, 2007). Consequently, consumer engagement with online health services might best be understood as simultaneously a health-related behavior and an e-service usage behavior. Therefore to better understand variations in the use of such services, this chapter considers both theories of health behavior, i.e., the Health Belief Model (Rosenstock, 1966; Rosenstock, 1974), as well as e-service usage behavior, i.e., the extended valence framework (Kim et al., 2009a). In an attempt to further our understanding of the ways to which trust and risk come to influence online health information services, the following research questions are posed for this chapter:

CH6RQ1: To what extent is consumer acceptance of online health information services both a health-related behavior and an e-service usage behavior?

CH6RQ2: Which of the multi-dimensional trust beliefs, multi-faceted risk barriers, or health beliefs are the more salient determinants of consumer acceptance of online health information services?

The Health Belief Model (HBM) was developed initially in the 1950s by social psychologists to explain preventive health behavior (Rosenstock, 1974). The model posits that individual's health behavior depends on the existence of certain beliefs toward a given condition (Chen and Land, 1986). There are four health beliefs in this model to explain why people will take an action to prevent or to control illness conditions, namely perceived susceptibility, perceived severity, perceived benefits and perceived barriers.

However, past HBM studies have mostly focused on explaining traditional health management behaviors such as smoking cessation, exercise habits and prevention of skin cancer. There are few studies that apply HBM in the context of online health information seeking.

The use of online health information services however still requires a consumer to be willing to engage with the information provider through the platforms and technologies of an e-service. As address previously in this thesis, the use of e-services across contexts as varied as e-shopping (Jarvenpaa et al., 2000; Corbitt et al., 2003; Gefen et al., 2003a; Pavlou, 2003; Teo and Liu, 2007; Kim et al., 2008), e-banking (Yousafzai et al., 2009; Luo et al., 2010), online legal services (Cho, 2006), mobile payment services (Lu et al., 2011; Chandra et al., 2010), e-government (Horst et al., 2007; Bélanger and Carter, 2008) and including online health care services (Egea and Gonzalez, 2011; Zahedi and Song, 2008), have been shown to be influenced by consumer trust and risk beliefs, alongside their perceptions of e-service benefits. It is expected therefore that these concepts of trust, risk and benefit, which have been combined by Kim et al. (2009a) into an extended valence framework, will still be relevant to consumer acceptance in the online health context as shown in Chapter 5. While trust, risk and benefits have been separately considered in the online health information context (e.g., Lanseng and Andreassen, 2007; Bansal et al., 2010; Anderson and Agarwal, 2011; Yi et al., 2013; Xiao et al., 2014), they have not been considered together, and have not been integrated with the HBM in an effort to explain consumer engagement with online health information services.

Therefore, the purpose of this chapter is to develop and test an integrated HBM and Extended Valence Framework (EVF) of consumer acceptance of online health information services. The model is tested using dataset 3 collected from a sample of undergraduate students using an experimental scenarios approach combined with a questionnaire survey (as discussed in 2.3).

This chapter proceeds as follows: In the next section, the theoretical foundation, the proposed research model and hypotheses are developed. Next, the research methodology is outlined. Thereafter, the empirical results are presented followed by discussion and implications.

6.2 Theoretical Foundation and Hypotheses

The health belief model (HBM) was developed by social psychologists to explain health-related behaviors in social psychology and health science (Rosenstock, 1966, 1974; Janz and Becker, 1984). The basic postulate of this model states that a person's intentions to perform health-related behaviors are determined by perceived threats and outcome expectancies. Perceived threats include the perceived susceptibility of the individual to a health-related threat and perceived severity of the consequences should the threat materialize. Outcome expectancies include the perceived benefits of performing the health-related behavior relative to the perceived barriers associated with performing the behavior. Self-efficacy to perform the behavior has also been added to the HBM in more recent studies (Rosenstock et al., 1988). The HBM is outlined in Figure 19. Health belief model has become one of the most comprehensive models to understand health-related behaviors and to understand why people will take/not take an action to prevent or to control illness conditions (Harrison et al., 1992; Carpenter, 2010). This study is focused on information seeking behavior, and not on subsequent actions that may be taken based on the information. HBM is relevant to explanations of behavioral intention toward health information seeking in both online (McKinley and Ruppel, 2014) and off-line contexts (Kim et al., 2012).

The valence framework is developed from economics and psychology literature to understand consumer behaviors (Kim et al., 2009a). It is based on the view that perceived risk and perceived benefit are two fundamental aspects on consumer purchasing behavior (Peter and Tarpey, 1975). This is because, on the one hand, consumers want to minimize unexpected negative effects whilst, on the other hand, consumers also want to maximize positive effects of purchasing (Kim et al., 2009a). In the context of online consumer behaviors, Kim et al. (2009) extended the basic valence framework by adding consumer trust beliefs (see Figure 19). This extend valence framework contends that trust beliefs precede risk perceptions and perceived benefits and that all three subsequently predict online consumer behavior. The valence framework is depicted in Figure 19.

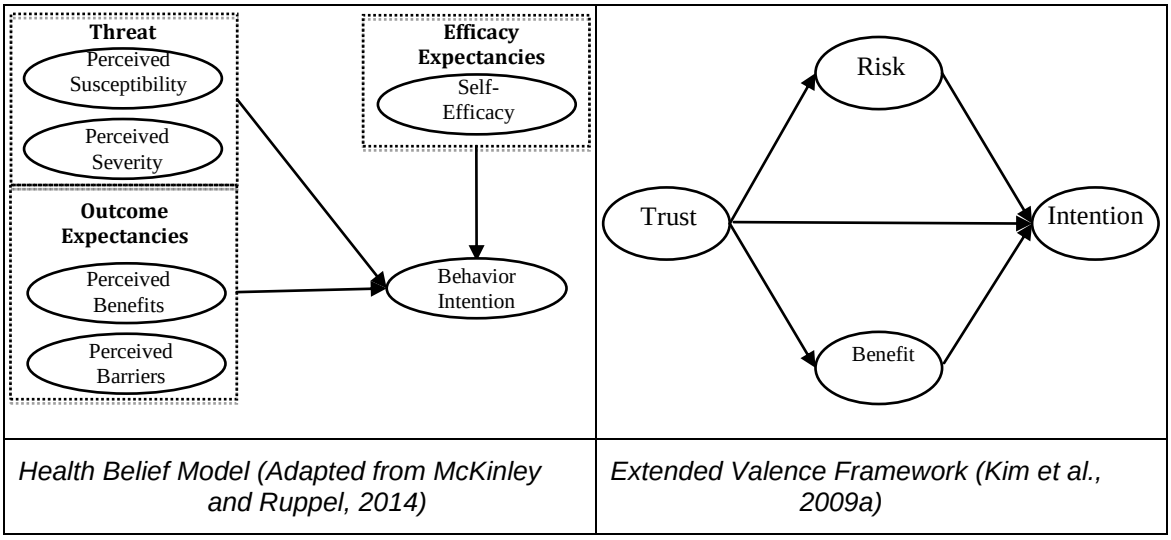


Figure 19: Theoretical Models for Chapter 6

Given both theories are focused on explaining individual's behavioral intentions prior to actual behavior, it is possible to consider their integration so as to derive a research model (Figure 20). The dependent variable, representing consumer acceptance, is the consumer's behavioral intention to use online health information services. Because this chapter views this behavior as simultaneously a health behavior and e-service usage behavior, the model draws on the HBM to identify perceived health susceptibility, perceived severity, perceived benefits, perceived barriers and self-efficacy as determinants of intention. Moreover, this study draws on the extended valence framework to include trust and its effects on both perceived benefits as well as perceived barriers (in the form of risk perceptions). Because risk perceptions are considered amongst the most significant barriers to consumer online behaviors (Kim et al., 2008), three risks as barriers to intention are identified whilst Chapter 5 only considered performance risk, in this chapter risk was extended to included performance risk, psychological risk and time risk. Consistent with the extended valence framework, both perceived benefits and perceived risks are influenced by consumer trust. Given concerns over the credibility of online information providers (Dutta-Bergman, 2003; Lemire et al., 2008), having previously established the relative salience of trust in provider above trust in website and platform, here a multi-dimensional perspective on trust in the e-service provider is therefore taken. Specifically, consumer trust in the online health information provider's ability, benevolence, and integrity are identified as relevant trust beliefs with the potential to influence perceived risks, benefits and intentions towards online health services. Finally,

the model reflects that self-efficacy may interact with severity and susceptibility to predict health behavior (Carpenter, 2010; McKinley and Ruppel, 2014). The variables and the model's hypotheses are outlined in more detail next.

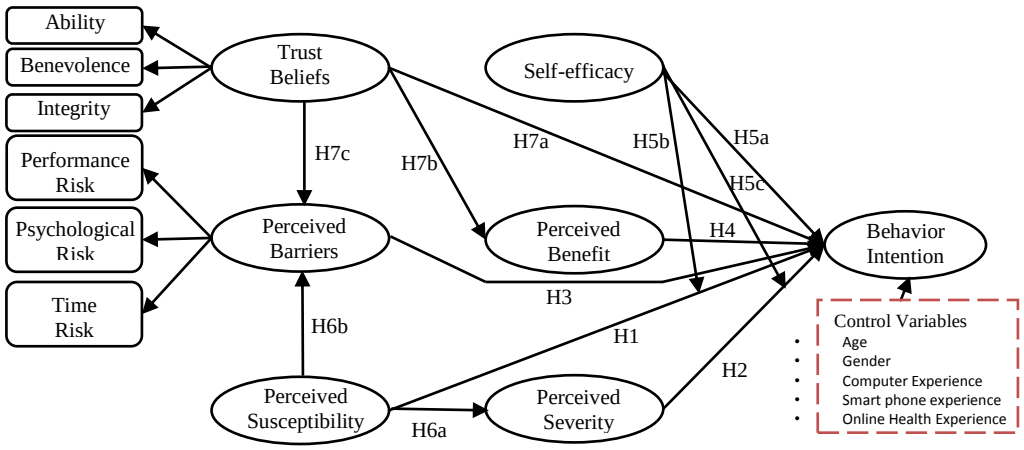


Figure 20: Research Model for Chapter 6

Perceived susceptibility is defined as one's feeling of vulnerability to a condition or one's risk perceptions of contracting a condition (Janz and Becker's, 1984). The HBM states that health behavior depends on the degree to which an individual believes they are vulnerable such that when an individual's vulnerability or perceived susceptibility is high, they are more likely to do something to prevent the health threat from happening. Therefore, increased levels of susceptibility to one or more health threats are likely to increase consumer intentions to adopt online health services. Past empirical studies across a number of health behaviors empirically support this link (e.g., Marlow et al., 2009). Hence, it is hypothesized:

H1: Perceived susceptibility has a positive effect on consumer behavioral intentions toward online health information services.

Perceived severity relates to the seriousness of the clinical or social consequences of the health condition (Janz and Becker, 1984). The HBM predicts that if people believe the consequences will be serious, they are more likely to act to avoid the negative health outcome (Rosenstock, 1966). When online health information seekers consider that they are likely to suffer seriously as a consequence of not taking action to avoid a health-related threat, they are more likely to consider adopting online health services as part of their self-management and health seeking behaviors (Sun et al., 2013). Previous health behavior studies support this link (e.g., Kim et al., 2012). It is therefore hypothesized:

H2: Perceived severity has a positive effect on consumer behavioral intentions toward online health information services.

Risks represent both a barrier to undertaking a health action as well as to engaging in the use of an e-service. Risk in the online context is multi-dimensional (Lim, 2003; Featherman and Pavlou, 2003) with psychological risk, performance risk and time risk likely to be relevant in the online health context. Psychological risk refers to the possibility that an individual suffers mental stress or loses self-esteem because of the use of online health services (Liao et al., 2010) (e.g., use of the service may give the health information seeker a feeling of unwanted anxiety). Performance risk is the loss incurred if the online service does not meet the consumer's expectation (Sun, 2014) (e.g., the consumer may obtain health information that is inaccurate or lacks the expected comprehensiveness). Time risk is the possibility that individuals lose time researching health conditions (Featherman and Pavlou, 2003) (e.g., the consumer may waste too much time obtaining the information). The extended valence theory suggests that consumers are motivated to minimize such risks by avoiding behaviors where such risks are considered high. These risks thus present a barrier to acceptance, and according to HBM when individuals perceive strong barriers to taking health actions, they are less likely to engage in the behavior (Carpenter, 2010). This leads to the following hypothesis:

H3: Perceived risks are a barrier that will have a negative effect on consumer behavioral intentions toward online health information services.

Within the HBM, perceived benefits are defined as the "beliefs regarding the effectiveness of the various actions available in reducing the disease threat" (Janz and Becker, 1984). The HBM contends that if individuals believe that the perceived benefits from taking preventive a health action is greater than the barriers or risk perceptions then the individual is more likely to perform the behavior (Kim et al., 2012). This is because individuals must believe the action will be effective and must associate it with the likelihood of preventing a health outcome. This is necessary to overcome conflicting motives of avoidance and the possibility of any undesirable consequences that may result from performing the health action (Rosenstock, 1974). Thus consumers are likely to adopt online health information when they believe this behavior will prevent a negative health condition or help them maintain or improve their health condition. Benefits are also a core belief within the e-service valence framework where benefits are seen to encourage utility maximizing consumers to make use of online services (Kim et al., 2009a). The use of

online services can make it more convenient for consumers and empower them and improve their ability to self-manage their health. Past empirical studies support the effects of perceived benefits on online health service adoption (e.g. Lanseng and Andreassen, 2007). It is therefore hypothesized that:

H4: Perceived benefit has a positive effect on consumer behavioral intentions toward online health information services.

Self-efficacy is defined as “the conviction that one can successfully execute the behavior required to produce the outcomes” (Bandura, 1997). It is another predictor in the HBM that can influence health-related behaviors. Normally, people do not try to do something new, unless they think they have the ability to do it. More specifically, in the online health service context, a consumer’s Internet self-efficacy is likely to be important to their online activity. If users are confident in their ability to use Internet, they will be more likely to adopt online health information services and perform online health information searching. Past studies have found self-efficacy to exert a strong influence on online health acceptance (Sun et al., 2013; Lim et al., 2011). Thus:

H5a: Internet self-efficacy has a positive effect on consumer behavioral intentions toward online health information services.

The effects of susceptibility and severity on user’s health behavior may also be moderated by self-efficacy (Carpenter, 2010; McKinley and Ruppel, 2014). Despite the perceptions of a health threat (i.e., high susceptibility and high severity), individuals who lack self-efficacy to engage with online health providers may view their services as less valuable (McKinley and Ruppel, 2014). Individuals lacking in self-efficacy may feel it beyond their control to search out health information and thus perceive use of online health sites for self-management as less appropriate (Rimal, 2001). Self-efficacy thus enhances the effects of perceived health threats on behavior such that the effects of severity and susceptibility on intention are likely to be stronger for individuals with higher levels of self-efficacy. Hence, it is hypothesized:

H5b: Internet self-efficacy moderates the effect of perceived susceptibility on consumer behavioral intentions toward online health information services.

H5c: Internet self-efficacy moderates the effect of perceived severity on consumer behavioral intentions toward online health information services.

Previous meta-analysis of HBM revealed that severity is the more proximal predictor of behavior for both prevention and treatment related actions (Carpenter, 2010). Susceptibility, which is the subjective vulnerability of contracting a condition (Rosenstock, 1974) is unlikely to influence behavior unless the individual judges the condition as serious or severe. Consequently, severity may intervene in the relationship between susceptibility and behavior. Others have considered this extension of the HBM to include this intervening relationship (Milne et al., 2000). Thus:

H6a: Perceived severity mediates the effects of perceived susceptibility on consumer behavioral intentions toward online health information services.

Moreover, the greater an individual's susceptibility to a condition, the more barriers or risks the individual may perceive in taking a health action such as searching out health information online. An individual is more likely to perceive greater risks of psychological discomfort, time loss and poor quality information when they are using online health services when they believe themselves more vulnerable to a condition. Therefore:

H6b: Perceived susceptibility has a positive effect on perceived risk barriers.

Based on Gefen et al. (2003a), this study defines trust as the consumer's belief in the integrity, benevolence, ability and predictability of the online health information provider. Trust in e-service provider is important to adoption because uncertainties characterize the use of e-services, which have resulted in consumers' trust beliefs being considered amongst the most important psychological states influencing online behaviors (Pavlou and Gefen, 2002; Pavlou, 2003; Kim et al., 2008). A trusted e-service provider is more likely to be perceived as offering accurate and useful information that is in the best interests of the consumer. Pavlou (2003) argues that trust reduces uncertainty and provides expectation for a satisfactory transaction experience. Trust is therefore considered important to consumer intentions to engage in the use of online health services (Song and Zahedi, 2007; Yi et al., 2013). Therefore, it is hypothesized that:

H7a: Trust has a positive effect on consumer behavioral intentions toward online health information services.

The extended valence framework suggests that consumers are likely to perceive the potential for benefits only if the online provider is trusted to fulfil its obligations (Kim et al., 2009a). If consumers trust an online health service as a reliable and competent provider

of health information, they are more likely to believe the service will improve their effectiveness in managing their health. Past empirical study in the health context found that trust beliefs positively influence perceived benefits such as convenience (e.g., Lanseng and Andreassen, 2007). Hence, it is hypothesized:

H7b: Trust beliefs have a positive effect on the perceived benefits of online health information.

Trust and risk are arguably closely related. According to the extended valence framework trust is antecedent to risk perceptions because trust reduces the uncertainties that give rise to risk perceptions. Under this perspective, risk mediates the effects of trust on consumer acceptance (Jarvenpaa et al., 2000; Pavlou, 2003; Nicolaou and McKnight, 2006; Kim et al., 2008, 2009a). Therefore, it is hypothesized:

H7c: Trust beliefs have a negative effect on the perceived risks associated with using online health information.

6.3 Research Methodology

6.3.1 Study Design and Procedures

To test the hypotheses, a laboratory-based experimental scenarios research design was carried out in a large national university in South Africa. This context was selected because students represent an important portion of online consumers (Kim et al., 2008) and a primary population using the Internet for health services (Bansal et al., 2010; Yi et al., 2013). Moreover, young people often have difficulties accessing traditional health services, and the Internet can offer them a confidential and convenient way to access health services (Gray et al., 2005). Even though college students are generally believed to be healthy, they still often struggle with responsible sexual behavior, confront mental health issues, drug and alcohol abuse, smoking, and poor eating habits (Bansal et al., 2010; Kim et al., 2012; McKinley and Ruppel, 2014). In South Africa where this study was carried out, HIV/Aids represents a significant health issue facing the student population. One study suggests there was 3.4% at risk for HIV prevalence (HEAIDS, 2010). Moreover, other studies in the South Africa context have recorded that from age 18 to 34 years old, 11.1% have alcohol abuse disorders, and 4.6% population have drug abuse

and mental health e.g., anxiety and depressive disorders (Herman et al., 2009). There are other issues associated with a large International student body including e.g., requirements for immunizations. Consequently, this student body selected for this study represents a diverse cross-section of the consumer population who confront various health-related issues. Many of these students are also learning to function independently at college without the typical family and support structures that surrounded them in their earlier childhood. The engagement of such consumer with online health information services is thus particularly useful to examine.

As per section 2.3.1, this study used dataset 3. The research design involved a first phase where participants were provided an opportunity to gain experience in the use of an online health service by completing a number of tasks. This was followed by a second phase for completing the survey questionnaire. First year undergraduate students who are registered in computer-lab related courses were invited to take part in the study. There are total around 1300 fist year students registered for the courses. In the first phase, the purpose of this study was introduced and identified three popular online health service websites to provide context for the experimental tasks (one leading local health information site and two international sites that have been used in other studies e.g., Zhang, 2014). The websites were all general medical, health and wellness sites accessible to consumers with optional registration. The participants were asked to choose one of the three websites. Self-selection allowing participants the opportunity to select their own health information website increased the voluntary nature of the e-service usage process (Zahedi and Song, 2008). Participants were asked to browse their chosen health website for information on a variety of issues in a number of general health categories that included diet and nutrition, exercise and fitness, and were asked to complete specific tasks related to the search for health information (see Appendix D). The tasks were adopted and redesigned from van Deursen (2012) and Keselman et al. (2008). The use of tasks aims to provide participants with some experience and exposure to their chosen health information website and promote variability in the use and attitudes toward using the site for maintaining and self-managing their health. Thus healthy students interested in health maintenance as well as student managing a specific health conditions constitute the study's population. The scenarios required approximately 25 minutes to complete. After that, in the second phase, participants were asked to complete an online questionnaire. The questionnaire captured the participants' perceptions on all the study's constructs. Demographic questions (e.g., age, gender and health information website

experience) were also asked. The questionnaire was pre and pilot-tested prior to its administration. The relevant ethical clearances were received prior to data collection. To facilitate collection of responses, the questionnaire was distributed via the university's e-learning system. In order to increase the response rate, participants were given a small token of appreciation for their participation.

6.3.2 Measures

Constructs were operationalized based on previously validated instruments. Behavior intention (BI) was measured using scales developed by Bhattacherjee and Premkumar (2004). Given the online context, self-efficacy (SE) was measured using four items reflecting Internet self-efficacy adopted from Hsu and Chiu (2004). Perceived performance risk (RPE) was measured using the scale by Corbitt et al. (2003), Lee (2009) and Sun (2014). Perceived psychological risk (RPS) was measured using scales developed by Liao et al. (2009). Perceived time risk (RT) was measured by adapting scales developed by Featherman and Pavlou (2003) and Forsthe et al. (2006). In addition, three items developed by Ng et al. (2009) were used for measuring perceived severity (PSE). Three items developed by Goonawardene et al. (2013) were used to measure perceived susceptibility (PSU). Perceived benefit (PB) was measured by adapting the perceived usefulness scale developed by Bhattacherjee and Premkumar (2004). Three dimensions of trust (benevolence, ability and integrity) were measured using scales developed by Hwang and Lee (2012) and Thatcher et al. (2012). Demographic questions collected data on age and gender. Respondents were asked if they had used online health services before.

All items measured using a seven-point Likert-scale with anchors from "strongly disagree" to "strongly agree". Example measurement items for each construct are presented in the Table 20 below. The full set of items and questionnaires are outlined in Appendix F.

Constructs	Operationalization	Example Items
Behavior intention (BI)	3-item scale modified based on Bhattacherjee and Premkumar, 2004.	I intend to continue using this website to obtain health information.
Self-efficacy (SE)	4-item scale modified based on Hsu and Chiu, 2004.	I feel confident exchanging messages with others users in online discussion.
Perceived performance risk (RPE)	4-item scale modified based on Corbitt et al., 2003; Lee, 2009; Sun, 2014.	The health information site is risky, because it may not get what I want.
Perceived psychological risk (RPS)	3-item scale modified based on Liao et al., 2010.	The thought of using the health information site makes me feel psychologically uncomfortable.
Perceived time risk (RT)	2-item scale modified based on Featherman and Pavlou, 2003; Forsythe et al., 2006.	Using the website may waste my time.
Perceived severity (PSE)	3-item scale modified based on Ng et al., 2009.	Not having access to health information is a serious problem for me.
Perceived susceptibility (PSU)	3-item scale modified based on Goonawardene et al., 2013.	My general health is in bad condition.
Perceived benefit (PB)	4-item scale modified based on Bhattacherjee and Premkumar, 2004.	Using this website can be of benefit to me in managing my health.
Trust-Benevolence (TRB)	3-item scale modified based on Hwang and Lee, 2012.	I expect this website information provider has good intentions toward me.
Trust-Ability (TRA)	4-item scale modified based on Thatcher et al., 2012.	I believe this website information provider is effective in assisting and fulfilling my searching.
Trust-Integrity (TRI)	4-item scale modified based on Thatcher et al., 2012.	This website information provider is truthful in its dealings with me.

Table 20: Questionnaire Items for Chapter 6

6.4 Empirical Results

6.4.1 Participants

In total, 761 respondents completed the online scenarios and questionnaire. However, 58 responses were subsequently eliminated as they were missing a large number of data values or exhibited clear response patterns. Following the approach of Ragu-Nathan et al. (2008), the remaining sample (N=703) was randomly split into two datasets. Dataset 3a (350 cases) was used for scale refinement through principal components analysis. Dataset 3b (353 cases) was used as a holdout sample for partial least squares analysis of the measurement model and structural model. Because participants were allowed to choose between three online health information providers for the carrying out the tasks and gaining familiarity with the online health service context, an ANOVA test determined if trust, perceived barriers, self-efficacy, health beliefs, and the intention scores were

independent of the choice of provider. Results indicated that there were no significant differences along the items measuring trust, perceived barriers, self-efficacy, health belief variables or intention variables.

Table 21 reports demographic profile of the 703 useable responses. The results show that 46.5% of the respondents were male and 53.5% were female. Among them, 52.1% respondents have had online health information seeking experience. Most of the participants chose website 1 and website 2 to do the scenario tasks, only a few participants chose website3. An ANOVA test showed that there were no significant differences across the three website choices. The largest age group consisted of those aged 18-19 (85.1%). Moreover, most of the participants had a smartphone (84.6%), and 76.2% participants have more than 4 years computer experience.

Demographics	Category	Frequency	Percentage
Gender	Male	327	46.5
	Female	376	53.5
Age	18-19	598	85.1
	20-22	83	11.8
	23-25	9	1.3
	>25	13	1.8
Online health information experience	Yes	366	52.1
	No	337	47.9
Choice of online health information service provider	WebMD	286	40.7
	Health24	389	55.3
	MedlinePlus	27	3.8
	Missing	1	0.1

Table 21: Descriptive Statistics of Respondents' Characteristics for Chapter 6 (N=703).

6.4.2 Common Method Bias

A check for common method bias was carried out by performing Harman's one factor test (Podsakoff and Organ, 1986). According to this approach, common method variance is present if one factor accounts for the majority of the covariance in the dependent and independent variables. An exploratory factor analysis (EFA) of all of the scale items revealed factors explaining 68.3% (N=703) of the variance in the study's constructs, the first factor explaining 24.8%, and the last factor explaining 3.5% of the total variance. These results suggest that no single factor explained a majority of the variance, thus supporting that common method bias was not a threat for this study.

Furthermore, data was collected from an additional 41 responses from students not registered in the surveyed classes who were present at different times of the day in other computer laboratories across campus. Their responses was compared to those from the sample (N=703). No significant differences in responses was found, except for two items which given the number of items included in the instrument is likely due to chance. Thus it is not expected that the timing of the survey, or the laboratory condition or location had an influence on the results.

6.4.3 Scale Refinement

An initial principal components (PCA) analysis was carried out on dataset 3a to confirm the unidimensionality of the measures and to eliminate any inappropriate items (N=350). One item ISE3 was removed at this stage. Thereafter, a separate PCA was carried out on the hold out sample (dataset 3b N=353) and the total sample (N=703) to determine if the same factor structures are reproduced. The results indicated that both holdout sample and total sample produced identical factor structures with ISE3 eliminated, and all items loaded on their expected theoretical constructs.

6.4.4 Measurement Model Assessment

Reliability and validity for each measure was further assessed using Smart-PLS software package (version 2.0 M3) (Ringle et al., 2005). Two measurement and structural models were tested, one each using the holdout sample (dataset 3b: N=353), and one each using the whole dataset (N=703). The measurement model was tested with respect to internal consistency and discriminant validity. Table 22 reports item loadings, average variance extracted (AVE), composite reliability (CR) and alpha value for the measures. Item loadings are all above 0.70. Moreover, none of the items exhibited high cross-loadings on factors they were not intended to measure. AVE results ranged from 0.702 to 0.946 (full dataset) and 0.704 to 0.942 (holdout sample), which are above the recommended threshold value 0.5. Moreover, for scale reliability, all of the composite reliability (CR) values are above 0.875 and alpha values are above 0.734, which are above the acceptable values. Thus, the convergent validity is confirmed. The discriminant validity of the constructs was verfied by checking the square root of the AVE. As shown in Table 23,

the square root of AVE of each construct is larger than the inter-construct correlations, thus discriminant validity is confirmed.

	Items	Standardized Loading (353 vs. 703)		AVE (353 vs. 703)		CR (353 vs. 703)		Alpha Value (353 vs. 703)	
BI	BI1	.968	.971	.942	.946	.980	.981	.969	.971
	BI2	.974	.977						
	BI3	.970	.970						
ISE	ISE1	.885	.872	.704	.702	.877	.876	.790	.785
	ISE2	.868	.875						
	ISE4	.793	.762						
RPE	RPE1	.842	.839	.704	.705	.905	.905	.861	.861
	RPE2	.879	.869						
	RPE3	.832	.842						
	RPE4	.802	.807						
RPS	RPS1	.951	.925	.816	.825	.930	.934	.896	.896
	RPS2	.904	.920						
	RPS3	.853	.880						
RT	RT1	.807	.817	.780	.779	.875	.875	.742	.734
	RT2	.953	.943						
PSE	PSE1	.914	.908	.814	.808	.929	.926	.885	.881
	PSE2	.929	.921						
	PSE3	.903	.913						
PSU	PSU1	.896	.906	.817	.836	.931	.939	.889	.902
	PSU2	.913	.924						
	PSU3	.903	.913						
PB	PB1	.897	.905	.791	.815	.938	.946	.912	.924
	PB2	.913	.924						
	PB3	.868	.892						
	PB4	.880	.889						
TRB	TRB1	.916	.935	.841	.876	.941	.955	.905	.929
	TRB2	.938	.948						
	TRB3	.896	.926						
TRA	TRA1	.875	.883	.796	.825	.940	.950	.915	.929
	TRA2	.901	.919						
	TRA3	.899	.922						
	TRA4	.893	.909						
TRI	TRI1	.862	.880	.766	.804	.929	.943	.898	.919
	TRI2	.919	.918						
	TRI3	.870	.906						
	TRI4	.848	.882						

Table 22: Results of Reliability, Validity of the Construct Items for Chapter 6

	Mean (S.D.)	BI	ISE	RPE	RPS	RT	PSE	PSU	PB	TRA	TRB	TRI
BI	4.88 (1.56)	**.971**										
SE	3.95 (1.58)	.139	**.839**									
RPE	3.87 (1.43)	-.297	-.016	**.839**								
RPS	3.00 (1.57)	-.101	.032	.434	**.903**							
RT	3.59 (1.56)	-.353	-.047	.554	.363	**.883**						
PSE	4.10 (1.75)	.385	.108	-.064	.020	-.085	**.902**					
PSU	3.15 (1.71)	.217	.037	.113	.258	.105	.340	**.904**				
PB	5.67 (1.10)	.344	.116	-.208	-.152	-.278	.115	.036	**.890**			
TRA	5.50 (1.03)	.576	.112	-.283	-.148	-.348	.256	.032	.401	**.892**		
TRB	5.60 (1.07)	.459	.071	-.246	-.157	-.264	.187	-.043	.276	.714	**.917**	
TRI	5.37 (1.01)	.505	.123	-.333	-.182	-.340	.215	-.021	.309	.785	.753	**.875**

Table 23: Construct Correlations for Chapter 6 (Diagonal bold values are square root of AVE N=353) Notes: BI=Behavior intention; SE=Self-efficacy; RPE=Perceived performance risk; RPS=Perceived psychological risk; RT=Perceived time risk; PSE=Perceived severity; PSU=Perceived susceptibility; PB=Perceived benefit; TRA=Trust-Ability; TRB=Trust-Benevolence; TRI=Trust-Integrity.

6.4.5 Structural Model Assessment and Hypothesis Testing

After validating the measurement model, the hypotheses were tested by assessing the structural model in PLS. PLS is a variance based approach to modeling causal relationships among variables (Urbach and Ahlemann, 2010). PLS provides a good approximation of alternative covariance-based approaches to structural equation modeling in terms of final estimates (Gefen et al., 2011; Hair et al., 2011; Sun et al., 2013). Bootstrap method (1000 re-samples) was used to determine the significance of the paths within the structural model. “Bootstrapping is a nonparametric approach for estimating precision which creates N samples to obtain N sets of parameter estimates” (Bliemel and Hassanein, 2007). The analysis controlled for the effects of age, gender, online heath information service experience, computer experience and smart phone ownership. This is because previous study suggests that demographic characteristic may influence online health service adoption behavior (Ybarra and Suman, 2008). However, none of the control variables had the significant effect on behavior intention. The model explains 47.5% of the variance of intentions to use the online health information services. The model was also tested by using the full dataset 3 (N=703). The full data indicated that the R^2 value for consumer intention in online health information is 0.44, which means the model explains 44% of variance. The standardized path coefficients (β) results for analysis of holdout sample (dataset 3b: N=353) of model testing are depicted in Figure 21.

As seen in Figure 21, perceived susceptibility had a significant positive effect on intention (β=.160, t=3.941), thus H1 was supported. Perceived severity had a significant positive effect on intention (β=.173, t=3.736), supporting H2. Perceived barrier as a higher-order factor had a significant negative effect on intention (β=-.160, t=3.743), thus H3 was supported. Perceived benefit had a significant positive effect on intention (β=.107, t=2.225), hence, H4 was supported. However, self-efficacy has no significant effect on consumer intention (β=.046, t=1.078). Therefore, H5a was rejected. The moderation effect indicates that self-efficacy moderates the effects of perceived severity on behavior intention (β=-.121, t=2.612), although perceived susceptibility's effect was not moderated by self-efficacy (β=-.004, t=.062). Thereby, H5c was supported and H5b was rejected. Perceived susceptibility had a significant positive on perceived severity (β=.342, t=7.237) and perceived barriers (β=.172, t=2.894), thus supporting H6a and H6B. Trust as a higher-order factor had a significant positive effect on intention (β=.462, t=9.467) and on perceived benefits (β=.365, t=6.118), as well as a significant negative effect on perceived barriers (β=-.368, t=8.221). Hence, H7a, H7b, and H7c were supported. Table 24 summarizes the results of this study.

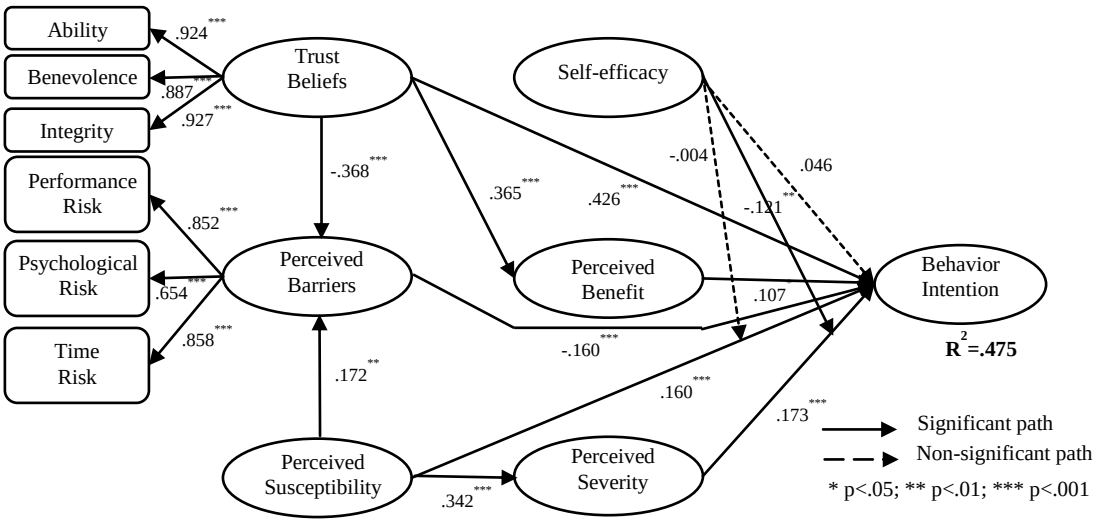


*Figure 21: PLS Test of Research Model for Chapter 6 (N=353; * p<.05; ** p<.01; *** p<.001)*

Sample Size	Hypothesis (path)	Path coefficient	t-Value	Supported
N = 353	H1	.160	3.941***	Yes
	H2	.173	3.736***	Yes
	H3	-.160	3.743***	Yes
	H4	.107	2.225*	Yes
	H5a	.046	1.078	No
	H5b	-.004	.062	No
	H5c	-.121	2.612**	Yes
	H6a	.342	7.237***	Yes
	H6b	.172	2.894**	Yes
	H7a	.462	9.467***	Yes
	H7b	.365	6.118***	Yes
	H7c	-.368	8.221***	Yes
N = 703	H1	.132	4.034***	Yes
	H2	.188	5.692***	Yes
	H3	-.175	5.884***	Yes
	H4	.154	4.564***	Yes
	H5a	.060	1.83	No
	H5b	-.01	.191	No
	H5c	-.085	2.481*	Yes
	H6a	.359	10.254***	Yes
	H6b	.124	2.871**	Yes
	H7a	.387	11.132***	Yes
	H7b	.340	8.465***	Yes
	H7c	-.357	10.278***	Yes

Table 24: Summary of Results for Chapter 6 (p<.05; ** p<.01; *** p<.001)*

6.5 Discussion

This chapter aimed to examine to extend our understanding of the factors influencing individuals' use of online health information services. To do so, the HBM and extended valence framework were integrated and empirically tested. Data was collected in a laboratory setting from a sample of university students. Results have several important implications.

First, both perceived susceptibility and perceived severity had a significant positive impact on consumer acceptance of online health information services. The results show that the use of online health information services is a health-related behavior and that, consistent with the HBM, health threats are important to this behavior.

Second, outcome expectancies (perceived benefit and perceived barriers) do have a significant impact on behavioral intention. Perceived benefit positively influences intention, while perceived barriers negatively impact intention. This finding is consistent with theory of HBM and extended valence framework i.e. the more barriers an individual perceives,

the less likely they will form positive behavioral intentions. The results suggest that online health information service providers should minimize barrier perceptions and maximize perceived benefits to promote positive intentions towards using online health information. This implies that consumers value information that will help them improve their performance in managing their health. Importantly, performance risk, psychological risk and time risk represent three barriers. Online health information providers should understand the multi-dimensional nature of risk and that performance, psychological and time losses are important barriers to consumers. This chapter improved on the measurement of performance risk, and considered it also with other risk perceptions to provide a better understanding of the effects of risk than was revealed in Chapter 5.

Third, it is worth noting that self-efficacy had a non-significant impact on consumer intentions. This is not consistent with HBM although a non-significant relationship between self-efficacy and intention has been found in other health behavioral studies (e.g., Wong and Tang, 2005). This can be explained by the possibility that younger online consumers (who constituted the study sample) may possess greater Internet self-efficacy (which was examined in the model), thereby making this factors less relevant to their acceptance of online health services than might be the case in a broader consumer sample (McKinley and Ruppel, 2014).

Self-efficacy was found to negatively moderate the effect of perceived severity on behavioral intention toward online health information services. Thus when individuals have low self-efficacy, perceived severity is more important to their behavioral intentions. Thus for individuals with lower self-efficacy, it is only when confronted by serious clinical or social consequences of a health condition are they able to overcome lower self-efficacy to engage in the use of the online service. Others have also commented on the complicated nature of self-efficacy's moderating effects on online health behavior McKinley and Ruppel's (2014)[10]. It was not however found self-efficacy to moderate the relationship between perceived susceptibility and behavioral intention. This result is inconsistent with Carpenter's (2010) suggestion. Perceived susceptibility did however have a significant direct effect on perceived barriers. Moreover, participants who believe themselves more vulnerable to a health threat are more likely to be concerned with the

[10] They found that when online health information seekers suffer serious mental health problems, and possess greater self-efficacy, they may be less motivated to use health information service online.

risks associated with using the online service. Severity was also shown to partially intervene in the effects of susceptibility. The serious of the health condition and not just vulnerability to the condition is important to behavior.

Fifth, it was found that trust had the strongest direct impact on behavioral intention. This finding supports the view that trust is important to consumer acceptance of online health services. Thus the use of online health services is driven by typical e-service concerns for trust in the ability, benevolence and integrity of the online provider. This is a particularly useful finding for the service providers. In addition, consumer trust has a strongly significant negative effect on perceived barriers. This supports the arguments that trust lowers risks as barriers to consumer acceptance of e-services (e.g., Pavlou, 2003; Gefen et al., 2003a). Perceived benefit was influenced by trust beliefs. This result indicated that consumers only believe they will gain benefits from a trusted health information provider. The findings are consistent with the extended valence framework.

Taken together, results suggest that the use of online health information services are both a health related behavior influenced by perceptions of susceptibility and severity and an e-service usage behavior influenced by trust, perceived benefits and perceived barriers.

6.6 Implications and Conclusion

6.6.1 Implications for Theory

From a theoretical perspective, this chapter has made the following theoretical contributions. First, it has extended the valence framework to a non-commercial e-service context. More specifically, empirically validated this theoretical framework in the online health information service area. Previous applications have focused on e-commerce or mobile commerce (e.g., Kim et al., 2009a; Lu et al., 2011; Lin et al., 2014). To the best of my knowledge, there are no studies adopting the extended valence framework to study online health behaviors.

Second, unlike many of previous studies of HBM that examine general health behaviors (e.g., Marlow et al., 2009; Kim et al., 2012), the chapter has shown it relevant also to the study of online health information seeking, and extended recent work (McKinley and Ruppel, 2014).

Results indicate that health beliefs and the valence framework are two fundamental aspects that health information seekers take into account when making their decisions about online health services. To my best knowledge, no other study has integrated HBM and extended valence framework to study online heath behaviors.

Third, the results of this study highlight the role of trust and barriers in consumer acceptance of online health information service context. More specifically, the chapter has identified the multifaceted barriers that include performance risk, psychological risk and time risk. While, trust beliefs include online service provider's ability, benevolence and integrity. Moreover, it is shown that trust is not only salient in commercial e-service contexts but also extends to in the non-commercial online health services context. The finding that trust and barriers can be reliably modeled as a higher-order construct can help future researchers to more comprehensively capture these constructs in the e-service context.

6.6.2 Implications for Practice

This study also has several important practical implications. First, the study founded that trust has the strongest directly effects on behavioral intentions. The importance of three dimensions of trust in this study namely, online health services providers' ability, benevolence, and integrity can help practitioners better understand the formation of trust. Practitioners need to ensure that they increase provider-based trust by building their reputation as a reliable, competent provider of health information and that they are seen to do so in a manner that is in the best interests of consumers rather than, for example, pharmaceutical companies or commercial advertisers on their sites.

Second, the salient and negative effect of perceived barriers on intention implies that barriers play an important role in dampening consumers' online health information acceptance behavior. Perceived barriers include performance risk, psychological risk and time risk that negatively affect online health information acceptance. This suggests that when online health service providers promote their health information to facilitate the potential online health information seekers, they should countermeasures those barriers. For example, online health information service provider may reduce performance risk by providing evidence of sources used to compile the health information, mitigate time loss by providing a friendly interface, good search navigation and clear categories to index

information, and through the provision of simple and actionable information may help break the psychological anxieties associated with site use.

Third, perceived benefits, perceived susceptibility and perceived severity are other important factors influencing consumer behaviors. Individuals are more likely to seek out health information when they perceive their general health as poorer and have a need for access to health information. This finding can help service providers to understand the profiles of consumers that may come to interact with their sites and how perceived health threats as well as the need for improved self-management are important to their motivation. Health sites should empower self-management in a manner that allows for better decision making based on differing levels of susceptibility and severity e.g., through advanced search options.

6.6.3 Limitations and Future Research

It is important to note some limitations of the study. First, the sample is drawn from a university population and this is a recognized threat to the generalizability of the conclusions to broader consumer populations, future research may wish extended the study using other samples such as: adults with chronic diseases. Second, some of the tasks may not be applicable to all consumers and may have created bias in their perceptions (Lanseng and Andreassen, 2007). Third, data was also cross-sectional and therefore causal inferences can only be made with reference to theory. Future studies may wish to adopt longitudinal designs and consider the temporal changes in extended valence framework as well as health belief behavior towards online health services. This is addressed in past in upcoming Chapters 7 and 8. Moreover, future research may wish to conduct a longitudinal study to consider whether trust belief and health beliefs change over time. For example, some researchers have argued that earlier beliefs may influence later beliefs in consumer acceptance of new technology (e.g., Bhattacherjee and Premkumar, 2004; Venkatesh et al., 2011; Hsu et al., 2006).

6.6.4 Conclusion

This chapter develops a research model to understand consumer acceptance of online health information services by integrating health belief model (HBM) and extended

valence framework. A laboratory-based experimental scenarios research design was used to collect data from a sample of 703 university students in South Africa. To test hypotheses, trust and perceived risk barriers were modeled as higher-order constructs. The multi-dimensional trust construct was found to have the strongest effect on consumer acceptance. Perceived risk barriers were also found to have a direct significant negative effect on consumer acceptance. Furthermore, health belief variables such as perceived susceptibility and severity were confirmed as important to consumer acceptance of online health information services, and perceived susceptibility has a significant positive effect on perceived severity. Self-efficacy had non-significant effects on intentions; however, it was found to moderate the effect of perceived severity on consumer behavioral intentions. The model explains 47.5% of the variance of intentions to use the online health information services. Results have helped identify the relative salience of HBM and extended valence framework in consumer acceptance of online health information services and have important implications for practice.

The next section of this thesis contributes to overcoming limitations of past e-service research by adopting longitudinal investigations of trust and risk in e-services.

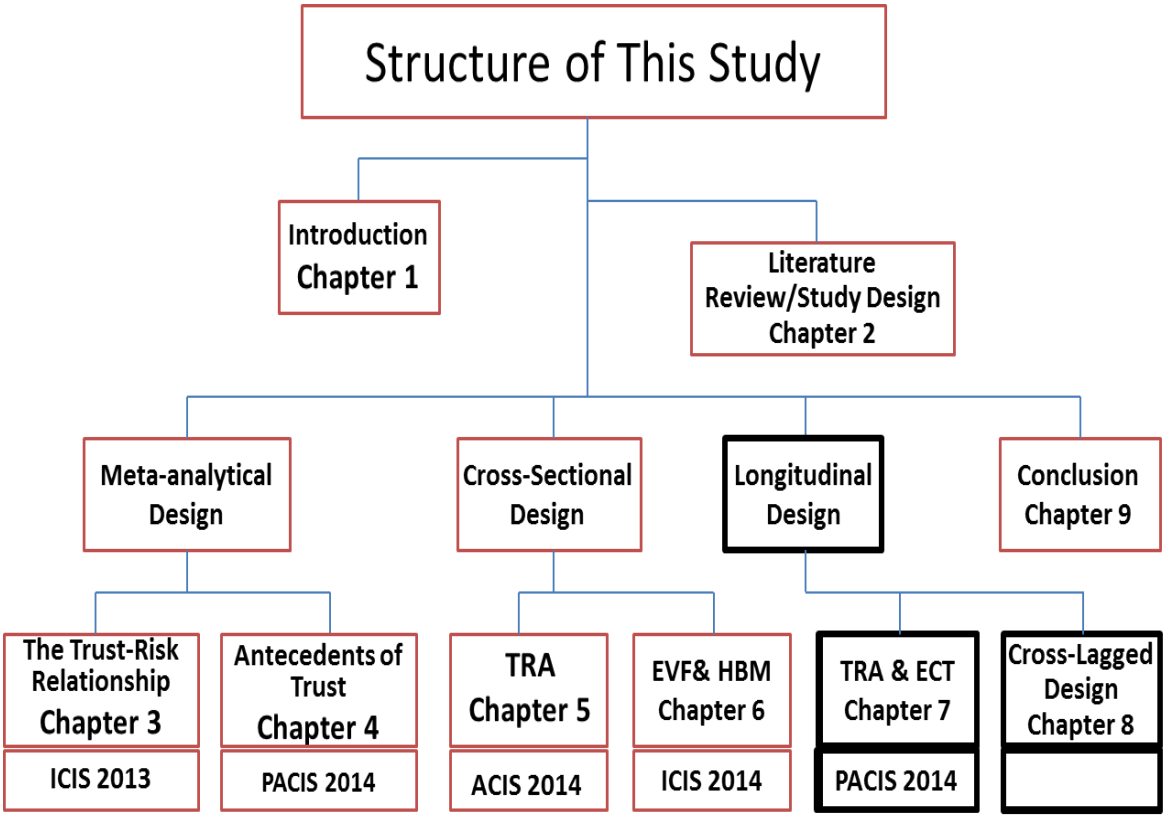


Figure 22: Longitudinal Studies

Chapter 5 developed a research model of the effects of trust, perceived risk and perceived usefulness on consumer acceptance of online health information services. While Chapter 6 developed a research model by integrating Health Belief Model (HBM), and Extended Valence Framework to explain user acceptance.

These past two chapters have not however considered the potentially dynamic nature of trust beliefs and risk, and how early-stage trust and risk might influence later-stage adoption and use. To address these gaps, the next chapter (Chapter 7) draws on the theory of reasoned action and expectation-confirmation theory to carry out a longitudinal study of trust and risk in e-services. Moreover, to better address the causality between trust and perceived risk, Chapter 8 presents a structural equation modeling cross-lagged panel design.

Although Chapter 3 through the MASEM has provided some advancement towards understanding causal relationships, Chapter 3 did not fully address the causal question. Therefore, the problem is revisited.

CHAPTER 7: A LONGITUDINAL STUDY OF TRUST AND PERCEIVED USEFULNESS IN CONSUMER ACCEPTANCE OF AN E-SERVICE: THE CASE OF ONLINE HEALTH SERVICES

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7.1 Introduction

Previous chapters indicated that because e-services offer consumers great promise it is important to understand the adoption of such services and the role of trust and risk in acceptance of e-services. However, initial adoption of e-service by consumers is only the first step toward realizing their success. Their long-term viability will depend on their continued usage by consumers (Bhattacherjee, 2001). Examining the long-term viability of new e-service contexts therefore requires a dynamic and longitudinal focus on consumer beliefs, attitudes and usage behaviors rather than simply their initial intentions (Venkatesh et al., 2011). Previous studies have confirmed the need to consider dynamic beliefs in information technology usage and e-commerce adoption (e.g., Bhattacherjee and Premkumar, 2004; Hsu et al., 2006; Venkatesh et al., 2011; Lin et al., 2014). Few studies have however given consideration to the dynamic nature of consumer beliefs in online health services adoption.

The purpose of this chapter is to address this need by determining the extent to which consumers' beliefs toward e-service usage change over time, and examining how these beliefs come to influence their intentions and behaviors at both early and later stages of use. This chapter focuses on two important consumer beliefs, namely trust and perceived usefulness. As per previous chapters, trust is defined as a consumer's confidence in the e-service provider's reliability, integrity, dependability, and ability to deliver on expectations (Bhattacherjee, 2002; Pavlou, 2003). Perceived usefulness has been identified across a number of technology contexts as a cognitive belief salient to

technology acceptance (Davis et al., 1989). It is defined as “the degree to which a person believes that using a particular system would enhance his or her job performance” (Davis, 1989). Perceived usefulness has been found important in e-service contexts such as e-commerce (Pavlou, 2003; Gefen et al., 2003a), mobile payment service (Chandra et al., 2010), online banking (Bhattacherjee, 2001), and also as relevant to the dynamic study of system usage (Bhattacherjee and Premkumar, 2004).

This chapter first develops a research model by drawing on the theory of reasoned action (TRA) to examine the effects of trust and usefulness perceptions on consumers’ initial acceptance and usage behaviors. Moreover, it draws on expectation confirmation theory (ECT) to examine how temporal changes in these consumer beliefs influence their later stage continuance intentions.

The model was empirically validated using data collected in a longitudinal study of consumer use of online health information services. Previous chapter explained that the Web has become an important health information dissemination channel (Yi et al., 2013) that can help consumers to engage in the self-management of their or their family's health (Harbour and Chowdhury, 2007). Overcoming the limitations of cross-sectional designs in the study of online health service usage is important. Understanding long term acceptance and use of such services is important to the realization of their potential and therefore deserves consideration.

The rest of the paper proceeds as follows. In the next section, the theoretical background for this chapter is presented. Next, the research model and hypotheses are developed. Then, the research methodology and approach are outlined. The fifth section presents empirical results and the final section discusses the findings and the contributions.

7.2 Theoretical Background

Two theories underpin the longitudinal investigation. The first, the theory of reasoned action (TRA) underpins the study of early e-service acceptance. This theory is well described elsewhere (Venkatesh and Morris, 2000; Pavlou and Fygenson, 2006) and has been used to explain individual initial acceptance of IT (Komiak and Benbasat, 2006). The second theory underpinning the model is expectation-confirmation theory (ECT). ECT is used to explain post-purchase consumer satisfaction and behaviors (Oliver, 1980), and

has been used in prior studies to investigate later stages of IT use (Bhattacherjee and Premkumar, 2004; Limayem et al., 2007; Bhattacherjee and Lin, 2014). Both of the theories are expanded upon next.

7.2.1 Theory of Reasoned Action (TRA)

In the past three decades, numerous theoretical models of e-service acceptance have been proposed. Among them, the theory of reasoned action (TRA), the theory of planned behavior (TPB) and technology acceptance model (TAM) have frequently been applied to provide an understanding of e-services adoption (e.g., Featherman and Pavlou, 2003; Leonard et al., 2004; Yousafzai et al., 2010). The TRA (Ajzen and Fishbein, 1980) has been well established in social psychology discipline. It is one of the most widely used models for explaining individual behavior (see Figure 16). It predicates a belief–attitude-intention-actual behavior model. According to the TRA, actual behavior is influenced by behavioral intention, while behavioral intention is determined by attitude and subjective norm. Subjective norm is defined as "the person's perception that most people who are important to him think he should or should not perform the behavior in question", attitude is defined as "an individual's positive or negative feelings (evaluative affect) about performing the target behavior" (Fishbein and Ajzen, 1975). Furthermore, behavioral beliefs are proposed to influence attitude and normative beliefs to influence subjective norm. However, TRA does not specify the specific behavioral beliefs that come to influence attitude. Consequently, researches drawing on TRA are required to identify the beliefs considered appropriate to employ in their research specific context (Davis et al., 1989; Yousafzai et al., 2010). In the context of e-services, trust and perceived usefulness are considered important behavioral beliefs with the potential to influence consumer adoption of e-services. Attitude has often been omitted in applications of the theory in order to derive more parsimonious research models (e.g., Kim et al., 2009a; Bhattacherjee and Lin, 2014).

7.2.2 Expectation-Confirmation Theory

Expectation confirmation theory (ECT) is used to explain consumer satisfaction, post-purchase behaviors and loyalty (Oliver, 1980). Bhattacherjee (2001) adopted ECT to develop an IS continuance model to explain user post-adoption behavior. ECT suggests

that consumers have expectations before making a purchase/adoption decision. After their period of use, consumers will compare performance perceptions with their initial expectations. These expectations may be confirmed or disconfirmed. Confirmation of expectation is defined as a user's perception of congruence between their initial expectations and observed performance (Bhattacherjee, 2001). A positive confirmation results in consumer satisfaction, which leads to repurchase intentions. Bhattacherjee and Premkumar's model (2004) also posits that modified beliefs (e.g., PU) are themselves a function of the usage experience and that these modified beliefs can in turn influence continued and on-going usage. The model is illustrated in Figure 23.

The post-acceptance ECT model has been applied in contexts such as online shopping (Hsu et al., 2006; Kim et al., 2009a), WWW usage (Limayem et al., 2007), e-government (Venkatesh et al., 2011), and social networking service (Islam and Mäntymäki, 2011). Past research has also attempted to extend the model through inclusion of various additional beliefs as predictors of continuance intentions. For example, Venkatesh et al. (2011) extended the model by incorporating effort expectancy, social influence and facilitating conditions (adopted from UTAUT model). Trust may also serve as a relevant post-usage belief (Venkatesh et al., 2011).

Limayem et al. (2007) also extended Bhattacherjee's model by incorporating habit as a predictor on continuance intention (see Figure 24). Habit is defined as "the extent to which people tend to perform behaviors automatically because of learning" (Limayem et al., 2007). Past study suggests "when IT use is habitual, it ceases to be guided by conscious planning and is instead triggered by specific environmental cues in an unthinking or automatic manner" (Bhattacherjee and Lin, 2014).

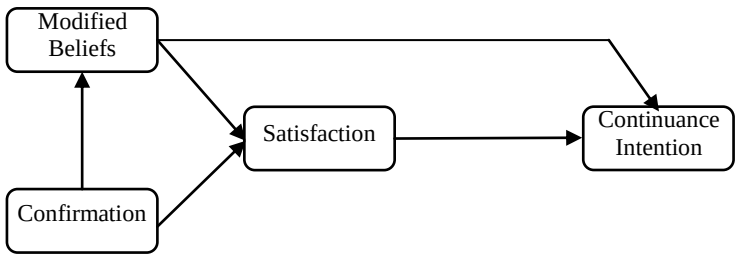


Figure 23: A Post-Acceptance Model of IS Continuance (adapted from Bhattacherjee, 2001)

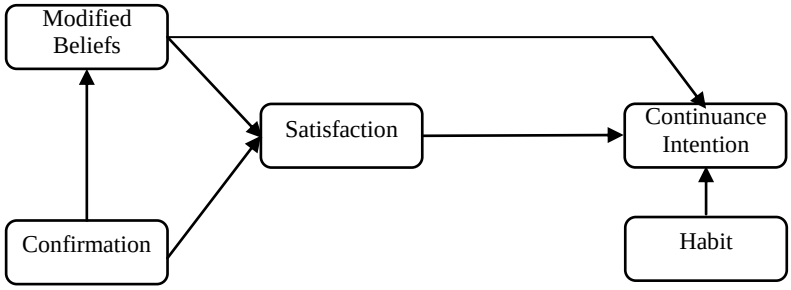
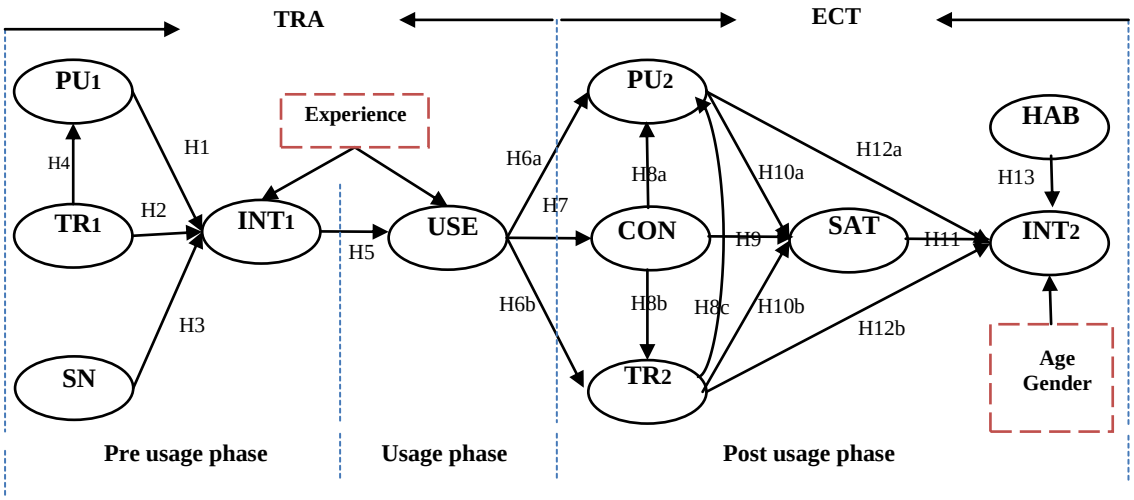


Figure 24: Habit in IS Continuance (adapted from Limayem et al., 2007; Chiu et al., 2010)

7.3 Model Development and Hypotheses

Drawing on both the TRA and ECT theories, this chapter's research model is derived and is illustrated in Figure 25.



TR1: Trust in provider at time 1; TR2: Trust in provider at time 2; CON: Confirmation; PU1: Perceived usefulness at time 1; PU2: Perceived usefulness at time 2; INT1: Intention at time 1; INT2: Continuance intention at time 2; SN: Subjective norm; HAB: Habit; SAT: Satisfaction; USE: Actual usage.

Figure 25: Longitudinal Model of Trust and Perceived Usefulness

The model incorporates both trust and perceived usefulness as behavioral beliefs that can influence consumers' intentions at both the early initial usage stage and, once modified based on the usage experience, at later stages of use. TRA underpins the early, initial usage phase whilst ECT underpins the later usage phase. The underlying hypotheses of the model are discussed next.

7.3.1 The Link between Beliefs and Early-Stage Intentions and Use

TRA explains the relationships between beliefs, subjective norms, intentions and actual usage. As reflected in Figure 25, trust and perceived usefulness were examined as important behavioral beliefs. Perceived usefulness (PU) refers to the degree to which a consumer believes that using the e-service would enhance his/her performance or effectiveness. Past studies have empirically illustrated that PU influences online consumer behavior (e.g., Pavlou, 2003; Gefen et al., 2003a). In the online health services context, PU is defined as a consumer's belief that an online health service will be of benefit and will enhance their effectiveness in self-management of their health (Lanseng and Andreassen, 2007).

Trust in the e-service provider is defined as the consumer's confidence in the integrity and dependability of the provider (Rotter, 1967; Bhattacherjee, 2002; Pavlou and Gefen, 2002). Past research has given attention to the effects of initial trust on e-commerce acceptance (e.g., McKnight et al., 2002; Gefen, 2002b). The more trusted e-service provider is more likely to be perceived as offering accurate and useful information that is in the best interests of the consumer. Trust can reduce uncertainty and provides expectation for a satisfactory transaction experience (Pavlou, 2003).

Moreover, consumers are likely to perceive the potential for benefits only if the online health information provider is trusted as a reliable and competent provider of health information (Lanseng and Andreassen, 2007). Thus the beliefs of trust and perceived usefulness are inter-related.

Figure 25, also reflects the influence of subjective norm. According to TRA, consumers are likely to form positive or negative intentions towards behavior based on how they believe significant others will view such behavior (Bhattacherjee and Lin, 2014). This normative influence arises from peers or other significant people e.g., friends and family.

Taken together it is hypothesized that:

H1: Perceived usefulness at t1 has a positive effect on consumers' early-stage behavioral intentions toward online health information services.

H2: Trust at t1 has a positive effect on consumers' early-stage behavioral intentions toward online health information services.

H3: Subjective norm at t1 has a positive effect on consumers' early-stage behavioral intentions toward online health information services.

H4: Trust at t1 has a positive effect on the perceived usefulness of online health information services at the early usage stage.

According to TRA, actual behavior is determined by behavioral intention. Past studies have shown IT usage intentions correlate with actual usage behaviors. Therefore, it is further hypothesized that:

H5: Behavioral intention at t1 has a positive effect on the subsequent actual usage of online health information services.

7.3.2 The Link between Actual Usage and Later-Stage Beliefs and Confirmation

Past studies posit that the usage experience will modify beliefs and behavioral intentions (e.g., Bajaj and Nidumolu, 1998; Kim and Malhotra, 2005; Maier et al., 2012). Hence, a consumer's actual usage experience with the e-service was expect to influence (or update) their beliefs, namely perceived usefulness and trust. According to ECT, the usage experience will also provide the basis for the confirmation of initial expectations. Confirmation will in turn support belief modification (Venkatesh et al., 2011). In other words, users are theorized to revise their cognitions based on the degree to which their actual experience exceeded or fell short of their initial expectations. In this chapter it is thus expected that usage and confirmation will influence perceived usefulness and trust beliefs at post online health service usage stage. Therefore, it is further hypothesized that:

H6a: Degree of actual use has a positive effect on perceived usefulness at t2.

H6b: Degree of actual use has a positive effect on consumer trust at t2.

H7: Degree of actual use has a positive effect on confirmation of expectation at t2.

H8a: Confirmation of expectation has a positive effect on perceived usefulness at t2.

H8b: Confirmation of expectation has a positive effect on trust at t2.

In addition, empirical studies have found that, at the post e-service usage stage, perceived usefulness is also determined by trust (Gefen et al., 2003a). Hence:

H8c: Trust at t2 has a positive effect on perceived usefulness at t2.

7.3.3 The Link between Later-Stage Beliefs, Confirmation, Satisfaction and Continuance Intention

The influences of modified beliefs and expectation confirmation on satisfaction were further hypothesized in Figure 25. ECT posits that satisfaction is determined by consumers' confirmation of expectations from initial usage (Bhattacherjee, 2001). This is because consumers may compare early-usage expectations with their actual usage experience. If the initial expectations are confirmed then according to ECT they will be more satisfied with the systems or service. Hsu et al. (2006) found that confirmation has a positive effect on consumer's satisfaction of online shopping usage. Hence:

H9: Confirmation of expectation has a positive effect on consumers' satisfaction with online health information use.

Moreover, Bhattacherjee (2001) argues that beliefs also influence a user's post-acceptance affects such as their satisfaction. It is therefore hypothesized that:

H10a: Perceived usefulness of online health usage at t2 has a positive effect on consumer satisfaction with online health information service use.

H10b: Consumer trust beliefs at t2 have a positive effect on consumer satisfaction with online health information service use.

Bhattacherjee's (2001) IS continuance model proposes satisfaction as one of the primary antecedents of consumer continuance intentions. This is because, in the post-usage phase, users may rely not only on their cognitive beliefs but also on their affective experience when forming subsequent behavioral responses (Bhattacherjee and Lin, 2014). This affective experience is captured in the satisfaction construct. Past empirical studies support the effects of satisfaction on consumers' continuance intentions in the e-

service context (e.g., Hsu et al., 2006; Lee and Kwon, 2011; Zhao and Lu, 2012). Hence it is hypothesized that,

H11: Satisfaction with online health information service use has a positive effect on continuance intentions.

Prior work (Bhattacherjee and Premkumar, 2004; Venkatesh et al., 2011) posits that intentions are also directly determined by consumer's post-usage evaluated beliefs. It is therefore expected that consumers' continuance intentions are also determined by evaluated (modified) beliefs of trust and perceived usefulness. It is therefore, further hypothesized that:

H12a: Perceived usefulness of online health usage at t2 has a positive effect on continuance intentions.

H12b: Consumer trust beliefs at t2 have a positive effect on continuance intentions.

7.3.4 The Role of Habit

Habit plays an important role in predicting IT usage behavioral (Limayem et al., 2007; Ko 2013). Limayem et al. (2007) defined habit as "the extent to which people tend to perform behaviors (use IS) automatically because of learning". Empirical evidence supports habit as having a direct effect on usage Intention (e.g., Chiu et al., 2010; Escobar-Rodríguez and Carvajal-Trujillo, 2014). Habit in web usage can help consumers become more familiar with web-based services. Once consumers have developed habits of browsing the webs, they are more like to form positive intention to adopt e-services. Therefore, it is expected that even in the online health information context, a consumer's web usage habit could have a positive effect on their continued usage intention. Hence:

H13: Habit has a positive effect on continuance intentions.

7.3.5 Control Variables

Figure 25 identifies past online health service experience as a necessary control variable for early behavioral intention and for actual use. This is because social psychology literature suggests that past behavior may influence intentions and actual use (Bajaj and

Nidumolu, 1998; Kim and Malhotra, 2005). For instance, Shim et al. (2001) found that prior experience with the e-service predicts consumer behavior. Consumers who have not used online health information before may have a lower likelihood of future acceptance and use. In the online heath information context, gender and age differences have been considered to shape consumer's online health service adoption behavior (Ybarra and Suman, 2008). Therefore, age and gender are considered as additional controls in the later usage phase of the model.

7.4 Research Methodology

To test this chapter's research model and hypothesis, a longitudinal research design was carried out. Through a longitudinal design the dynamic nature of the study's focal substantive constructs can be examined (Berrington et al., 2006). Longitudinal studies are rare in IS research (see Appendix O for some notable examples). A longitudinal design requires the researcher to collect repeated measures over time from the same units of observation. Doing so in this study allowed for the change in trust and usefulness to be described over time, as well as to estimate the hypothesized model (Figure 25).

Data collection followed a longitudinal multiple-phase controlled laboratory design similar to that adopted in Zahedi and Song (2008). The phases of the longitudinal study are described below and illustrated in Figure 26. Phase 1 produced dataset 1 and phase 2 produced dataset 2 (see Figure 9 in Chapter 2).

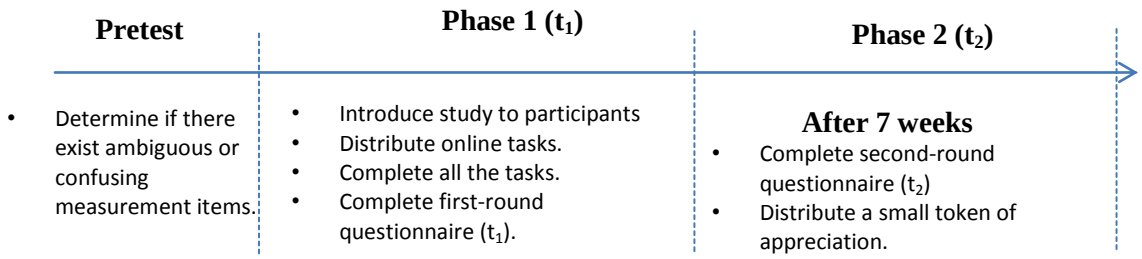


Figure 26: Longitudinal Data Collection Schedule

7.4.1 Longitudinal Study Design

The data collection was carried out a large national university in South Africa using a sample of university students who represent an important portion of online consumers (Kim et al., 2008).

Data collection commenced with a pre-test to determine if there were any ambiguous or confusing measurement items in the questionnaire. The pre-test was carried out using a convenience sample of students. The pre-test was followed by the first phase of the study where participation from the larger student population was invited.

7.4.1.1 Phase 1(t1)

The data for phase 1 (t1) has already been introduced in Chapter 5. As explained, phase 1 was conducted in a computer laboratory setting and involved a number of steps. Participants were first introduced to the purpose of this study and then given the opportunity to choose between four popular health informatics websites. The websites namely WebMD, MedlinePlus, Health24 and Mayoclinic were all general medical, health and wellness sites accessible to consumers with optional registration. These four health information websites have different features and information content. Allowing participants the opportunity to select their own website of interest increases the voluntary nature of the e-service usage process (Zahedi and Song, 2008). Participants were asked to browse their chosen health website for information on a variety of issues in a number of general health categories that included diet and nutrition, exercise and fitness, and were asked to complete specific tasks related to the search for health information. The tasks were adopted and redesigned from van Deursen's (2012) study. The use of tasks within a controlled laboratory design is used to promote variability in use and attitudes and to provide participants a foundation for their initial perceptions. Participants were then asked to complete the first-round questionnaire. The questionnaire captured the participants' trust beliefs, their perceptions of site usefulness, subjective norms and their future usage intentions.

7.4.1.2 Phase 2 (t2)

After seven weeks, participants were asked to return to the laboratory. Bhattacherjee and Premkumar (2004) considered seven weeks to be an acceptable time period for longitudinal usage studies involving consumers. Participants were asked to then complete the second-round survey which focused on their current perceptions, beliefs and intentions. Both phase 1 (dataset 1) and phase 2 (dataset 2) surveys were administered to the student participants through the university's e-learning system.

7.4.2 Measurement Instrument

All constructs in the research model were operationalized based on previously validated instruments. Besides the actual usage (USE) variable, all constructs were measured using multi-item Likert-scales with anchors ranging from 1="strongly disagree" to 7="strongly agree". Example questionnaire items for measuring the constructs are presented in Table 25. For time 2, the measurement items for trust, usefulness and intentions were the same as in phase 1 to facilitate analysis of the dynamic nature of the beliefs. The measures for satisfaction and confirmation in the phase 2 instrument are also highlighted in Table 25 together with the measures for actual use.

The phase 1 and phase 2 questionnaires appears in Appendix G. As explained previously, the study was approved by ethics committee and institutional permission was obtained prior to data collection (see Appendix A and B).

Constructs	Operationalization	Example Items	Phase 1	Phase 2
Perceived Usefulness (PU)	4-item scale modified based on Bhattacherjee and Premkumar (2004).	Using this website can be of benefit to me in managing my health.	✓	✓
Trust in Provider (TR)	4-item scale modified based on Pavlou and Gefen (2004).	This website information provider is in general trustworthy.	✓	✓
Continuance Intention (INT)	8-item scale modified based on Bhattacherjee and Premkumar (2004); Kim et al. (2009)	I intend to continue using/use this website to obtain health information.	✓	✓
Subjective Norms (SN)	3-item scale modified based on Venkatesh et al. (2011).	People who influence my behavior think that I should use health infomatics website.	✓	
Actual Usage (USE)	2-item scale modified based on Suh and Han (2002).	Over the past 7 week's period, how often did you use the health website? (Not at all - Several times a week).		✓
Confirmation (CON)	4-items item scale modified based on Bhattacherjee and Premkumar (2004).	My experience with using this website was better than what I had expected.		✓
Satisfaction (SAT)	4-items item scale adapted from Bhattacherjee and Premkumar (2004).	How do you feel about your overall experience of the surfing through this website? 1)very satisfied, (2) pleased, (3) contented, (4) delighted		✓
Experience	Dichotomous yes/no scale	Before participating in this study did you have any previous experience with online health website?	✓	
Habit (HAB)	3-item scale modified based on Limayem et al. (2007).	Using the Web has become automatic to me.		✓

Table 25: Phase 1 and Phase 2 Questionnaire Items for Chapter 7.

7.5 Empirical Results

7.5.1 Participants

At time t1 161 useable responses were obtained. At time 2 these 161 participants were invited to do the second round survey. In total, 74 respondents completed the second round survey. This suggests an attrition rate of approximately 54%. Four respondents were subsequently eliminated as they were missing a large number of data values. The final usable longitudinal data was 70 respondents. An anonymous user ID was used to match t1 and t2 data. The demographic profile of the respondents is reported in table 26. The respondents aged between 18 and 22 (81.3%). Among them 58.6% were male, 41.4%

were female. Among the respondents, 60% had previous online health information experience. Most of the participants chose website 1 (44%) and website 2 (34%) to do the scenario tasks (see Table 26).

Demographics	Category	Frequency	Percentage (%)
Gender	Male	41	58.57
	Female	29	41.43
Age	18-19	13	18.57
	20-22	44	62.86
	23-25	10	14.29
	>25	3	4.29
Online health information experience	Yes	42	60.00
	No	28	40.00
Choice of online health information service provider	WebMD	31	44.29
	Health24	24	34.29
	Mayoclinic	3	4.29
	MedlinePlus	12	17.14

Table 26: Descriptive Statistics of Respondents' Characteristics for Chapter 7

7.5.2 Data Analysis

The analysis was carried out in three stages. First, the data was evaluated for common method bias. Second, it was examined whether the intentions and beliefs (trust and usefulness) change over time by comparing the construct means at t1 and t2. After that, the measurement model and structural model were tested by using Smart-PLS software package (version 2.0 M3) (Ringle et al., 2005).

7.5.2.1 Common method bias

In addition to the use of a longitudinal design, which itself can reduce common method bias associated with cross-sectional designs (Premkumar and Bhattacherjee, 2008), data was also checked for common method bias by performing Harman's one factor test (Podaskoff and Organ, 1986). According to this approach, common method variance is present if one factor accounts for the majority of the covariance in the dependent and independent variables. An exploratory factor analysis (EFA) of all of the time 1 scale items revealed factors explaining 78.1% of the variance, the first factor explaining less than 50%. For time 2, EFA revealed factors explaining 76.4% of the variance, the first factor did not explain more than 50%. These results suggest that no single factor

explained a majority of the variance, thus supporting that common method bias was not a threat for this study at either t1 or t2.

7.5.2.2 Comparison of construct means

Past work into IT usage has considered whether user beliefs change over time (e.g., Bhattacherjee and Premkumar, 2004; Venkatesh et al., 2011; Hsu et al., 2006). Those researchers have argued that earlier beliefs serve as an anchor for later stage evaluations. This is because later-stage judgments are not made from scratch but are formed from earlier judgments (Kim and Malhotra, 2005). Others however have argued that early-stage beliefs wear off over time, and are less likely than actual user experiences to influence later-stage beliefs (Szajna and Scamell, 1993). To determine if user beliefs change over time, the means at the two time periods were compared by using a paired-sample t-test. The mean PU score dropped from 5.62 to 5.40, but the change was not statistically significant (t=1.18, p=0.243). INT kept the same mean. However, TR increased from 5.15 at time 1 to 5.33 at time 2 (t=-1.12, p=0.268). Hence, users' trust beliefs seem to increase slightly with the using of online health service over time (see Table 27). Perceived usefulness decreased slightly over time, this is not unexpected given that as the subject matter (i.e., e-service) becomes more realistic to consumers, they have been known to correct their performance expectations from application use (Sokura et al., 2012).

		First time point		Second time point		Paired differences (1-2)		t-statistic	p-value
	N	Mean	S.D.	Mean	S.D.	Mean	S.D.		
PU1=PU2	70	5.62	0.99	5.40	1.09	0.22	1.57	1.18	0.243
TR1=TR2	70	5.15	1.08	5.33	1.05	-0.19	1.37	-1.12	0.268
INT1=INT2	70	4.45	1.53	4.45	1.57	-0.04	2.09	-0.14	0.886

Table 27: Comparison of Means in Usefulness, Trust and Intention.

7.5.2.3 Measurement model evaluation

The study's research model was then to be tested. An initial principal components (PCA) analysis was carried out to confirm the unidimensionality of the measures and to eliminate any inappropriate items. SAT1 and CON1 items were removed at this stage. Thereafter, the measurement model was analyzed by using Smart PLS.

	Items	Mean	S.D.	Standardized Loading	AVE	CR	Alpha value
USE	ACU1	0.67	0.928	0.947	0.794	0.885	0.757
	ACU2	0.19	0.597	0.832			
INT1	INT11	4.44	1.720	0.901	0.807	0.971	0.966
	INT 12	4.44	1.711	0.900			
	INT 13	4.44	1.720	0.896			
	INT 14	4.45	1.759	0.896			
	INT 15	4.49	1.683	0.929			
	INT 16	4.47	1.717	0.909			
	INT 17	4.39	1.780	0.893			
	INT 18	4.66	1.541	0.859			
INT2	INT 21	4.52	1.799	0.950	0.859	0.980	0.977
	INT 22	4.39	1.679	0.933			
	INT 23	4.51	1.656	0.929			
	INT 24	4.75	1.645	0.944			
	INT 25	4.51	1.656	0.915			
	INT 26	4.43	1.714	0.928			
	INT 27	4.23	1.704	0.890			
	INT 28	4.57	1.655	0.926			
CON	CON2	5.03	1.274	0.836	0.742	0.896	0.827
	CON3	5.14	1.025	0.862			
	CON4	5.09	1.126	0.887			
PU1	PU11	5.66	1.414	0.822	0.758	0.926	0.893
	PU12	5.67	0.944	0.881			
	PU13	5.63	1.206	0.880			
	PU14	5.53	1.248	0.898			
PU2	PU21	5.56	1.270	0.932	0.810	0.945	0.922
	PU22	5.39	1.011	0.877			
	PU23	5.20	1.314	0.894			
	PU24	5.46	1.259	0.896			
SAT	SAT2	4.97	1.351	0.949	0.846	0.943	0.909
	SAT3	4.94	1.371	0.926			
	SAT4	4.26	1.520	0.882			
TR1	TR11	5.23	1.169	0.942	0.881	0.967	0.955
	TR12	5.16	1.199	0.933			
	TR13	5.12	1.123	0.926			
	TR14	5.08	1.120	0.953			
TR2	TR21	5.36	1.167	0.948	0.881	0.967	0.955
	TR22	5.29	1.118	0.938			
	TR23	5.36	1.129	0.935			
	TR24	5.31	1.067	0.934			
SN	SN1	3.77	1.543	0.859	0.815	0.929	0.890
	SN2	3.53	1.530	0.960			
	SN3	3.64	1.494	0.885			
HAB	HAB1	5.34	1.854	0.935	0.899	0.964	0.944
	HAB2	5.51	1.773	0.967			
	HAB3	5.59	1.828	0.941			

Table 28: Results of Reliability, Validity and Means of the Construct Items.

	Mean (S.D.)	CON	INT1	INT2	PU1	PU2	SAT	TR1	SN	HAB	TR2	USE
CON	5.09 (0.98)	**0.74**										
INT1	4.45 (1.53)	0.05	**0.81**									
INT2	4.49 (1.57)	0.64	0.09	**0.86**								
PU1	5.62 (0.99)	-0.23	0.39	-0.11	**0.76**							
PU2	5.40 (1.09)	0.55	-0.10	0.64	-0.14	**0.81**						
SAT	4.72 (1.30)	0.68	-0.09	0.67	-0.16	0.66	**0.85**					
TR1	5.15 (1.08)	0.17	0.40	0.06	0.51	-0.08	0.06	**0.88**				
SN	3.65 (1.38)	0.00	0.27	0.02	0.36	-0.04	-0.11	0.33	**0.90**			
HAB	5.48 (1.73)	0.16	0.10	0.38	0.05	0.16	0.03	-0.03	-0.12	**0.95**		
TR2	5.33 (1.05)	0.56	-0.08	0.63	-0.11	0.58	0.62	0.14	-0.23	0.12	**0.88**	
USE	0.43 (0.69)	0.25	0.23	0.45	-0.10	0.31	0.25	-0.05	-0.06	0.18	0.15	**0.79**

Table 29: Construct Correlations for Chapter 7 (Diagonal bold values are square root of AVE).

The items loaded onto their expected theoretical constructs. The mean, standardized loadings of the measurement items, average variance extracted (AVE), composite reliability (CR) and Cronbach's alpha value are reported in Table 28. The values of the loadings are above the recommended value of 0.70. The values of composite reliability are above the acceptable value of 0.70, and the AVE is above the recommend threshold of 0.50, thus, the convergent validity is confirmed. For the discriminant validity, the square root of AVE of each construct is larger than the inter-construct correlations (see Table 29), and thus discriminant validity is confirmed.

7.5.2.4 Results of hypothesis testing

For the structural model, the PLS results are reported in Figure 27. Bootstrap resampling (300 resamples) was used to produce t-values for determining significance of paths. The model explains roughly 30% of the variance in early stage intentions to use the online health information service. However, in the later stage, the R^2 value for continuance intention is 0.65, which means the model explains 65% of variance for consumer continuance usage intention.

As seen from Figure 27, at initial usage phase, perceived usefulness is significantly influenced by trust. Both trust and perceived usefulness has significant effects on behavioral intention. In turn behavioral intention has a positive effect on actual usage of online health services. Hence, H1, H2, H4, H5 are supported. However, subjective norm has no significant effect on behavioral intention. H3 is thus rejected. This finding supports the view that trust and perceived usefulness are important to consumer acceptance of

online health service. However, intention is not influenced by subjective norm at early usage phase. The use of an online health service is thus affected more by individual beliefs than social influences. Intentions were important to subsequent usage behaviors.

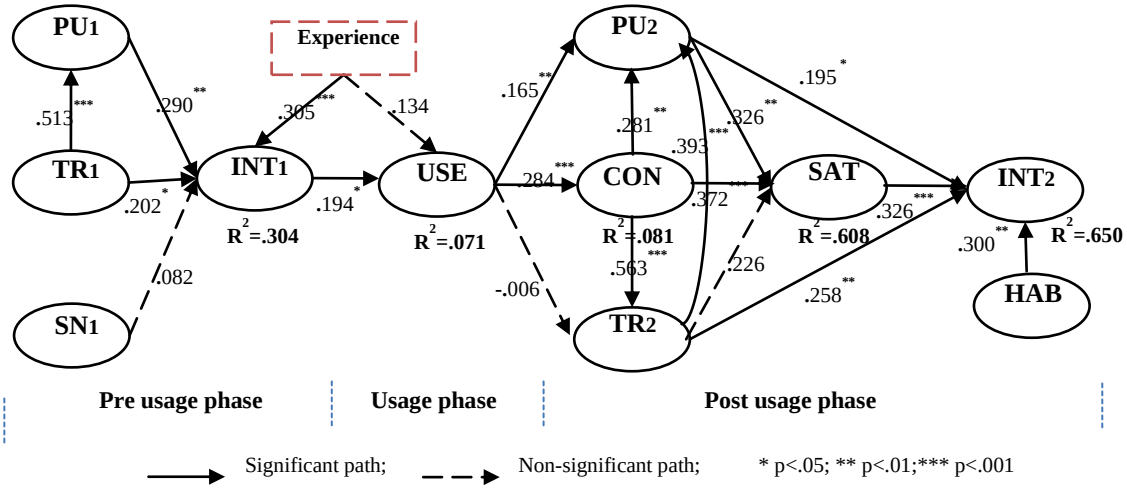


Figure 27: PLS Test of Research Model for Chapter 7 (non-significant controls omitted to improve readability).

At t2, perceived usefulness and confirmation were determined by usage behavior. Supporting H6a and H7, H6b is rejected as usage did not influence trust. Confirmation has a significant influence on perceived usefulness and trust at t2, thus supporting H8a and H8b. Confirmation and Perceived usefulness are subsequently important to satisfaction, whilst trust has an indirect effect through usefulness. Hence, H8c, H9 and H10a are supported. H10b is rejected. Continuance intention at t2 is significantly determined by satisfaction, and perceived usefulness and trust at t2. Hence, H11, H12a and H12b are supported. This finding confirmed the suggestions of the IS continuance model (Bhattacherjee, 2001) that intention is determined by evaluated (modified) beliefs and satisfaction, while satisfaction is determined by modified beliefs and confirmation. The analysis controlled for the effects of online health information experience (at initial usage phase), age and gender for behavioral intention at post usage stage. The effect of online health information experience on early stage intention was significant. Habit has a positive effect on continuance intentions. Thus H13 was supported. Table 30 summarises the results of this study.

Hypothesis (path)	Path coefficient	t-Value	Supported
H1	0.290	2.595**	Yes
H2	0.202	2.191*	Yes
H3	0.082	0.819	No
H4	0.513	4.785***	Yes
H5	.194	2.331*	Yes
H6a	0.165	3.063**	Yes
H6b	-0.006	0.086	No
H7	0.284	4.891***	Yes
H8a	0.281	2.746**	Yes
H8b	0.563	8.760***	Yes
H8c	0.393	2.330*	Yes
H9	0.372	4.708***	Yes
H10a	0.326	2.750**	Yes
H10b	0.226	1.851	No
H11	0.326	4.741***	Yes
H12a	0.195	2.144*	Yes
H12b	0.258	3.990**	Yes
H13	0.300	3.890**	Yes

Table 30: Summary of Results for Chapter 7 (p<.05; ** p<.01; *** p<.001)*

7.6 Discussion

The objective of this chapter was to develop and test a longitudinal model of consumer acceptance of online health information services. Research model was empirically tested by carrying out data collection at two points in time seven weeks apart.

TRA theorized that beliefs and subjective norms are the key determinants of consumer intention to accept information systems or e-services. Results showed that initial beliefs were important to intentions, in turn, intentions drove actual use. Surprisingly, the effect of subjective norm on acceptance was not confirmed, TRA suggest that subjective norm is a salient variable that influences behavioral intention. However, at early usage stage consumers' acceptance intention is not influenced by subjective norms. This may be due to the context under study within which normative pressures of the social environment may not be as important in influencing individual behaviors (Martín and Herrero, 2012). Moreover, in this study, 60% of users had online health information seeking experience. Venkatesh and Davis (2000) suggested that subjective norm becomes less important when users have already gained some usage experiences and when usage is voluntary. The findings support ECT's suggestions that confirmation was important to satisfaction and the updating of beliefs, in turn, evaluated (modified) beliefs and satisfaction were important to continued usage. However, later trust had an insignificant effect on satisfaction. Such findings have occurred in other online contexts (e.g., Harris and Goode,

2004). This suggests that trust may not be a relevant component within an ECT-based model of post-usage intention, where satisfaction is primarily driven by experience of outcomes i.e., usefulness and confirmation (Bhattacherjee, 2001). Moreover, trust was not directly influenced by actual use but rather increased in relation to a positive confirmation of expectations suggesting that consumers consider benefit gained as a part of their trust building.

This chapter makes important contributions in several ways. First, this study has integrated TRA and ECT as two theoretical perspectives important for predicting initial and continuance acceptance in the e-service context. TRA and ECT has been confirmed as useful theoretical underpinnings for the examination of early and later stages of IS use and actual usage has shown as important to the integration of these two models. Actual usage would precede confirmation of expectation and belief modification in both a process and causal sense. Second, the results show that trust and perceived usefulness are important to the prediction of consumer acceptance of online health services at both the early and later usage phase. This suggests that e-service providers should increase consumers' usefulness perceptions to promote acceptance and should focus on trust building e.g., through the implementation of privacy protection and through establishing their reputation as a reliable and competent provider of health information services. Later stage trust was not however found to be a simple function of actual usage. Future research will need to consider the importance of other trust building mechanisms.

It is important to note some limitations. First, due to the difficultly in carrying out longitudinal studies in the field, the sample is drawn from a university population. This is a recognized threat to external validity of the findings and may limit the generalizability of the conclusions to other populations. The use of online health information services as a context for study is important due to its recent growth as a high-potential area for e-services and one in which the salience of trust and usefulness perceptions is likely to be highly significant. It is recognized that results of the dynamic model test may not generalize beyond this particular e-service context. Second, some of the scenario tasks used in the initial phase of data collection may not be applicable to all consumers and this lack of immediate applicability may have created bias in initial perceptions of usefulness (Lanseng and Andreassen, 2007). This chapter focused specifically on the impacts of trust and usefulness, future research may wish to consider alternative beliefs such as risk and security perceptions, as well as other individual factors such as self-efficacy within a longitudinal study of e-service usage.

7.7 Conclusion

This chapter has drawn on the theory of reasoned action and expectation-confirmation theory to carry out a longitudinal study of trust in e-services. Specifically, this chapter examined how trust interacts with other consumer beliefs, such as perceived usefulness, and how together these beliefs influence consumer intentions and actual behaviors toward online health information services at both initial and later stages of use. Data collection was carried out at two time periods, approximately 7 weeks apart using a student population. The results show that perceived usefulness and trust are important at both initial and later stages in consumer acceptance of online health services. Consumers' actual usage experiences modify perceptions of usefulness and influence the confirmation of their initial expectations. These results have implications for our understanding of the dynamic nature of trust and perceived usefulness, and their roles in long term success of e-services.

The next chapter presents a second longitudinal study in order to test causal relationships between trust and risk by employing a cross-lagged structural equation modeling approach.

CHAPTER 8: TESTING CAUSAL RELATIONSHIPS BETWEEN TRUST AND RISK: A CROSS-LAGGED STRUCTURAL EQUATION MODELING APPROACH

8.1 Introduction

Causality is described as one of the fundamental attributes of a good theory (Gregor, 2006; Zheng and Pavlou, 2010). Knowledge of causal connections amongst phenomena is not only useful to make predictions, but also allows researchers to provide better guidance to practice (Gregor, 2006). Questions regarding how to establish causal connections amongst phenomena has thus been the subject of much attention in various disciplines such as psychology (e.g., James and Jones, 1980); marketing (e.g., Shugan, 2007) and information systems (e.g., Lee et al., 1997; Sun and Zhang, 2006; Zheng and Pavlou, 2010). An operational definition of causality, views it in terms of three criteria. Firstly, the cause has to precede the effect in time (temporal ordering), secondly, the cause and effect must be related (association), and thirdly alternative explanations of the cause-effect relationship have to be eliminated (isolation of the effect) (Gregor, 2006; Bullock et al., 1994).

In Information Systems, most researchers use cross-sectional data when examining causal models. However, cross-sectional data can only establish weak temporal precedence between cause and effect (Pinsonneault and Kraemer, 1993; Gable, 1994). Researchers have turned their attention towards identifying research methods useful for examining causal relationships using cross-sectional data. For instance, Lee et al. (1997) suggested using TETRAD a non-parametric tool to exam causal models. Sun and Zhang (2006) proposed Cohen's path analysis to examine the controversial causal relation between perceived enjoyment and perceived ease of use. A recent approach to causality methods was developed by Zheng and Pavlou (2010) namely Bayesian Networks for Latent Variables method which examines causal relationships. However, researchers are always cautioned in causally interpreting results derived from cross-sectional data (Baumgartner and Homburg, 1996). Due to the limitation of cross-sectional data to examine causal models, scholars have used longitudinal data to test their causal models (e.g., Venkatesh et al., 2011; Bhattacherjee and Lin, 2014). Such studies argue that

longitudinal data can better establish the temporal precedence needed to infer causal relationships. However, many longitudinal studies seldom consider reciprocal causality amongst variables.[11]

With the development of structural equitation modeling (SEM) techniques, researchers have developed a cross-lagged structural equation modeling method (Jöreskog, 1979). Cross-lagged studies use two-wave panel data to examine causal relationships. In this approach, two variables are each measured on two or more occasions, and then covariance structural equation modeling analysis (e.g., AMOS or LISREL) are conducted to determine whether changes in one of the measured variables precedes i.e., causes, or results from changes in the other (Biddle and Marlin, 1987). For example, if two variables (X and Y) are significantly correlated, early stage X (namely X1) may cause later stage X (namely X2), and later stage Y (namely Y2) and/or early stage Y (namely Y1) may cause X2 and Y2. As illustrated in Figure 28.

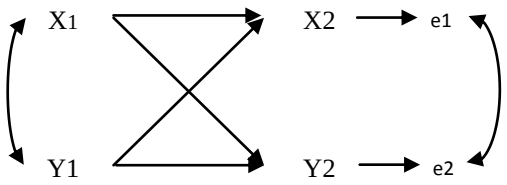


Figure 28: Cross-Lagged Model for Two Wave Two Variables.

In this way, cross-lagged SEM allows researchers to discover patterns of covariation among variables by watching their behavior over time. The longitudinal data analysis also provides estimates on relative construct stability by analysing the relation between subsequent measurements of the same variable. The approach thus also enables researchers to determine cross-construct relations once within-construct correlation is controlled for, and thus lead one closer to establishing a truly 'causal' model. Moreover, the technique allows both directions of potential causality to be tested (i.e., does the independent variable cause the dependent variable or vice versa?) (Burkholder and Harlow, 2003).

[11] When a model involves feedback or reciprocal relations or correlated residuals, we normally considered it is nonrecursive, otherwise the model is recursive (Lei and Wu, 2007). For example, there are two variables X and Y. The possible causal inference is that X causes Y, Y causes x or X and Y may have reciprocal causality (X1 causes Y2 and Y1 causes X2).

8.1.1 Causal relationships in IS

Some of the possible controversial causal relationships in Information Systems are: perceived enjoyment ↔ perceived ease of use (Sun and Zhang, 2006), service quality ↔ satisfaction (Kassim and Abdullab, 2008), trust in website ↔ trust in provider (Thatcher et al., 2013), trust ↔ perceived risk (Gefen et al., 2003b; Lim, 2003), and use ↔ satisfaction (Seddon, 1997). This thesis is particularly interested in the relationships between trust and risk perceptions in e-services. Past work, has not adequately examined the causal relationship between trust and risk perceptions in consumer use of e-services. Previous studies of trust-risk relationship have modeled: risk as a predictor of trust (Dinev and Hart, 2006; Corbitt et al., 2003; Chandra et al., 2010); and trust as a predictor of risk (Jarvenpaa et al., 2000; Pavlou, 2003; Kim et al., 2008, 2009). The issue of the causal direction of the relationships have remained unresolved (Gefen et al., 2003b; Lim, 2003). As indicated before, much of the work on trust and risk has consisted of studies using cross-sectional designs rather than longitudinal designs (e.g., Pavlou, 2003; Pavlou and Gefen, 2004; Bélanger and Carter, 2008). The literature reviewed for this thesis suggests that few studies have used cross-lagged structural equation modeling designs in IS and none to examine the controversy surrounding the relationship between trust and risk phenomenon. Demonstrating the causal relationships and the dynamic nature between trust and risk perceptions have become important from a theoretical, practical and methodological perspective i.e., whether trust and risk perceptions change over time, and how early-stage trust and risk perceptions might influence later-stage adoption and use, and if there is reciprocal causality between trust and risk perceptions. The need to examine the dynamic nature of trust and risk through longitudinal research designs has been noted in the literature (e.g., Urban et al., 2009).

For e-service context, it is important to address the trust ↔ risk relationship because such understandings can inform how the dynamic nature of trust-risk in e-service should be modeled. For e-service providers such understanding is important to how they form their online business strategies. This is also important to help them determine the relative emphasis they need to place on strategies for risk mitigation versus strategies for trust-building. Moreover, the contradictory interpretations of the trust-risk relationship and the lack of consensus regarding whether and how they effect each other, and consequently how this impacts online consumer behavior, limits the field's ability to develop a coherent and cumulative body of e-service research. This chapter's effort to improve understanding

of the trust-risk relationship and their effects on consumer acceptance is thus of theoretical importance. Moreover, by carrying out cross-lagged structural equation modeling to address this limitation of past work, an additional methodological contribution is made to IS research by this chapter.

This chapter therefore aims to use the longitudinal field data (dataset 3 and dataset 4) to carry out a cross-lagged structural equations modeling design to illustrate the causal relationship between trust and risk perceptions in consumer use of online health information services.

This chapter is organized as follows: First, the context is introduced and the specific trust and risk variables under study are identified. In the next section, prior research on trust, risk and the relationships between trust and risk in e-services adoption are reviewed. Next, the proposed cross-lagged models are presented. Then, the research methodology and approach are outlined. The chapter concludes with implications of the study.

8.1.2 Context of the Study

The empirical context for the thesis is online health information services. Health information is defined as “any information related to the practice of medicine and healthcare. This includes knowledge of human anatomy, physiology, and pathology, and the maintenance of good health and treatment of disease, as well as information related to patient care, such as patient records and epidemiological databases” (Cullen, 2006). However, health information seeking is defined as “the search for and receipt of messages that help to reduce uncertainty regarding health status and construct a social and personal (cognitive) sense of health” (Cotton and Gaupta, 2004). Based on above definition of health information and health information seeking, online health information services can therefore be defined as any health information whose delivery is enabled by Internet technologies for the purpose of reducing consumer uncertainty regarding health status, such as the maintenance of good health and treatment of disease as well as information related to patient care. Online health care services have become an important channel for consumers to engage in the self-management of their or their family's health (Harbour and Chowdhury, 2007).

This chapter is particularly interested in consumer trust in online health information websites, trust in online health information providers and risk perceptions in using online

health information services. To approach the controversy surrounding causal controversy amongst these trust and risk phenomena, a cross-lagged structural equation modeling design is carried out. This will be used to illustrate the causal link between trust in provider ↔ risk perceptions; 2) trust in website ↔ risk perceptions; and 3) trust in provider ↔ trust in website.

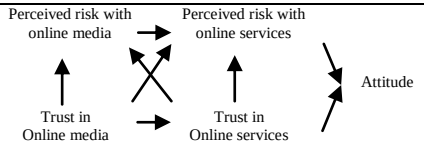
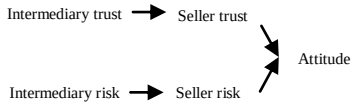
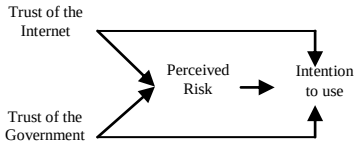
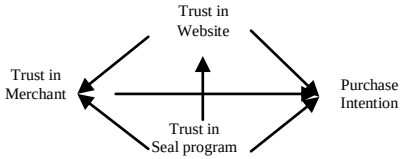
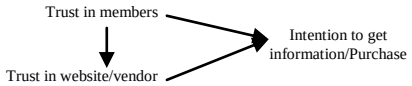
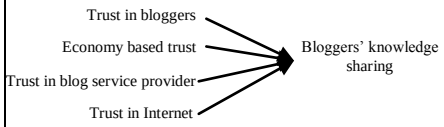
8.2 Literature Review

8.2.1 Trust in E-Service

Trust plays an important role in exchange relationships between organizations and their customers (Corbitt et al., 2003; Teo and Liu, 2007). Rotter (1967) defines interpersonal trust as “the belief that a party’s word or promise is reliable and a party will fulfil his/her obligations in an exchange relationship”. In the online context, researches have distinguished between trust in the website interface (e.g., Dinev and Hart, 2006; Liao et al., 2011) and trust in the e-service provider (e.g., Gefen, 2002b; Pavlou and Gefen, 2004; Nicolaou and McKnight, 2006; Kim et al., 2008, 2009a). Trust in the website implies Internet websites are a safe environment in which to exchange information with others (Liao et al., 2011). Trust in the e-service provider is defined as the consumer's belief in the integrity, ability and benevolence of the vender (Rotter, 1967; Morgan and Hunt, 1994; Bhattacherjee, 2002; Pavlou and Gefen, 2002; Kim et al., 2004) and their willingness to be vulnerable to actions taken by the vendor based on their feelings of confidence and assurance (Gefen, 2000). If e-vendors are not considered trustworthy, they will lose their customers (Zhu et al., 2011). One of the reasons trust becomes an issue is because consumers may have little prior experience with the e-vendor (McKnight et al., 2002) and e-service providers often collect customer’s personal and/or financial information during transactions (Hagel and Rayport, 1997). Past work has associated trust with adoption and use in e-service contexts such as e-commerce/e-shopping (Jarvenpaa et al., 2000; Corbitt et al., 2003; Gefen et al., 2003a; Pavlou, 2003; Teo and Liu, 2007; Kim et al., 2008; Zhu et al., 2011), e-banking (Yousafzai et al., 2009; Luo et al., 2010), online health care services (Egea and Gonzalez, 2011; Zahedi and Song, 2008), online legal services (Cho, 2006), mobile payment services (Lu et al., 2011) and e-government (Horst et al., 2007; Bélanger and Carter, 2008). Trust in the e-service context has been considered in relation to the e-service provider, the e-service web site or platform as well as the

enabling technologies or infrastructure e.g., the Internet (Bart et al., 2005). Taken together, trust in e-service reflects a combination of the consumer's trust in 1) the e-service provider's reliability, good intentions, and ability to deliver on expectations; and 2) the e-service website or platform to perform the required functions dependably (Bhattacherjee, 2002; Pavlou, 2003; Bart et al., 2005; Ribbink et al., 2004; Harridge-March, 2006).

Thatcher et al. (2013) refer to trust in provider as a form of "specific trust". Consumers are likely to consider whether the e-service provider is trustworthy, dependable, honest and reliable so that better transactions may be performed (Pavlou and Gefen, 2004). The features and functions of the website also play an important role in online transactions (Thatcher et al., 2013). If the website is reliable, dependable, as well as meets a consumer's need of functionality and capabilities, then consumers may prefer to use it (McKnight and Thatcher, 2006). Thatcher et al. (2013) argues that a website acts as representation of a provider, because in an online context, e-service users lack the ability to directly observe the vendor. They form their perceptions based on cues from the online interface i.e. website. The website replaces employees and physical attributes of the vendor as a basis for transacting. Therefore, trust in the website based on an assessment of its characteristics, may form the basis for the evaluation of the vendor (Thatcher et al., 2013). As discussed in Table 30 below, past work has shown trust in website influences trust in provider. However, it is also possible that consumers are more likely to place confidence in a website that is established by a trusted provider. The relationship between trust in provider and trust in website are illustrated in Table 31.

Studies	Predictor variable	Outcome variable	Context	Roles in model *	Empirical findings
Cho 2006	Trust in online media Perceived risk with online media	Trust in online services Perceived risk with online services attitude	Online legal services		Trust in online media significantly influences perceived risk with online media. Perceived risk with online services is determined by trust in online media, trust in online services and perceived risk with online media. Trust in media influences trust in provider of online services.
Verhagen et al. 2006	Intermediary trust Intermediary risk	Seller trust Seller risk attitude	Electronic marketplaces		All the paths are significant, i.e., trust in website influences trust in provider.
Bélanger and Carter 2008	Trust of the Internet Trust of the Government	Perceived risk Intention to use	E-government		Trust of the government indirectly influences intention. Perceived risk but also had direct effects on intention. However, trust of the internet only had direct influence on intention. Here, trust in provider and trust in Internet are not related.
Li et al. 2009	Trust in seal programs	Trust in website Trust in merchant Purchase intention	B2C Internet-based store		Trust in website significantly influences trust in merchant and purchase intension, in turn, trust in merchant significantly influences purchase intention. Trust in seal program significantly influence trust in merchant and trust in website. However, trust in seal program does not significantly influence purchase intention.
Lu et al. 2010	Trust in members (Integrity/benevolence and Ability)	Trust in website/vendor (Ability, Integrity and Benevolence). Intention to get information. Purchase intention.	C2C e-commerce		Trust in members (ability) significantly influences trust in website/ vendors (ability, integrity and benevolence). Integrity/benevolence (trust in members) significantly influences purchase intention. Ability (trust in website/vendor) has significant positive effects on intention to get information and purchase intention.
Chai and Kim 2010	Trust in bloggers Economy based trust Trust in blog service provider Trust in Internet	Bloggers' knowledge sharing	Web 2.0 technology		Beside trust in Internet, all the other three types of trust have significant influences on bloggers' knowledge sharing. However, this study they did not considered the internal relationship between trust dimensions.

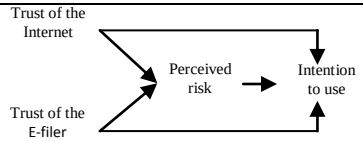
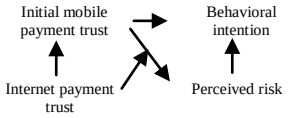
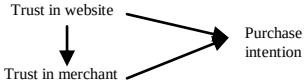
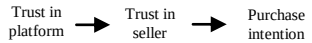
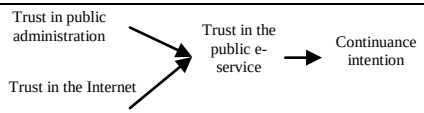
Schaupp et al. 2010	Trust in e-file system Trust of the Internet	Perceived risk Intention to use	e-government service (e-file)		Trust of the e-file system significantly influences perceived risk, in turn; perceived risk significantly influences intention to use. However, trust of the Internet has no significant effect on perceived risk.
Schaupp and Carter 2010	Trust of the Internet Trust of the e-filer	Perceived risk Intention to use e-filling	e-government service (e-filing)		Both of trust of the Internet and trust of the e-filer directly influence perceived risk, while perceived risk significantly influence intention to use e-filing. Trust of the e-filer has a significant effect on intention; however, trust of the Internet has not. Trust in Internet and trust in e-file are not related.
Lu et al. 2011	Internet payment trust Initial mobile payment trust	Perceived risk Initial mobile payment trust intention	Mobile payment services		Internet payment trust are important to form initial mobile payment trust, and mediates initial mobile payment trust-perceived risk, and moderates initial mobile payment trust-intention relation. Perceived risk has a negitive effect on intention, and initial mobile payment trust are important to determine percieved risk and intention.
Thatcher et al. 2013	Trust in website	Trust in merchant Purchase intention	B2C e-commerce		Trust in website has a significant effect on trust in merchant in both a familiar online shopping context and non-familiar online shopping context. Trust in website also has a significant effect on purchase intention at both a familiar online shopping context and non-familiar online shopping context. However, only the familiar online shopping context, trust in website has a significant effect on purchase intention.
Chen et al. 2014	Trust in platform	Trust in seller Purchase intention	E-commerce		Trust in platform has a significant effect on trust in seller, in turn; purchase intention is determined by trust in seller.
Belanche et al. 2014	Trust in public administration Trust in the Internet	Trust in the public e-service Continuance intention	Public e-services		Trust in the public e-service has a significant effect on continuance intention. Both trust in public administration and trust in Internet influence trust in e-service.

Table 31: A: The Relationships between Multi-Dimensional Trust and Behavioral Intention.

**: only considered the variable that interested in current study.*

8.2.2 Risk in E-Service

During the last decades, the construct of perceived risk has been well studied in marketing and information systems disciplines. Moreover, a number of empirical studies found that perceived risk is a critical factor for online consumer behavior research (e.g., Featherman and Pavlou, 2003; Pavlou, 2003; Horst et al., 2007; Bélanger and Carter, 2008). Garbarino and Strahilevitz (2004) define perceived risk as the potential for loss and the seriousness of outcome if loss was to occur. Hoover et al. (1978) argue that two factors are important to determine perceived risk. These are "the amount that would be lost (i.e., that which is at stake) if the consequences of the act are not favourable and the individual's subjective felling or degree of certainty that the consequences will be unfavourable". Past works show risk perceptions are important barriers for consumer online decision making (Kim et al., 2008). Privacy related risks predominate in the online environment (Dinev and Hart, 2006). This is due to loss of control over the disclosed personal information to a website (Zimmer et al., 2010). Other types of risks in the online context include financial risks resulting from disclosure of financial data such as credit card data (Kim et al., 2008; Liao et al., 2011), performance risks relating to product or service quality (Hong and Yi, 2012), social and psychological risks relating to potential loss of status or negative self-perceptions that could result from e-service use (Featherman and Pavlou, 2003). Past research has associated risks with both commercial and non-commercial e-service contexts e.g., in e-commerce/e-shopping (Jarvenpaa et al., 2000; Pavlou, 2003; Teo and Liu, 2007; Kim et al., 2008), e-banking (Yousafzai et al., 2009; Luo et al., 2010), and e-government (Horst et al., 2007; Bélanger and Carter, 2008). In online shopping context, researchers have argued that not all types of risk perceptions are relevant, and that certain types of risk may be more important in a specific context (Ko et al., 2004).

8.2.3 The Relationship between Trust and Risk Perceptions

Uncertainties still characterize the use of e-services and varying degrees of consumer adoption and engagement in the use of e-services has been noted (Featherman and Pavlou, 2003; Kim et al., 2009a). The uncertainty and opportunism inherent in e-services results in increased consumer perceptions of risk and elevates the need for trust in

electronic exchange relationships (Pavlou, 2003). Consequently, consumers' risk perceptions and their trust beliefs are considered amongst the most important psychological states influencing their online behaviors (Pavlou and Gefen, 2002; Pavlou, 2003; Kim et al., 2008).

Managing consumer trust and perceptions of online risk are considered critical to the continued development and success of the online service environment (Pavlou, 2003). Moreover, the efforts of e-service providers to mitigate risk perceptions and build trust are hampered by a lack of understanding of how trust and risk perceptions interact and how they come to influence online behavior.

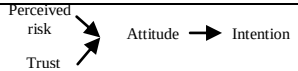
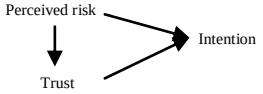
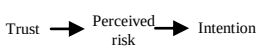
Unfortunately, prior studies have not been consistent in their treatment of the relationship between trust and risk perceptions, and the nature of the relationship remains unclear (more details see Table 32). Pavlou (2003) argues that trust is antecedent to risk perceptions because trust reduces the uncertainties that give rise to risk perceptions. Under this perspective risk mediates the effects of trust on consumer acceptance. Others who follow this perspective include (Jarvenpaa et al., 2000; Nicolaou and McKnight, 2006; Kim et al., 2008, 2009).

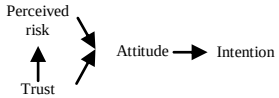
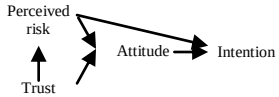
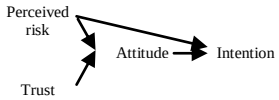
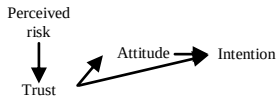
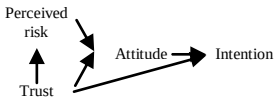
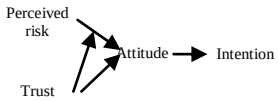
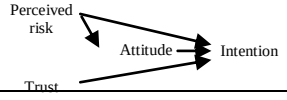
A second view argues that risk perceptions are antecedent to trust. Proponents of this perspective argue that if the uncertainties and risk of loss are perceived to be low then there is less need to form trust perceptions (Dinev and Hart, 2006). Similarly, higher levels of risk perception will increase a consumer’s need to trust (Corbitt et al., 2003). Under this perspective trust mediates the effects of risk on consumer acceptance. Others who follow this perspective include (Chandra et al., 2010)

A third view argues that trust and risk perceptions are independent predictors of consumer adoption of e-services. There is no causal link between them. For example, Verhagen et al. (2006) examined seller trust and seller risk as independently influencing consumer attitude toward online shopping. Others who follow this perspective include (Lee, 2009; Izquierdo-Yusta and Galderon-Monge, 2011; Bianchi and Andrews, 2012).

A fourth view argues that trust moderates the path between risk perceptions and behavioral intention, or perceived risk moderate the path between trust and behavioral intention (e.g., Grazioli and Jarvenpaa, 2000; Lu et al. 2011).

The relationship between trust, risk and intention are illustrated in Table 32.

	Example models*	Example studies	Context	Empirical findings
Trust and risk as independent predictors		[1]. Kim and Prabhakar 2000; [2]. Junglas and Spitzmüler 2005; [3]. Song and Zahedi 2007; [4]. Lo 2010.	[1]. Internet banking [2]. Location-based services [3]. Health infomediary [4]. Social networking services	[1]. Proposed model [2]. Proposed model [3]. All significant. [4]. All significant.
Trust and risk as independent predictors (Intention)		[1]. Hung et al. 2006.	[1]. E-government services	[1]. All significant.
Trust as mediator		[1]. Dinev et al. 2006; [2]. Liao et al. 2011.	[1]. E-commerce [2]. Monetary transactions	[1]. For US sample, all significant. For Italy sample, from trust to intention is not significant. [2]. All significant.
Trust as partial mediator		[1]. Chandra et al. 2010; [2]. Bansal et al. 2010.	[1]. Mobile payment systems [2]. Online health information	[1]. All significant. [2]. All significant.
Risk as full mediator		[1]. Pavlou 2001; [2]. Yousafzai et al. 2003; [3]. Schaupp et al. 2010; [4]. Curry 2011.	[1]. E-commerce [2]. Electronic banking [3]. E-government services [4]. Wi-Fi hotspots	[1]. All significant. [2]. Proposed model. [3]. All significant. [4]. All significant.
Risk as partial mediator		[1]. Pavlou 2003; [2]. Pavlou and Gefen 2004; [3]. Malhotra et al. 2004; [4]. Xu et al. 2005; [5]. Slyke et al. 2006; [6]. Pavlou and Gefen 2005; [7]. Gefen and Pavlou 2006; [8]. Nicolaou and McKnight 2006; [9]. Kim et al. 2008; [10]. Kim et al. 2009a; [11]. Aldás-Manzano et al. 2009; [12]. Luo et al. 2010; [13]. Zhou 2011; [14]. Lu et al. 2011; [15]. Shukla 2014; [16]. Li et al. 2014.	[1]. E-commerce [2]. Online marketplace [3]. Online companies [4]. P2P sharing software [5]. E-commerce [6]. Online marketplaces [7]. Online marketplaces [8]. B2B electronic commerce [9]. E-commerce [10]. E-commerce [11]. Internet banking services [12]. Mobile banking services [13]. Location-based services [14]. Mobile payment services [15]. Online context [16]. Personal health record systems	[1]. All significant. [2]. All significant. [3]. All significant. [4]. All significant. [5]. For Amazon.com sample, all the paths are significant. However, for Half.com sample, willingness to transact is not determined by trust. [6]. All significant. [7]. All significant. [8]. All significant. [9]. All significant. [10]. All significant. [11]. From trust to internet banking use is not significant. [12]. Perceived risk has a negative effect on intention. However, trust is not important to lower risk and to form intention. [13]. All significant. [14]. All significant. [15]. All significant.

				[16]. All significant.
Risk as full mediator with intervention effect of attitude		[1]. Van der Heijden et al. 2003; [2]. Zimmer et al. 2010.	[1]. Online purchase [2]. E-commerce	[1]. From trust to attitude is not significant, other paths are significant. [2]. All significant.
Risk as full mediator with partial intervention effect of attitude		[1]. Jarvenpaa et al. 2000; [2]. Kimery and McCord 2002a, 2002b; [3]. Teo and Liu 2007; [4]. Katos 2012.	[1]. Internet store [2]. a. online retailing; b. e-retailing [3]. E-commerce [4]. Online transactions	[1]. All significant [2]. a. All significant; b. all significant. [3]. All three countries are significant. [4]. From risk to intention and from trust to attitude are not significant.
Trust and risk as independent with partial intervention effect of attitude		[1]. Dinev and Hart 2006; [2]. Lee 2009.	[1]. E-commerce [2]. Online trading	[1]. All significant. [2]. All significant.
Trust as full mediator with partial intervention effect of attitude		[1]. Egea and González 2011.	[1]. Electronic health care records systems	[1]. All significant.
Proposed trust-risk model from Chapter 3		Proposed trust-risk e-service acceptance model	--	Best fit
Trust and perceived risk are non-recursive		[1]. Chang and Chen 2008.	[1]. Online store	[1]. The direction from risk to trust had stronger effects than trust to risk.
Trust as a moderator for Perceived risk-attitude		[1]. Grazioli and Jarvenpaa 2000.	[1]. Internet shopping	[1]. Attitude is determined by trust and risk. High trust moderates perceived risk-attitude.
Trust and risk independent with trust having direct effect on		[1]. Izquierdo-Yusta and Calderon-Monge 2011.	[1]. Online hotel reservation	[1]. All significant.

intention				

*Table 32: The Relationships between Trust, Risk and Behavioral Intention *: For a comprehensive literature review, we also considered "attitude variable" due to the importance of consumer behavior research in Information system*

8.3 Cross-Lagged Models

The problem discussed above suggests that the following types of relationships need to be better understood. 1), the relationship between trust in provider and risk, 2), the relationship between trust in website and risk, and 3), the relationship between trust in provider and trust in website. Therefore, this chapter aims to demonstrate the causal relationships between trust and risk, and how trust and risk perceptions change over time in consumer acceptance of e-services. In addition, it has an opportunity to provide a better understanding of the relationship between trust and risk and how they come to influence consumer acceptance of e-service (through post-hoc analysis). More specific this chapter tested three cross-lagged structural equation models, namely, (1) trust in provider-risk model (TRPR) (Figure 29); (2) trust in website-risk model (TRPWR) (Figure 30); and (3) trust in provider-trust in website model (TRPW) (Figure 31). In this chapter, these relationships to TRP-PR, TRW-PR, and TRP-TRW are illustrated below.

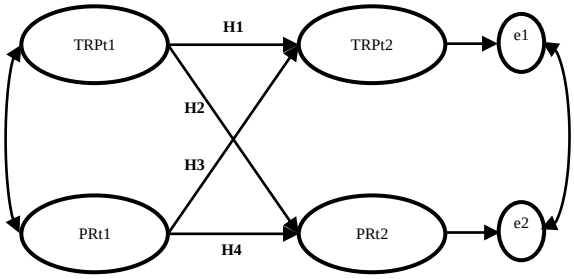


Figure 29: Trust in Provider-Risk Model (TRPR)

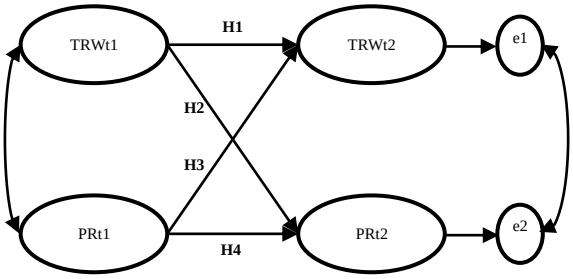


Figure 30: Trust in Website-Risk Model (TRWR)

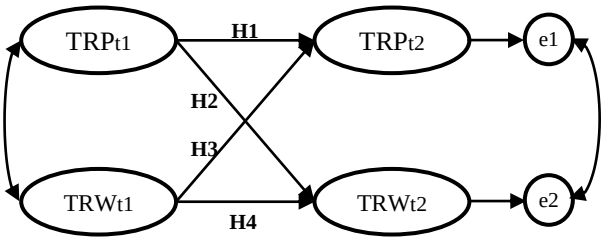


Figure 31: Trust in Provider-Trust in Website Model (TRPW). H1 and H4: Temporal Stabilities Effects; H2 or H3: One Cross-Lagged Effect; H2 and H3: Reciprocal Effects.

For each of the above cross-lagged structural models (Figure 29-31), four types of relations can be considered. They are: 1). a model without paths but with temporal stabilities reflecting Hypothesis H1 and H4) (see Figure 32, M1), 2). a model with one cross-lagged path from time 1 to time 2 reflecting Hypothesis H2 (see Figure 32, M2a) or

Hypothesis H3 (see Figure 32, M2b), and 3). a model with both cross-lagged structural patterns representing reciprocal effects reflecting both Hypothesis H2 and Hypothesis H3 (see Figure 32, M3). Figure 32 illustrates these for the relationship between trust in provider and risk.

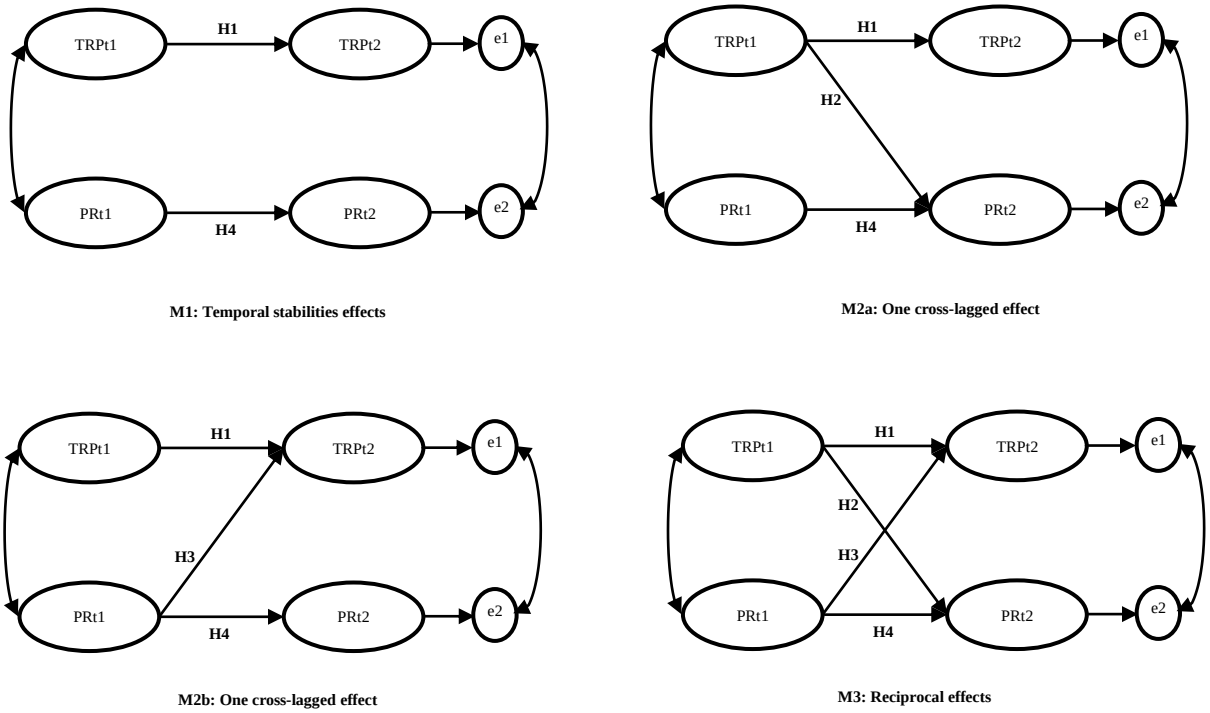


Figure 32: Three Types of Relationships

8.4 Research Methodology

To examine the causal relationship between trust and risk, a cross-lagged structural equation modeling design was employed. Through a longitudinal design the dynamic nature of the study's focal substantive constructs as implied by the cross-lagged models is able to be examined (Berrington et al., 2006). A longitudinal design requires the researcher to collect repeated measures over time from the same units of observation. While cross-lagged design allows us testing both directions of potential causality, estimating on relative construct stability, and establishing truly causal model. Doing so in this study will allow for the change in trust beliefs and risk perceptions to be described over time. This study used the longitudinal multiple-phase controlled laboratory design described earlier. The phases of the study are described below and illustrated in Figure 33 (also see Section 2.3).

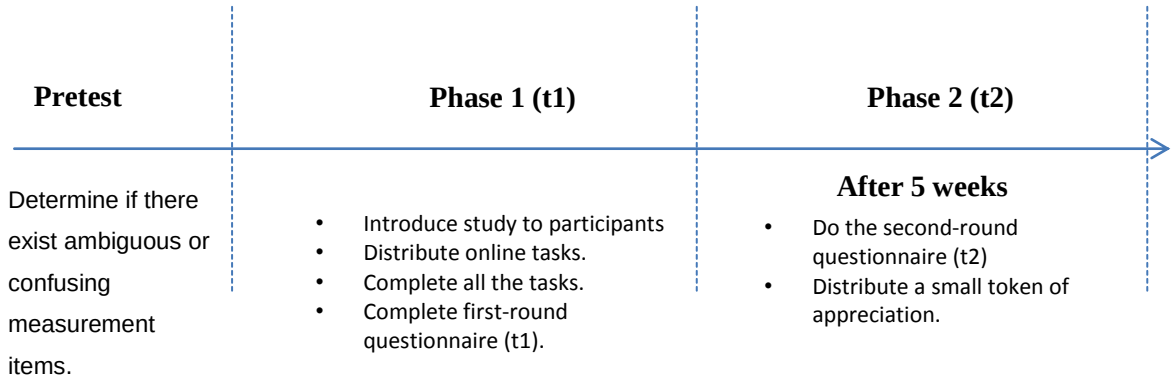


Figure 33: Longitudinal Data Collection Schedule for Chapter 8

8.4.1 Study Design

Data collection was carried out a large national university in South Africa. The sample consisted of undergraduate students registered for computer laboratory-based classes. The students were first year in information systems and accounting information systems department. There were seven such classes available from which data could be collected. The use of university sample is appropriate because they represent an important portion of online consumers (Kim et al., 2008). Harbour and Ghowdhury's (2006) research results show that more than 71% of the students have some experience in using the Internet for health information and therefore constitute a valid subset of the e-service user population. Moreover, a recent review on the use of student samples in IS research indicated that if the theories are under examination, using a student sample is valid and appropriate (Compeau et al., 2012). To address theory on trust and risk, this chapter aims to use cross-lagged structural equation modeling to examine the causality between trust beliefs and risk perceptions. Therefore, a student sample is considered appropriate. The use of student sample also helps to overcome high attrition rates associated with longitudinal study. Moreover, young people often have difficulties accessing traditional health services, and the Internet can offer them a confidential and convenient way to access health services (Gray et al., 2005). Even though college students are generally believed to be healthy, they still often struggle with responsible sexual behavior, confront mental health issues, drug and alcohol abuse, smoking, and poor eating habits (Bansal et al., 2010; Kim et al., 2012; McKinley and Ruppel, 2014). In South Africa where this study was carried out, HIV/Aids represents a significant health issue facing the student population. One

study suggests there was 3.4% at risk for HIV prevalence (HEAIDS, 2010). Moreover, other studies in the South Africa context have recorded that from age 18 to 34 years old, 11.1% have alcohol abuse disorders, and 4.6% population have drug abuse and mental health e.g., anxiety and depressive disorders is estimated (Herman et al., 2009).

8.4.1.1 Pre-test

The study commenced with a pre-test to determine if there were any ambiguous or confusing measurement items in the questionnaire. The pre-test was carried out using a convenience sample of senior students. The pre-test was followed by the first phase of the study where participation from the larger student population was invited.

8.4.1.2 Phase 1(t1)

The data collection was conducted in the student's computer laboratory environment. In phase 1, the purpose and how to participate in this study was first introduced, and then some popular online health service websites were identified to provide context for the experimental tasks. The websites were all general medical, health and wellness sites accessible to consumers with optional registration. Allowing participants the opportunity to select their own website of interest increases the voluntary nature of the e-service usage process (Zahedi and Song, 2008). Then participants were asked to surf their chosen health website to do a list of scenario tasks. The use of such tasks aims to promote variability in the use and attitudes toward surfing the site. Participants then were asked to complete a first-round questionnaire. The questionnaire aims to capture the participants' trust beliefs, their risk perceptions as well as their future usage intentions. Demographic questions (e.g., age, gender and health information website experience) also were asked. The questionnaire items are presented in Appendix H and scenario tasks are presented in Appendix D. To facilitate collection of responses and match the respondents' two round questionnaire at the end of this study, the questionnaire was distributed via the university's e-learning system. In order to increase the response rate, participants were given a small token of appreciation for their participation at the end of the survey. This resulted in dataset 3.

8.4.1.3 Phase 2 (t2)

After 5 weeks, participants were asked to return to the laboratory. Five weeks was considered in Yamasaki et al. (2006) as being a good compromise for a time period for longitudinal study of behavior and personality. Then, participants were asked to complete the second-round survey with the focus on their current perceptions, beliefs and behavioral intentions. The measurement items were the same as the previous phase. This resulted in dataset 4.

8.4.2 Measures

All constructs in the research model were operationalized based on previously validated instruments and modified them to fit the context of online health information services. All constructs were measured using multi-item Likert-scales with anchors ranging from 1="strongly disagree" to 7="strongly agree". Appendix H contains the measurement items used for the constructs.

The questionnaire included 11 items to measure three dimensions of trust in provider (TRP) (benevolence, ability and integrity). These measurements used scales developed by Hwang and Lee (2012) and Thatcher et al. (2013). Among them, three items used to measure benevolence, four items used to measure integrity, and four items used to measure ability.

Trust in website (TRW) was measured using six scales developed by Thatcher et al. (2013). There are two dimension of trust in website. These are reliability and capability. Among them, three items used to measure reliability and three items used to measure capability.

For tests of the cross-lagged model, two dimensions of perceived risk were considered. These are: performance risk and time risk. Three items used to measure performance risk. They are adopted from Sun (2014), Lee (2009) and Corbitt et al. (2003). Online health information services website may introduce performance risk, this is because it may provide information incorrectly, may fail to meet health information seeker's expectations and may fail to deliver what it promises. Time risk was measured using two scales developed by Forsythe et al. (2006) and Featherman and Pavlou (2003). Online health information websites may introduce time risks by wasting consumer time in searching for online health information.

Data was also collected on continuance intention (INT). It was measured using scales developed by Bhattacherjee and Premkumar (2004). Three items evaluated the likelihood that the subject intended to continue using this website to obtain health information; the likelihood to plan to continue using this website to obtain health information.

8.5 Empirical Results

8.5.1 Participants

The first-round survey was conducted at the beginning of March, 2014. At time 1 (t1), 703 usable responses were obtained, which the participants finished both the scenario tasks and questionnaires (dataset 3). After five weeks, the second round survey was conducted. By inviting the 703 participants were invited to do the second round survey (t2). In total, 491 respondents completed the second round (t2) survey (dataset 4). 55 respondents were subsequently eliminated as they were missing a large number of data values. The final usable data was 436 respondents. This suggests an attrition rate of approximately 37.9%. Time 1 (t1) and time 2 (t2) was matched by using an anonymous user ID. The demographic profile of the respondents is reported in table 33. The respondents aged between 18 and 22 (96%). Among them 40% were male, around 60% were female. Among the respondents, 50% had previous online health information experience. Most of the participants chose website 1 (41%) and website 2 (54%) to do the scenario tasks.

Demographics	Category	Frequency	Percentage (%)
Gender	Male	175	40.14
	Female	258	59.17
	Missing	3	0.69
Age	18-19	379	86.93
	20-22	40	9.17
	23-25	5	1.15
	>25	9	2.06
	Missing	3	0.69
Online health information experience	Yes	218	50.00
	No	212	48.62
	Missing	6	1.38
Choice of online health information service provider	WebMD	180	41.28
	Health24	238	54.59
	MedlinePlus	18	4.13

Table 33: Descriptive Statistics of Respondents' Characteristics for Chapter 8

All the subjects indicated that they also have used other types of e-services in the past including online shopping, Internet banking, mobile banking, and social networking services. Because participants were allowed to choose between three online health information providers for the carrying out the tasks and gaining familiarity with the online health service context, an ANOVA test determined if trust, risk perceptions and the intention scores were independent of the choice of online health information service provider. Results indicated that there were no significant differences along the items measuring trust, risk perceptions, and intention variables.

8.5.2 Data Analysis

Data analysis was carried out in several stages. Firstly, the data was evaluated for common method bias as well as non-response bias. Secondly, it was examined whether the intentions and beliefs (trust in e-services provider, trust in website and perceived risk) change over time by comparing the construct means at t1 and t2. Thirdly, AMOS version 22 was used to test the measurement models (i.e., CFA) at both times (t1 and t2). Lastly, the cross-lagged models were tested using AMOS. AMOS models were estimated with a maximum likelihood function to obtain parameter estimates.

To test the cross-lagged models, four competing structural models for each set of causal relationships trust in provider ↔ risk, trust in website ↔ risk, trust in provider ↔ trust in website (for example, see Figure 34) were fitted to the data in several steps. For example, for the relationship between trust in provider and perceived risk, first, a model without cross-lagged structural paths but with temporal stabilities (mode M1) was specified. Second, this stability model was compared with three more complex models: (a) a model with cross-lagged paths from time 1 trust in provider to time 2 perceived risk (model M2; reflecting Hypothesis H2); a model with cross-lagged structural paths from time 1 perceived risk to time 2 trust in provider (model M3; reflecting Hypothesis H3); a model with both cross-lagged structural patterns (model M4) representing reciprocal effects (reflecting both Hypothesis 2 and Hypothesis 3). In a similar vein, the relationship between trust in website and risk, and the relationship between trust in provider and trust in website were examined.

CFI, GFI, RMSEA and AIC values were used to assess model fit. In addition, the difference between Chi-square statistics was used to test whether the fit of a more

complex model was significantly better than the fit of a simpler model. All models were tested in the reflective model.

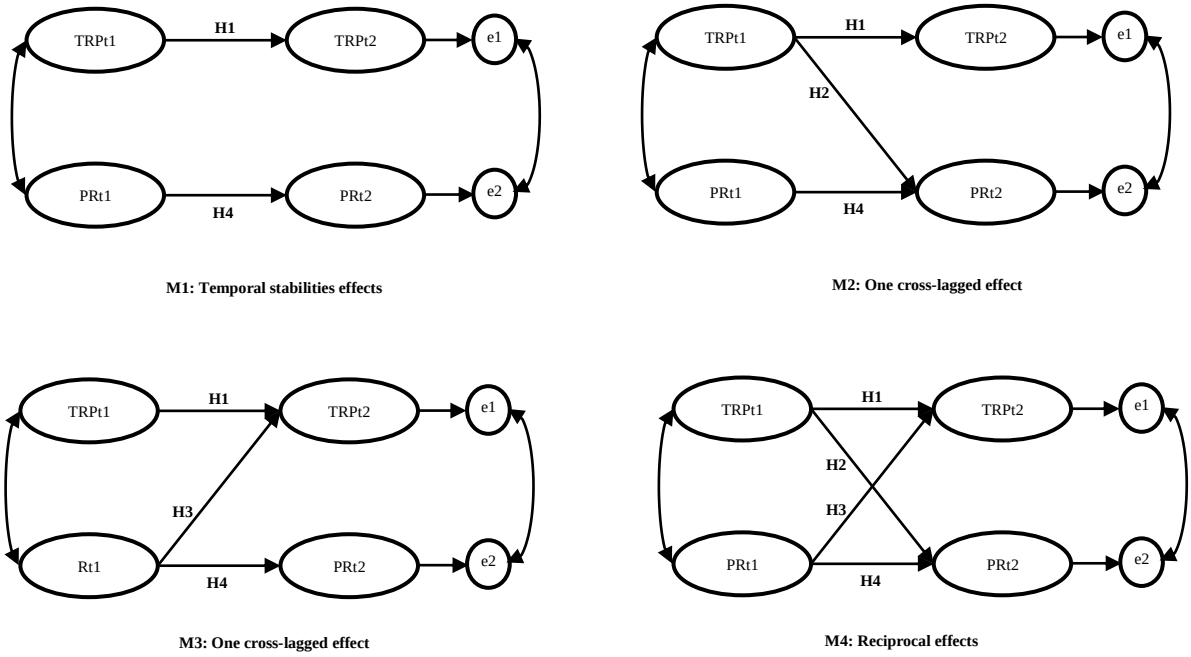


Figure 34: The Types of Relationships between Trust in Provider and Risk

In each of the models, the baseline (t1) latent variables were hypothesized as correlated (e.g., TRP t1 and PR t1). Direct paths were hypothesized between the t1 and t2 latent variables (e.g., TRP t1 and TRP t2). The error terms associated with the latent variables at t2 were also modeled as correlated (e.g., e1 and e2). The error terms of the same latent variables' items measured at time 1 and time 2 were also modeled as correlated. These error terms were covaried across the two time periods because the factors contributing to measurement error in any particular item or latent construct may be consistent across the two time points (Christens et al., 2011). Additional covariances were introduced based on some modification indices suggested by AMOS. As an example, the model for the relationship between trust in website and risk perceptions is depicted in see Figure 35 below.

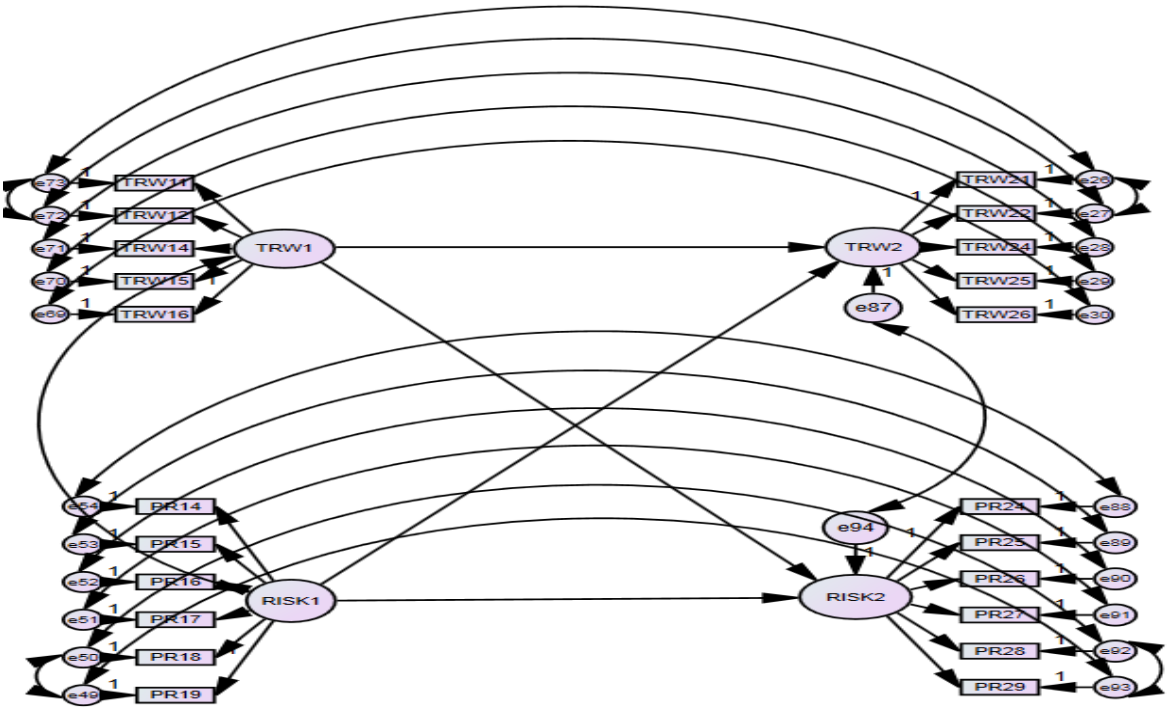


Figure 35: The Modeling between Trust in Provider vs. Trust in Website

8.5.3 Common Method Bias

Harman's one factor test (Podaskoff and Organ, 1986) is one of the most widespread approaches for evaluating possible common method bias (Malhotra et al., 2006; Urbach and Ahlemann, 2010). Therefore, this method was adopted to check common method bias. According to this approach, common method variance is present if one factor accounts for the majority of the covariance in the dependent and independent variables. Common method bias occurs when a significant amount of spurious covariance shared among variables is attributable to the common method used for data collection (Urbach and Ahlemann, 2010). An exploratory factor analysis (EFA) of all of the time 1 scale items revealed factors explaining 64.05% of the variance, the first factor explaining 34.96%. For time 2, EFA revealed factors explaining 63.44% of the variance, the first factor explained 28.54%. For both time 1 and time 2 scales revealed factors explaining 66.03% of the variance, the first factor accounted for 28.18%, which is less than 50%. These results suggest that no single factor explained a majority of the variance, thus supporting that common method bias was not a threat for this study at either t1 or t2.

To assess non-response bias, an additional 41 responses was randomly collected from students not registered in surveyed classes who were present at different times of the day

in other computer laboratories across campus. Their responses to those from time 1 sample (N=703) was compared. No significant difference in responses was found. Thus the timing of the survey, or the laboratory condition or location was not expected that had an influence on the results. Therefore the responses of early and late response do not differ significantly, thus, nonresponse bias is not a threat for the study.

8.5.4 Measurement Model Evaluation

The study's measurement model was tested. An initial principal components (PCA) analysis was carried out to confirm the unidimensionality of the measures and to eliminate any inappropriate items. TRP3 and TRW3 items were removed at this stage. Thereafter, the measurement model was analyzed by using AMOS 22. In order to ensure that the variables comprising each proposed research construct were internally consistent, reliability assessment was carried out using Cronbach's alpha. The items loaded onto their expected theoretical constructs. The values of composite reliability are above the acceptable value of 0.70, and the AVE is above the recommend threshold of 0.50, thus, the convergent validity is confirmed. See Appendix J to N.

For the measurement model, at time 1, the goodness-of fit of the four-factor measurement model (trust in provider t1, trust in website t1, perceived risk t1, and intention t1) was: χ^2 (245) = 3.721, $p < 0.000$; CFI = 0.923; GFI = 0.830; RMSEA = 0.079).

At time 2 the goodness-of fit of four-factor model (trust in provider t2, trust in website t2, perceived risk t2, and intention t2) was: χ^2 (245) = 4.002, $p < 0.000$; CFI = 0.910; GFI = 0.818; RMSEA = 0.083).

Therefore, for two measurement models, the goodness of fit met the suggested value, for example, adjusted goodness of-fit index (AGFI) should be larger than 0.8, goodness-of-fit index (GFI), normed fit index (NFI), and comparative fit index (CFI) should all exceed 0.9, and root mean square error (RMSE) should be less than 0.10 (Scott, 1994). Some researchers suggested that Chi-square normalized by degrees of freedom (χ^2/df) should be less than three (Carmines and Mclver, 1981). However, Bentler and Bonett (1980) suggested if the χ^2/ degrees of freedom ratio does not exceed five indicates acceptable model fit. In the study, after modification, the value is slightly higher than three but all the χ^2/ degrees of freedom ratio does not exceed five.

8.5.5 Comparison of Construct Means

Past work into IT usage has considered whether user beliefs change over time (e.g., Bhattacherjee and Premkumar, 2004; Venkatesh et al., 2011; Hsu et al., 2006). Those researchers have argued that earlier beliefs serve as an anchor for later stage evaluations. This is because later-stage judgments are not made from scratch but are formed from earlier judgments (Kim and Malhotra, 2005). Others however have argued that early-stage beliefs wear off over time, and are less likely than actual user experiences to influence later-stage beliefs (Szajna and Scamell, 1993). To determine if user beliefs change over time, the means at the two time periods were compared by using a paired-sample t-test. The mean of TRP score dropped from 5.516 to 5.458, but the change was not statistically significant (t=1.375, p=0.170). However, the mean of TRW increased from 5.064 to 5.233. The change was statistically significant (t=-3.515, p=0.000). The mean of PR also increased a little bit. However, the change was not statistically significant (t=-1.381, p=0.168). The mean of INT decreased a little bit, and the change was statistically significant (t=2.865, p=0.004). Hence, users' trust beliefs of website seem to increase slightly over time with the using of online health service (see Table 34). However, the trust beliefs of provider seem to decrease over time. Behavioral intention decreased over time. Additional post-hoc analysis may shed light on this. At last, perceived risk also increased a little bit over time and the increasing was not statistically significant.

		First time point		Second time point		Paired differences(1-2)		t-statistic	p-value
	N	Mean	S.D.	Mean	S.D.	Mean	S.D.		
TRP1=TRP2	436	5.516	0.914	5.458	0.864	0.058	0.887	1.375	0.170
TRW1≠TRW2	436	5.064	1.037	5.233	1.865	-0.169	1.001	-3.515***	0.000
PR1=PR2	436	3.643	1.299	3.733	1.374	-0.091	1.376	-1.381	0.168
INT1≠INT2	436	4.857	1.536	4.650	1.603	0.207	1.510	2.865**	0.004

Table 34: Comparison of Means Differences for Chapter 8

8.5.6 Model Comparisons of Causal Relationship between Trust in Provider and Risk

Table 35 shows an overview of the model comparison results. The first chi-square difference test (M1 vs. M2) showed that the difference between the stability model (M1)

and the model with cross-lagged effects from trust in provider time 1 to perceived risk time 2 was not significant (M1 vs. M2: $\Delta\chi^2(1) = 2.532$, ns.). This means that model M2 had no better statistical fit than model M1. This indicates that trust in provider did not influence changes in perceived risk from t1 to t2. Thus, model M2 has no better statistical fit than model M1.

The second chi-square difference test (M1 vs. M3) showed that the stability model and the model with cross-lagged structural paths from perceived risk (t1) to trust in provider (t2) was significant (M1 vs. M3: $\Delta\chi^2$ (1) = 5.000, $p < 0.05$). This means that the unconstrained model with lagged effects (M3) better account for the data than the constrained model with no lagged effects.

The third chi-square difference tested (M1 vs. M4) showed that the difference between the stability model and the model with reciprocal cross-lagged structural paths, which was significant (M1 vs. M4: $\Delta\chi^2$ (2) = 7.194, $p < 0.05$). This significant difference was likely due to the cross-lagged effect of t1 perceived risk on t2 trust in provider but not due to the reversed cross-lagged effect of t1 trust in provider on t2 perceived risk.

The fourth chi-square difference tested (M2 vs. M4) between the model with cross-lagged paths from t1 trust in provider to t2 perceived risk and the model with all cross-lagged structural paths was significant (M2 vs. M4: $\Delta\chi^2$ (1) = 4.662, $p < 0.05$).

The last chi-square difference test (M3 vs. M4) between the model with cross-lagged structural paths from t1 perceived risk to t2 trust in provider and the model with all cross-lagged structural paths was not significant (M3 vs. M4: $\Delta\chi^2$ (1) = 2.194, ns.).

Generally, in terms of chi-square relative to the degrees of freedom, as well as CFI, GFI, RMSEA and AIC, model M4 showed the best fit of all models (see table 35). The hypothesis testing results reported in Table 36. Figure 36 shows the estimated standardized path coefficients and levels of significance for the final model (M4). It should be noted that early stage trust in provider significantly influences later stage trust in provider (β=0.454, t=8.709), this is consistent with Kim's (2014) results; early stage risk perceptions of online health information usage also significantly influences later stage risk perceptions (β=0.565, t=6.908). Moreover, risk perceptions at time 1 significantly influences trust in provider at t2 (β=-0.092, t=-2.131), which suggest a significant cross-lagged effects. However, trust in provider at time 1 did not influence risk perceptions at t2 (β=-0.093, t=-1.477). Taken together, both trust in provider and risk perceptions at early

stage are important to influence later stage trust in provider and risk perceptions; importantly, it is found perceived risk causes trust in provider.

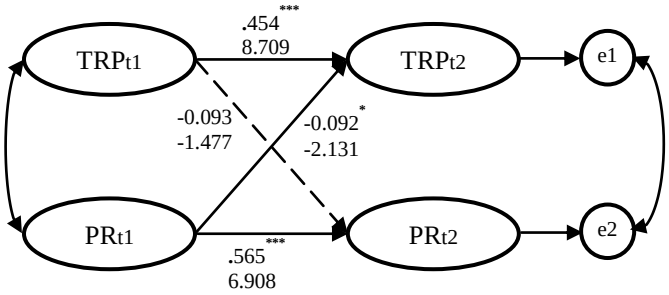


Figure 36: Results of TRPR-Trust in Provider-Risk (M4)

	χ^2	df	χ2/df		$\Delta\chi^2$	Δdf	CFI	GFI	RMSEA	AIC
M1	1177.816	438	2.689				0.930	0.836	0.062	1357.816
M2	1175.284	437	2.689	M1 vs. M2	2.532	1	0.930	0.836	0.062	1357.284
M3	1172.816	437	2.684	M1 vs. M3	5.000*	1	0.931	0.836	0.062	1354.816
M4	1170.622	436	2.685	M1 vs. M4	7.194*	2	0.931	0.837	0.062	1354.622
				M2 vs. M4	4.662*	1				
				M3 vs. M4	2.194	1				

Table 35: Goodness-of-Fit Indices and Chi-Square Difference Tests of TRPR.

		β	t-Value	Supported			β	t-Value	Supported
M1	TRP1-TRP2	0.481	9.543***	Yes	M2	TRP1-TRP2	0.489	9.603***	Yes
	PR1-PR2	0.583	7.306***	Yes		PR1-PR2	0.548	6.800***	Yes
M4	TRP1-TRP2	0.454	8.709***	Yes		TRP1-PR2	-0.099	-1.584	No
	PR1-PR2	0.565	6.908***	Yes	M3	TRP1-TRP2	0.445	8.628***	Yes
	TRP1-PR2	-0.093	-1.477	No		PR1-PR2	0.597	7.394***	Yes
	PR1-TRP2	-0.092	-2.131*	Yes		PR1-TRP2	-0.095	-2.201*	Yes

Table 36: Summary of Results: Trust in Provider vs. Perceived Risk (p<.05; ** p<.01; *** p<.001). β: Path Coefficient.*

8.5.7 Model Comparisons of Causal Relationship between Trust in Website and Risk

Table 37 shows the results of the model comparisons. The first chi-square difference (M1 vs. M2) test showed that the difference between the stability model (M1) and the model with cross-lagged effects from trust in website t1 to perceived risk t2 was not significant (M1 vs. M2: $\Delta\chi^2(1) = 0.133$, ns.). This means that model M2 had no better statistical fit

than model M1. This indicates that trust in website did not influence changes in perceived risk from t1 to t2. Thus, model M2 has no better statistical fit than model M1.

The second chi-square difference (M1 vs. M3) test showed that the stability model and the model with cross-lagged structural paths from t1 perceived risk to t2 trust in website was significant (M1 vs. M3: $\Delta\chi^2$ (1) = 4.426, $p < 0.05$). This means that the unconstrained model with lagged effects (M3) better account for the data than the constrained model with no lagged effects (M1).

The third chi-square difference (M1 vs. M4) test showed that the difference between the stability model and the model with reciprocal cross-lagged structural paths, which was significant (M1 vs. M4: $\Delta\chi^2$ (2) = 4.612, $p < 0.05$).

The fourth chi-square difference (M2 vs. M4) tested between the model with cross-lagged paths from t1 trust in website to t2 perceived risk and the model with all cross-lagged structural paths was significant (M2 vs. M4: $\Delta\chi^2$ (1) = 4.479, $p < 0.05$).

The last chi-square difference (M3 vs. M4) tested between the model with cross-lagged structural paths from t1 perceived risk to t2 trust in website and the model with all cross-lagged structural paths was not significant (M3 vs. M4: $\Delta\chi^2$ (1) = 0.186, ns.).

The results of model fit indicated that model M3 had the best fit of all models (see Figure 37). The results of hypothesis testing were reported in Table 38. Figure 38 shows the standardized path coefficients and levels of significance for the full cross-lagged model. The research results indicated that trust in website at t1 significantly influences trust in website at t2 (β=0.247, t=7.562), this is consistent with Kim's (2014) results; risk perceptions at t1 is also important to influence risk perceptions at t2 (β=0.781, t=7.583). Moreover, risk perceptions at t1 significantly influences trust in website at t2 (β=-0.084, t=-2.085), which is regarded as a significant cross-lagged effect. It should be noted that trust in website at t1 did not significantly influence risk perceptions at t2 (β=-0.024, t=0.432). Therefore, for TRWR model, perceived risk causes trust in website.

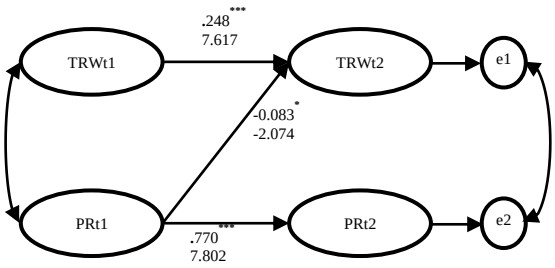


Figure 37: Results of TRWR-Best Fit Model (M3)

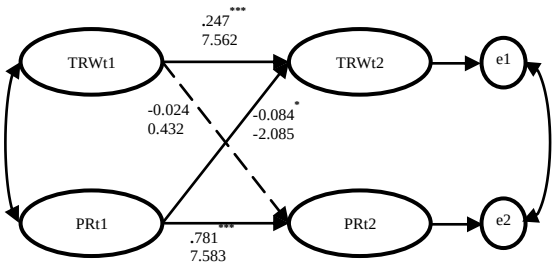


Figure 38: Results of TRWR-Trust in Website-Risk

	χ^2	df	$\chi 2/df$		$\Delta\chi^2$	Δdf	CFI	GFI	RMSEA	AIC
M1	408.377	190	2.149				0.962	0.921	0.051	534.377
M2	408.244	189	2.160	M1 vs. M2	0.133	1	0.962	0.921	0.052	536.244
M3	403.951	189	2.137	M1 vs. M3	4.426*	1	0.962	0.922	0.051	531.951
M4	403.765	188	2.148	M1 vs. M4	4.612*	2	0.962	0.922	0.051	533.765
				M2 vs. M4	4.479*	1				
				M3 vs. M4	0.186	1				

Table 37: Goodness-of-Fit Indices and Chi-Square Difference Tests of TRWR.

		β	t-Value	Supported			β	t-Value	Supported
M1	TRW1-TRW2	0.27	8.425***	Yes	M2	TRW1-TRW2	0.269	8.383***	Yes
	PR1-PR2	0.757	7.735***	Yes		PR1-PR2	0.767	7.499***	Yes
M4	TRW1-TRW2	0.247	7.562***	Yes		TRW1-PR2	0.021	0.366	No
	PR1-PR2	0.781	7.583***	Yes	M3	TRW1-TRW2	0.248	7.617***	Yes
	TRW1-PR2	0.024	0.432	No		PR1-PR2	0.770	7.802***	Yes
	PR1-TRW2	-0.084	-2.085*	Yes		PR1-TRW2	-0.083	-2.074*	Yes

Table 38: Summary of Results: Trust in Website vs. Perceived Risk (p<.05; ** p<.01; *** p<.001)*

8.5.8 Model Comparisons of Causal Relationship between Trust in Provider and Trust in Website

Table 39 reported the results of model comparisons. The first chi-square difference (M1 vs. M2) test showed that the difference between the stability model (M1) and the model with cross-lagged effects from trust in provider t1 to trust in website t2 was significant (M1 vs. M2: $\Delta\chi^2(1) = 24.624$, $p<0.001$). This means that model M2 had a better statistical fit than model M1. This indicates that trust in provider influences changes in trust in website from t1 to time2. Thus, model M2 has a better statistical fit than model M1.

The second chi-square difference (M1 vs. M3) test showed that the stability model and the model with cross-lagged structural paths from t1 perceived risk to t2 trust in provider was significant (M1 vs. M3: $\Delta\chi^2$ (1) = 10.527, $p < 0.01$). This means that the

unconstrained model with lagged effects (M3) better account for the data than the constrained model with no lagged effects (M1).

The third chi-square difference (M1 vs. M4) test showed that the difference between the stability model and the model with reciprocal cross-lagged structural paths, which was significant (M1 vs. M4: $\Delta\chi^2$ (2) = 30.761, p < 0.001).

The fourth chi-square difference (M2 vs. M4) tested between the model with cross-lagged paths from t1 trust in provider to t2 trust in website and the model with all cross-lagged structural paths was significant (M2 vs. M4: $\Delta\chi^2$ (1) = 6.137, p < 0.05).

The last chi-square difference (M3 vs. M4) tested between the model with cross-lagged structural paths from t1 trust in website to t2 trust in provider and the model with all cross-lagged structural paths was significant (M3 vs. M4: $\Delta\chi^2$ (1) = 20.234, p<0.001).

Taken together, model M4 showed the best fit of all models (see table 39). The hypothesis testing results reported in Table 40. The standardized path coefficients and levels of significance for the final model showed in Figure 39. The path results showed that trust in provider at t1 significantly influences trust in provider at t2 (β=0.426, t=7.62). Trust in website at t1 significantly influences trust in website at t2 (β=0.197, t=5.751). Interestingly, trust in provider at t1 also significantly influences trust in website at t2 (β=0.209, t=4.334); trust in website at t1 significantly influences trust in provider (β=0.086, t=2.483). This indicated that trust in provider and trust in website have reciprocal lagged effects.

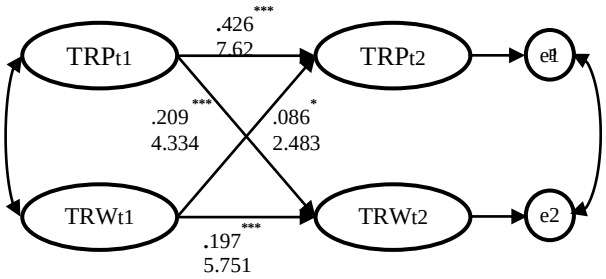


Figure 39: Results of TRPW-Trust in Provider-Trust in Website (M4)

	χ^2	df	χ^2/df		$\Delta\chi^2$	Δdf	CFI	GFI	RMSEA	AIC
M1	1150.235	380	3.027				0.926	0.926	0.828	1320.235
M2	1125.611	379	2.970	M1 vs. M2	24.624***	1	0.928	0.928	0.829	1297.611
M3	1139.708	379	3.007	M1 vs. M3	10.527**	1	0.927	0.927	0.829	1311.708
M4	1119.474	378	2.962	M1 vs. M4	30.761***	2	0.928	0.928	0.839	1293.474
				M2 vs. M4	6.137*	1				
				M3 vs. M4	20.234***	1				

Table 39: Goodness-of-Fit Indices and Chi-Square Difference Tests of TRPW.

		β	t-Value	Supported			β	t-Value	Supported
M1	TRP1-TRP2	0.445	9.163***	Yes	M2	TRP1-TRP2	0.494	9.661***	Yes
	TRW1-TRW2	0.259	8.265***	Yes		TRW1-TRW2	0.174	5.348***	Yes
M4	TRP1-TRP2	0.426	7.620***	Yes		TRP1-TRW2	0.227	4.720***	Yes
	TRW1-TRW2	0.197	5.751***	Yes	M3	TRP1-TRP2	0.359	6.844***	Yes
	TRP1-TRW2	0.209	4.334***	Yes		TRW1-TRW2	0.280	8.591***	Yes
	TRW1-TRP2	0.086	2.483*	Yes		TRW1-TRP2	0.113	3.238**	Yes

Table 40: Summary of Results: Trust in Website vs. Trust in Provider (p<.05; ** p<.01; *** p<.001)*

8.6 Post-Hoc Analysis

Previous studies used cross-sectional data to determine if trust in provider, trust in website and perceived risk are important to form behavioral intention. Therefore, as a post-hoc analysis, first round and second round data were tested. For t1, the goodness-of fit of four-factor model, after modification was: χ^2 (242) = 2.947, p < 0.001; CFI = 0.946; GFI = 0.867; RMSEA = 0.067) (see Table 41). The path coefficients and t-value are reported in Figure 40. For t2, the goodness-of fit of four-factor model after modification was: χ^2 (242) = 2.93, p < 0.001; CFI = 0.943; GFI = 0.864; RMSEA = 0.067) (see Table 42). The path coefficients and t-value are reported in Figure 41.

Both trust in provider and trust in website are important to form positive consumer behavioral intention in longitudinal data (t1 and t2). However, risk perceptions are less important than trust to influence behavioral intention at both t1 and t2. Compare with trust in website at both times, trust in provider are more important to form positive behavioral intentions. However, trust in provider is more important in t1; trust in website becomes more important at t2 compared with t1.

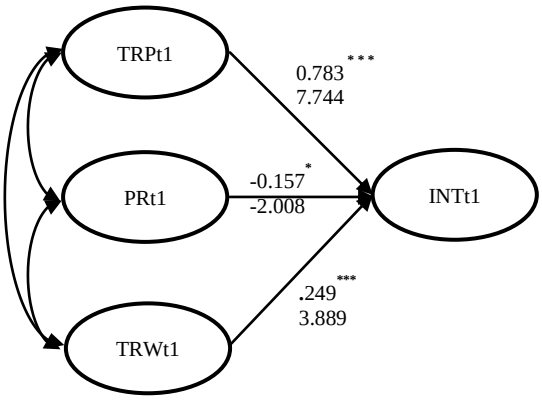


Figure 40: Results of Time 1

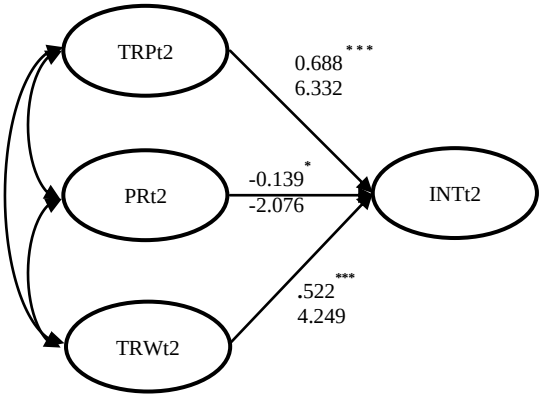


Figure 41: Results of Time 2

Before modification									
Path	χ^2	df	χ^2/df	β	t-value	CFI	GFI	RMSEA	AIC
TRP1-INT1	1113.985	246	4.528	0.709	7.529***	0.900	0.805	0.090	1221.985
TRW1-INT1				0.262	3.990***				
PR1-INT1				-0.165	-2.272*				
After modification									
TRP1-INT1	713.167	242	2.947	0.783	7.744***	0.946	0.867	0.067	829.167
TRW1-INT1				0.249	3.889***				
PR1-INT1				-0.157	-2.008*				

Table 41: Goodness-of-Fit Indices of Time 1.

Before modification									
Path	χ^2	df	χ^2/df	β	t-value	CFI	GFI	RMSEA	AIC
TRP2-INT2	1214.999	246	4.939	0.638	6.149***	0.882	0.795	0.095	1322.999
TRW2-INT2				4.242	4.242***				
PR2-INT2				-2.341	-2.341*				
After modification									
TRP2-INT2	709.018	242	2.93	0.688	6.332***	0.943	0.864	0.067	825.018
TRW2-INT2				0.522	4.249***				
PR2-INT2				-0.139	-2.076*				

Table 42: Goodness-of-Fit Indices of Time 2.

Based on above research results, a research model is proposed below. The basic assumption through the longitudinal study results indicated that trust in provider at t1 is important to influence trust in provider and website at t2. Trust in website at t1 is important to influence trust in website and provider at t2. However, perceived risk in t1 is depicted as lowering future trust (including both provider and website) at t2. Trust in provider and trust in website at t2 are important to form further behavioral intention (intention at t2). However, early stage risk perceptions are not important to influence intention at t2 (see Figure 42).

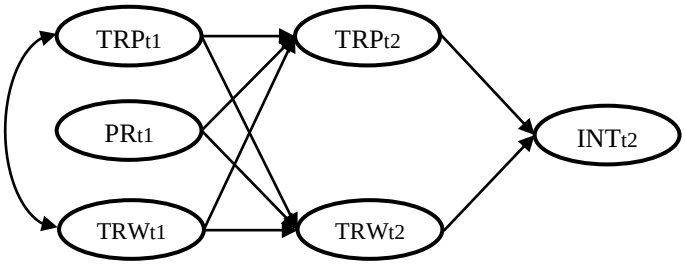


Figure 42: Proposed Future Research Model

Given that the data from this study was used to derive the proposed model, it would be inappropriate to also test the above model using the dataset, and this confirmation of the model is left to future work.

8.7 Discussion and Conclusion

Causality is described as the central element of a good theory (Gregor, 2006). Given its importance, questions regarding causality amongst phenomena have been the subject of much attention in various disciplines. Most of the researchers normally use cross-sectional data in examining causal relationships. However, cross-sectional data cannot establish causal relationships. Therefore, adopting longitudinal data to exam causal models has been considered a better option. However, one critical question in the IS discipline involves reciprocal relationship between variables. Therefore, this chapter applied SEM with survey data from a two-wave cross-lagged panel design to test reciprocal and causal relations between trust beliefs and risk perceptions.

There are two primary findings of TRPR model (Figure 36). The most important one is that perceived risk is antecedent to trust in provider. This finding is consistent with Egea and González (2011), which suggested that risk negatively affects trust in electronic health care records systems. It is also consistent with Bansal et al. (2010) that suggest risk influences trust in the online health information context. In contrast, the casual inference from trust in provider to risk perceptions was not confirmed. The cross-lagged model does not seem to support the argument that trust lowers risk in the context of online health use suggested by prior e-commerce research (e.g., Jarvenpaa et al., 2000; Van der Heijden et al., 2003; Pavlou, 2003; Pavlou and Gefen, 2004). In addition, results of chi-square difference test showed M4 had the best fit of the data. Which means the fully cross-lagged model provided a significantly better fit to the data. Another finding is early stage trust in provider is important to later stage trust in provider, and early stage risk perceptions are important to later stage risk perceptions. However, through paired-sample t-test, both trust in provider, and risk perceptions did not change significantly over time. Therefore, these beliefs appear quite stable over time and difficult to modify.

For the TRWR model (Figure 38), some important findings were also confirmed, which is consistent with the TRPR model. In other words, risk perceptions cause trust in website, which it is consistent with Dinev et al. (2006) and Liao et al. (2011). This finding supports

the argument of risk negatively affects trust (i.e., trust in website). In contrast, the causal direction from trust in website to risk perceptions has not been confirmed. The model in the online health context does appear to support the explanation for trust influences risk (Pavlou, 2003; Pavlou and Gefen, 2004). The cross-lagged model in the online health context does appear to support the suggestion by Dinev et al. (2006), which argue risk perceptions influence trust (i.e., trust in website). It is noteworthy that the results of chi-square difference test showed M3 had the best fit of the data. Moreover, early stage trust in website is important to influence later stage trust in website. Early stage risk perceptions are also important to later stage risk perceptions. Importantly, through the comparison of construct means this chapter found the mean of trust in website increased somewhat and the increase is statistically significant. In conclusion, examination of the relationship of trust in provider ↔ risk, and trust in website ↔ risk in this study context showed a consistent lagged pattern of relations in which early-stage risk perceptions cause later-stage trust beliefs.

For the TRPW model (Figure 39), trust in provider and trust in website existed reciprocal lagged effects. However, the effects from trust in provider to trust in website had a stronger effect than the reverse relationship effects. The SEM results revels that both early stage trust (provider and website) are important to influence later stage trust. In addition, M4 had the best fit. This means the fully cross-lagged model provided a significantly better fit to the data than other nested models. Taken together, the research results suggest that M4, the model in which reciprocal lagged effects between trust in provider and trust in website exists is the best fit model. The cross-lagged model does not seem to support the argument that trust in website influences trust in provider nor that trust in provider influences trust in website (e.g., Thatcher et al., 2013), but rather that the two have reciprocal relationships. This has not been previously modeled by past work.

In addition, through post-hoc analysis it was found that trust in provider, trust in website and risk perceptions are important to influence consumer behavioral intention at early stage. While, trust in provider (β= 0.783 $p<0.001$) is most important to form consumer positive behavioral intention to continually use online health information. Furthermore, trust in website (β= 0.249 $p<0.001$) is also important to form consumer positive behavioral intention. However, risk perceptions are negatively affecting online health information adoption. Both trust in provider (β= 0.522 $p<0.001$) and trust in website (β= 0.688 $p<0.001$) are strong affecting consumer behaviors at later stage. However, risk perceptions are found to have a direct significant negative effect on consumer adoption of

online health information services. In later stage, it appears that trust in website becomes more important predictor of continued use than in the earlier stages when trust in provider is more important.

8.7.1 Implications for Theory and Research

The present findings hold a number of important implications for the study of trust and risk in e-service context. First, early stage risk perceptions influences later stage trust in provider and website, this result is consistent with the study of Dinev et al., (2006). Online health seekers must take a risk in order to engage in trusting action, trust is decreased in situations where the potential loss exceeds the possible benefit (Horst et al., 2007; Egea and González, 2011). Empirical evidence provided here supports risk perceptions is influencing trust. This is important to guide future research on how to model trust-risk relationships in e-service context.

Second, stability in the relationships (trust in provider time 1 to trust in provider time 2, trust in website time 1 to trust in website time 2, risk perceptions time 1 to risk perceptions time 2) suggest that early beliefs are difficult to change and do not appear to wear off over time. Moreover, the cross-lagged model indicated that early stage trust in website influences later stage trust in website, and early stage trust in provider also influences later stage trust in provider in online health information context. Future research may wish therefore to explore how trust and risk perceptions may change over time and be influenced e.g., by provider-based interventions or consumer actual usage behaviors.

Third, the reciprocal relationship that was found to exist between trust in website and trust in provider implies that the two dimensions of trust are associated each other rather than one influences (causes) another one. This can guide future research to better model the relationship between trust in provider and trust in website. Moreover, trust in provider and trust in website are both found important to form positive behavioral intention at both early stage usage and later stage usage. However, trust in website gain more relevant in later stage. This suggests when modeling trust, future research may wish to consider the multi-dimensional nature of trust.

8.7.2 Practical Implications

This chapter also has several important practical implications. First, early stage trust in provider influences later stage trust in provider, this means practitioners should always pay attention to their public image, such as to be truthful in their dealings with their consumers and be effective in assisting their consumers to search for health information thereby gain more consumer trust.

Second, early stage trust in website influences later stage trust in website, this means a trusted website (e.g., a good web interface or a good navigation or search engine) is always important to form positive intentions. This can help website designers to pay attention to how they build and operate their website over time. Website designer should make their website reliable, dependable, and the functionality more meet consumer needs. Consumers will soon lose trust in provider that are unable to operate a reliable site that is also stable in operations, whilst provider who operate stable and reliable sites can gain more consumer trust.

Reciprocal relations between trust in provider and trust in website may particular important for practitioners to pay attention to trust building strategies. This is because the two dimensions of trust influence each other. In other words, more positive trust beliefs in e-service provider may cause more positive trust beliefs in website; in contrast, more positive trust beliefs in website may also cause more positive trust beliefs in provider.

Third, early stage risk perceptions influences later stage trust in provider and website. This means e-service providers should reduce risk perceptions to gain more trust beliefs. i.e., they need to reduce the level of uncertainty for trust to be built. Consumers may come to visit online health information services with uncertainty. Thus they perceive risks, which will reduce willingness to trust. Reducing perceptions that time loss may occur and/or that information may not be accurate or meet expectations will be important to help them obtain trust and more loyalty of consumers.

8.7.3 Methodological Implications

Causality is considered as an important issue in academic researchers. Various methodologies to address this issue, such as TETRAD a non-parametric tool, Cohen's path analysis and Bayesian Networks for Latent Variables method have been proposed.

However, most of the techniques use cross-sectional data. The current study adopted cross-lagged structural equation modeling to determine the casual relationship between trust and risk in a longitudinal design. Beside one paper published in Computer in Human Behavior (2014)[12], no other study has been found that employs cross-lagged SEM design in IS research. There is various advantage of this method, and it can be an especially useful technique to help IS researchers to examine controversial phenomenon in the fields. This chapter has demonstrated its usefulness.

8.7.4 Limitations and Future Research

It is important to note some limitations and suggestions for future work. Firstly, prior research has indicated that three time periods are usefulness when considering test of hypotheses involving causal relationships (Burkholder and Harlow, 2003). This study used a two wave design and future research may wish to conduct three or more waves of data collection to study trust-risk relationships.

Secondly, future research might consider whether five weeks is long enough for a longitudinal design. This time frame was used because many previous studies had used it (Yamasaki et al., 2006). Future research may consider a longer time frame.

Thirdly, a student sample was employed to test the cross-lagged model. This may result in less generalizability. However, as Compeau et al. (2012) suggested that if the theory is under examination, using a student sample can be appropriate. Moreover, this represents an important portion of online health services consumer.

Fourthly, some of the tasks presented to respondents for the purposes of familiarity with online health services may not be applicable to all consumers and may have created bias in their perceptions (Lanseng and Andreassen, 2007).

Fifthly, based on the literature review, various types of relationships between trust and risk were summarized. However, this chapter did not confirm any moderating effects suggested by past studies. Future research may consider whether trust moderate the links between risk and intention, or whether risk moderate the links between trust and intention.

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[12] Courtois et al. 2014. Computers in Human Behavior, 35, pp 278-286.

Finally, this chapter has only shown two dimensions of risk (performance and time), future work needs to determine whether the causal ordering i.e. risk antecedent to trust is the same for other dimensions of risk e.g. psychological risk.

8.7.5 Conclusion

This chapter tested and evaluated the direction of relationships between trust in provider and perceived risk, trust in website and perceived risk as well as the relationships between trust in provider and trust in website. To do so, a two-wave panel data through a cross-lagged structural equation modeling design was used. By comparing the mean differences over time, this chapter examined whether consumer trust and risk perceptions change over time in an e-service context. Online health information services were used as the empirical context. Data collection involved administration of an instrument to students at two periods in time approximately 5 weeks apart. Tests of cross-lagged SEM models supported the influence of risk perceptions on trust (both trust in provider and trust in website). This is consistent with past studies (Dinev et al., 2006; Horst et al., 2007; Bansal et al., 2010; Liao et al., 2011; Yi et al., 2013). Empirical results also found trust in provider and trust in website to have reciprocal relationships. Results are important for e-service researchers understanding of the trust-risk relationship and their effects on consumer acceptance as well as helping e-services researchers to understand dynamic trust-risk nature. Results can help e-service providers with their long-term online business strategies and with their technology platforms (i.e., website).

The next chapter concludes the thesis.

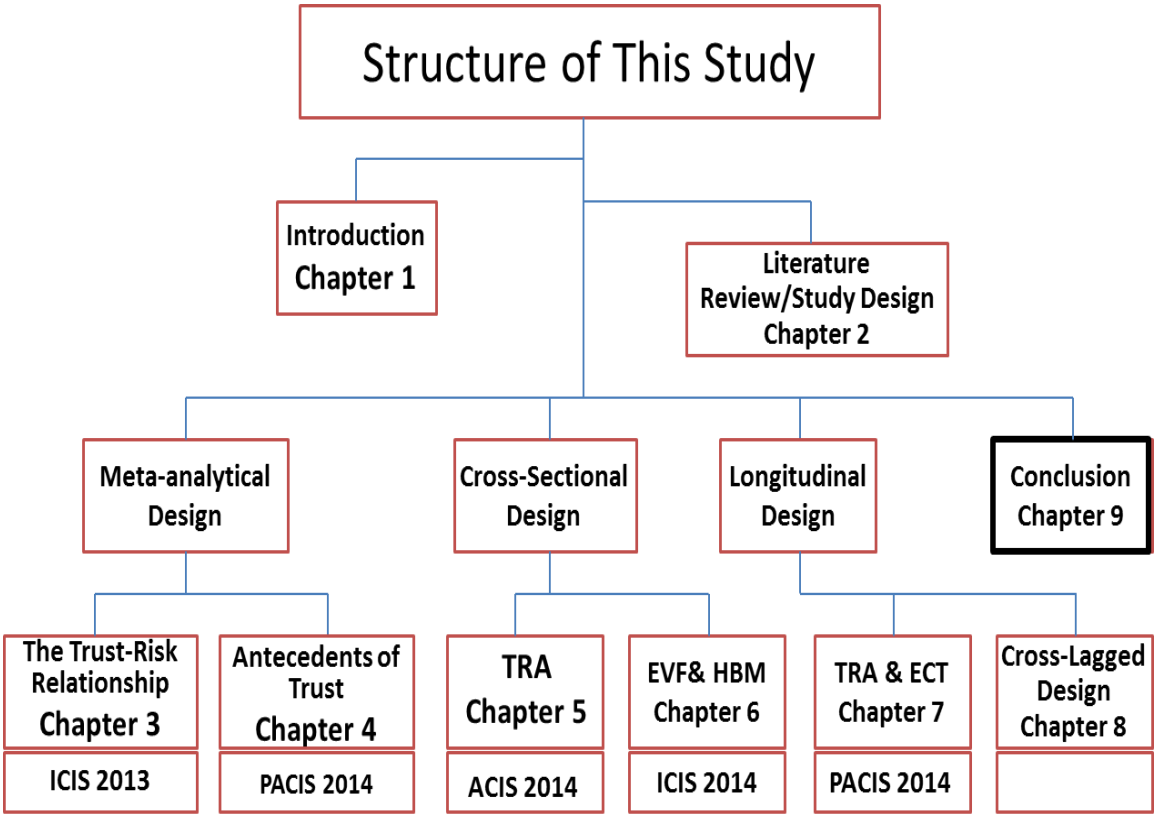


Figure 43: Conclusions

The previous chapters presented the meta-analytic, cross-sectional and longitudinal studies that constitute the contribution of this thesis. The thesis is concluded next.

CHAPTER 9: CONCLUSIONS

9.1 Summary of the study

This study has addressed trust and risk in consumer acceptance of e-services. More specifically, it explored the effects of trust and risk perceptions on acceptance, the antecedents of trust, the casual relationship between trust and risk, as well as whether trust and risk perceptions change over time and how they come to influence early and later stage acceptance of e-services. To do so, this thesis adopted three research designs, namely meta-analytic approaches, cross-sectional surveys and longitudinal designs.

Results of the meta-analysis showed that trust and risk in e-services are significantly related but, between the two, trust is relatively more important to consumer acceptance. Through synthesizing the antecedents of trust using a second meta-analysis of previously published studies, this thesis showed that structural assurance, reputation, perceived usefulness, system quality and services quality demonstrate the strongest effect sizes on trust. It has also been found that cultural context of the e-service moderates all the effect sizes with relationships strongest in Eastern contexts. Certain effect sizes were moderated by factors such as the type of e-service and the use of student samples.

Through the cross-sectional approach in the context of online health information services, this thesis shows that multi-dimensional trust (trust in provider, trust in website and trust in institutional structures) has both direct and indirect effects, via perceived usefulness, on consumer acceptance. Moreover, the multi-dimensional risk (performance risk, psychological risk and time risk) as well as health beliefs such as perceived susceptibility and severity, are important to consumer acceptance.

Through the longitudinal approaches, the thesis shows that trust, risk perceptions and perceived usefulness are important to the prediction of consumer acceptance of online health services at both the early and later usage phases. Furthermore, trust in provider and trust in website have reciprocal relations and empirical data supported the influence of risk perceptions on trust. The implications of this work are discussed next.

9.1.1 Implications for Theory and Research

This thesis has several valuable implications for theory and research. First, this is the first study to use meta-analysis to examine the effects of both trust and risk, and the antecedents of trust on consumer acceptance of e-services. In so doing it shed light on their relative importance to consumer attitudes and intentions. Specifically, it was found that that trust and risk are significantly related but, between the two, trust is relatively more important to consumer acceptance. Its effects on acceptance of e-services across a number of contexts were found only partially mediated by risk perceptions. Furthermore, this thesis also found that trust is not only salient in commercial e-service contexts but also extends to the non-commercial context (e.g., e-government and e-health), which can help researchers to better understand the importance of trust in both commercial and non-commercial context.

Through the meta-analytic approaches, this thesis has also confirmed that trust has a number of antecedents. The classification of antecedents of trust into vendor and institution-based; technological-based; knowledge-based and consumer-based may also provide a useful framework for future research. Among them, technological-based antecedents revealed that all the factors are strongly correlated with trust. Trust has strong links with all the TAM and IS Success model variables suggesting that trust can be usefully integrated into those theories in future explanations of e-service use and satisfaction.

By integrating the available evidence from prior studies, the meta-analysis results provide a benchmark against which future studies can compare their effect sizes. By examining the heterogeneity of effect sizes, important moderating effects were identified, which has important implications for researchers. In particular, the specific selection of antecedents should take the culture context into account, and classify the commercial and non-commercial nature of the e-service. Trust building may be especially difficult in Eastern contexts where reputation and familiarity are very important to trust alongside issued of security, privacy and technology factors. Commercial and non-commercial contexts are not different in terms of system quality and disposition to trust but they are different in that familiarity, information quality and security are more important to trust in non-commercial whilst structural assurance, usefulness, ease of use are more important in commercial context.

Through the cross-sectional approaches, the results confirm the importance of trust in the belief-attitude-acceptance structure, and the role of trust in online health information service usage. The findings that trust can be reliably modeled as a higher-order construct reflected by trust in provider, trust in website and trust in institutional structures can help future researchers to more comprehensively capture trust in the e-service context. This provided a new insight into the multidimensional nature of trust. Which can help researchers better understand the formation of trust.

Furthermore, this thesis extended the valence framework to study consumer acceptance of a non-commercial e-service, and integrated it with the Health Belief Model (HBM). Unlike many of previous studies of health beliefs that examine general health behaviors, this thesis has shown HBM relevant also to the study of online health information seeking. The results indicate that health beliefs and the valence framework provide two fundamental explanations for what health information seekers take into account when making decisions to use online health services. This can help researcher better understand variations in the use of online health information services. Consumer engagement with online health services is best understood as simultaneously a health-related behavior and an e-service usage behavior. To my best knowledge, no other study has integrated HBM and extended valence framework to study online health behaviors.

The results of this thesis also highlight the role of risk barriers in consumer acceptance of online health information service context. The thesis identified multifaceted barriers including performance risk, psychological risk and time risk. Trust could also be reliably modeled as a higher-order construct of beliefs including online service provider's ability, benevolence and integrity. This suggests that modeling multiple dimensions can be more appropriate than modeling uni-dimensional constructs. This can help future researchers to more comprehensively capture beliefs in the e-service context.

The thesis also integrated TRA and ECT as two theoretical perspectives important for predicting initial and post-usage continuance in the e-service context. This thesis has confirmed TRA and ECT as useful theoretical underpinnings for the examination of early and later stages of IS use and shown that actual usage is important to the integration of these two models. Actual usage would precede confirmation of expectation and belief modification in both a process and causal sense. ECT suggests that consumers have initial expectations before making a purchase/adoption decision. After their period of use, consumers form specific perceptions regarding the performance of the product or service.

In ECT, initial expectation directly influences confirmation. However, empirical evidence suggests that actual usage mediates the link between expectation (initial behavioral intention) and confirmation.

The findings provide added support to ECT as confirmations were found important to satisfaction and the updating of beliefs. These are in turn important to continued behavioral intention. However, trust at later stages had an insignificant effect on satisfaction. This suggests that trust may not be a relevant component within an ECT-based model of post-usage intention, where satisfaction is primarily driven by experience of outcomes i.e., usefulness and confirmation. Trust however has direct effects on continuance intention.

The thesis also found early stage risk perceptions influences later stage trust in provider and website, this result is consistent with the study of Dinev et al. (2006). Empirical evidence supports risk perceptions influence on trust. This thesis has contributed by using a novel technique (cross-lagged SEM) to shed light on an important question regarding the causal connection between trust and risk. This is important to guide future research how to model trust-risk relationships in e-service context. An important question about causality within the field has now been better examined.

It was also found that some early beliefs are difficult to change and do not appear to wear off over time. Moreover, the reciprocal relationship found between trust in website and trust in provider can guide future research to better model the relationship between the two types of trust. Moreover, trust in provider and trust in website are both found important to form positive behavioral intention at both early stage and later stage usage and are thus important to explanations of e-service usage at multiple stages of consumer engagement.

9.1.2 Implications for Practice

In the broader context of e-services, this thesis has the following practical implications.

Through the meta-analytic approaches, this study provided insights into the relative importance of different antecedents of trust which can be useful for guiding practitioners to focus on trust-building mechanisms. E-service providers in Western consumer populations need to also focus on improving attitudes toward the use of e-services through additional risk reduction mechanisms whilst those in Eastern contexts should

focus on changing trust beliefs through implementation of trust-building mechanisms relevant to more collectivist cultural contexts such as China. With this understanding, practitioners will be better positioned to establish their online service offerings. Moreover, the results confirmed that all the antecedents were moderated by culture. This is particularly important to global firms. The practitioners may build different e-service promotion strategies across different cultures/countries. This thesis also highlights for e-service providers the importance of focusing on vendor and technology platform related trust which may have increased payoffs for consumer acceptance. Consumers base their trust on whether the e-vendor is dependable and honest, the website is reliable and has the functionality needed, and institutional safeguards (e.g., statements of guarantees, encryption and legal structures) exist to make it safe to obtain service online. Trust is the foundation on which subsequent usefulness perceptions and behavioral intentions are formed.

In the specific context of online health information services, this thesis has the following practical implications.

Through the cross-sectional approaches, the results of this thesis can help focus practitioner attention on determining the mechanisms required for trust-building and for improving consumer acceptance through demonstration of the usefulness of health information provided. Online health information providers need to ensure that they increase trust by building their reputation as a reliable, competent provider of health information, ensuring their website platforms are dependable and perform reliably, and promoting over institutional trust by provision of assurances and support of technologies designed to safeguard consumer interactions with their site.

Moreover, risk barriers play an important role in dampening consumers' online health information acceptance behavior. Perceived barriers modeled as a high order construct including performance risk, psychological risk and time risk that negatively affect online health information acceptance. Online health service providers should mitigate those risk barriers for consumers by saving health information seeker's searching time, and reducing unwanted anxiety, as well as providing health information correctly.

Furthermore, perceived benefits, perceived susceptibility and perceived severity are other important factors influencing consumer behaviors. Individuals are more likely to seek out health information when they perceive their general health as poorer and have a need for access to health information. This finding can help online health-related information

providers to understand the profiles of consumers that may come to interact with their sites and how perceived health threats as well as the need for improved self-management are important to their motivation. Health sites should empower self-management in a manner that allows for better decision making based on differing levels of susceptibility and severity e.g., through advanced search options.

Through the longitudinal approaches, the results show that trust and perceived usefulness are important to the prediction of consumer acceptance of online health services at both the early and later usage phase. This suggests that online health service providers should increase consumers' trust beliefs and usefulness perceptions to promote acceptance.

This thesis also found that early stage trust in provider influences later stage trust in provider, this means practitioner should always pay attention to their public image, such as be truthful in its dealings with their consumers and be effective in assisting their consumers to search for health information. If in the early stage of interaction with providers, consumers are not confident in the e-vendor, it will be difficult to gain more trust beliefs at a later stage. Moreover, because early stage trust in website influences later stage trust in website, website designers should pay attention to how they build and operate their website over time. Website designer should make their website reliable, dependable, and the functionality must meet consumer needs (e.g., a good web interface or a good navigation or search engine).

9.1.3 Methodological Implications

This thesis also has several important methodological implications. To address the fragmented and contradictory nature of the field and the research questions posed in the introduction, this study adopted both a meta-analytic structural equation modeling (MASEM) approach and cross-lagged structural equation modeling approach.

MASEM combines the procedures of meta-analysis and structural equation modeling in a step-wise fashion. First, meta-analysis is used to combine quantitative evidence from prior studies and to estimate both weighted mean and true-score correlations between the variables of interest. A matrix of true-score correlations derived from a meta-analysis can then be applied in a structural equation modeling (SEM) analysis for testing whether a given model fits a hypothesized pattern of relationships (Viswesvaran and Ones, 1995).

By applying these techniques, this study has gone beyond previous works in e-service and trust-risk research to synthesize evidence from across past works, examine larger samples and consider moderating effects of culture, type of e-services were examined. Other researchers can learn from the techniques applied here to resolve other contradictory questions of the IS field.

Causality is considered an important issue in academic research. Addressing the problem of causality was of particular interest in this thesis. Longitudinal research design and cross-lagged structural equation modeling was adopted to determine the casual relationship between trust and risk. Few studies have employed cross-lagged SEM design in IS research. This thesis has shown various advantages of this method. Moreover, the aaproach adopted here is especially useful to guide future IS researchers on how to employ cross-lagged designs to study controversial causal phenomenon.

9.1.4 Limitations and Future Research

It is important to note some limitations of this thesis. The limitations of meta-analytic designs were presented in Chapter 3 and Chapter 4. They are summarized as follows. First, in meta-analyses, the findings are influenced by the underlying methods used in the primary empirical studies. Second, only studies that reported correlations and sample sizes can be include in the analysis. This results in possible omission of relevant studies that do not report sample sizes or variable's inter-correlations. Third, the focus on quantitative studies results in the exclusion of qualitative studies that may provide useful insights into trust building amongst consumers. Fourth, although several research databases were reviewed for relevant studies, resource constraints limit the number of research databases that can be covered and that are accessible to the researcher. Fifth, by aggregating findings from across studies, meta-analytic work loses information about the original study contexts. For example, the context and some factors may not be as well understood.

The limitations of the cross-sectional and longitudinal survey designs were presented in Chapters 5, 6, 7 and 8. They are summarized as follows. First, due to the difficultly in carrying out a laboratory-based experimental scenarios research designs in general consumer populations, the sample is drawn from a university population. This is a recognized threat to external validity of the findings and may limit the generalizability of the conclusions to other populations. Online health information services were selected as

the particular e-service context for empirical study. The use of online health information services as a context for study is important due to its recent growth as a high-potential area for e-services and one in which the salience of trust and usefulness perceptions is likely to be highly significant. However, results may not necessarily be generalizable beyond this context, e.g., to trust and risk in e-government, or social networking, or e-commerce contexts.

The cross-sectional design limits ability to make causal inferences, except with reference to theory. This was overcome in the longitudinal designs where temporal precedence could be better established. This thesis considered two wave panel data. Future research may conduct three or more waves to study trust-risk controversial causal relationships. Future research might also consider whether several weeks are long enough for a longitudinal design and may wish to consider longer time frames.

Moreover, the data collected was self-reported in this thesis (from Chapter 5-8). Future research may use more objective measures to mitigate the problems of biases in self-reported data e.g., using logs of actual e-service usage behavior.

Because this study has confirmed trust as multi-dimensional and as highly important to acceptance, future research may wish to determine the specific antecedents that can influence trust in digital health innovations and may wish to consider other variables potentially unique to the healthcare context.

9.1.5 Conclusion

To address the question of trust and risk in consumer acceptance of e-services, this thesis adopted meta-analytic, cross-sectional and longitudinal research designs. Through the meta-analytic approach, the effects of trust and risk on acceptance as well as the antecedents of trust were synthesized using previously published studies. Results confirm the salience of trust and risk across a variety of e-service contexts but have identified some important moderating influences of context.

Through the cross-sectional approaches, multi-dimensional trust and risk were found significant in the context of acceptance of online health services alongside factors driven from extended valence framework and health beliefs models.

Through the longitudinal designs, the thesis has overcome the limitations of past cross-sectional studies. The results show that trust and risk perceptions are important to the

prediction of consumer acceptance at both the early and later phases, risk perceptions influence trust, and trust in provider and trust in website have reciprocal relations. Findings of this thesis may have more general applicability beyond online health but future research should establish this. Together, these results have important implications for research, theory, methodology and practice.

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Appendix A. Ethics Clearance

Research Office

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)
R14/49 Mou

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER H13/07/25**
PROJECT TITLE	Trust and risk in consumer acceptance of e-service: the case of online health service
INVESTIGATOR(S)	Mr J Mou
SCHOOL/DEPARTMENT	CLM/Economic and Business Sciences
DATE CONSIDERED	19/07/2013
DECISION OF THE COMMITTEE	Approved Unconditionally
EXPIRY DATE	25/07/2015

DATE 26/07/2013 **CHAIRPERSON** pp
(Professor T Milani)

cc: Supervisor : Prof J Cohen

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10003, 10th Floor, Senate House, University.

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to completion of a yearly progress report.**

Signature

30 / 07 / 2013
Date

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

Appendix B. Survey Permission Letter

Deputy Registrar: Academic

Private Bag 3, Wits 2050, South Africa • Tel: +27 (0) 11 717-1204 • Fax: +27 (0) 86 553 3695 • E-mail: nita.lawton-misra@wits.ac.za



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4 July 2013

TO WHOM IT MAY CONCERN

"Trust and risk in consumer acceptance of e-services: the case of online health services"

It is hereby confirmed that the enclosed research material has been distributed in accordance with the University's approval procedures for such a project. Please be advised that it is your right to withdraw from participating in the process if you find the contents intrusive, too time-consuming, or inappropriate. The necessary ethical clearance has been obtained.

Should the University's internal mailing system be the mechanism whereby this questionnaire has been distributed, this notice serves as proof that permission to use it has been granted.

The student should schedule appointments with those academic members of staff he wishes to interview.

Nita Lawton-Misra
Deputy Registrar: Academic

Appendix C. Experimental Tasks for Chapter 5 and 7

Task sheet (PACIS 2014)

Please visit one of the following websites:

WebMD: www.webmd.com

Health24: www.health24.com

Mayoclinic: www.mayoclinic.com

MedlinePlus: www.nlm.nih.gov/medlineplus

1. Which website did you visit?

Please complete the following tasks using your chosen website.

2. Identify two topics that you would like to learn about from this website.

1).

2).

3. Based on your above answers, construct a search term for each topic.

Search 1:

Search 2:

Using the website's search feature, execute your first search, and answer the following question:

4. How many articles were retrieved?

5. Read one of the articles, and answer the following questions:

What is its title?

When was it written?

6. What information is required to register or sign up to your chosen website?

7. What are some advantages or benefits of signing up this website?

8. Does this website contain information on second-hand smoke?

(1). Yes (2). No

8. Does this website contain information on vaccinations?

(1). Yes (2). No

9. Does this website contain information on the relationship between exercise and heart disease?

(1). Yes (2). No

10. Does this website contain information on the role of fiber in one's diet?

(1). Yes (2). No

11. Imagine… You are visiting your elderly relative who lives alone, in another part of the country. On the second day of your visit, she carries several bags of groceries up two flights of stairs and stops with a pained expression on her face. When you press her to tell you what is wrong, she admits that she is having chest pain. She says that the pain feels as if something were squeezing her chest. She is also nauseous and out of breath. She lies down to rest. The discomfort lasts 2–3 minutes, after which the pain stops.

When you talk to her about this incident, she admits that for the past year, she has been troubled by periodic squeezing pain in her chest. Sometimes she can also feel the pain in her neck and shoulders. The pain usually happens after she does something physically active: climbs several flights of stairs, does some heavy housework, unloads groceries, etc. When this happens, she also often feels nauseous and out of breath. She also feels very tired. The pain typically lasts a few minutes and goes away after she rests a while.

Using your chosen website, try to identify what is the name of the condition your elderly relative suffers from?

1. Imagine… You would like to know more about the flu. Using your chosen website, search for articles on different types of flu (or flu viruses) and the causes of flu: How many articles could you find? Read one of the articles, and answer the following questions: (1) what is its title? (2) When was it written?

2. Imagine… During a hike you are bitten by a tick. A red spot appears that increases. This is a sign you have been infected with Lyme borreliosis. A friend recommends starting with an antiviral (remedy against viral infections) immediately, since Lyme's disease can have very unpleasant consequences, especially when treatment starts too late! Answer the following question using your chosen website:

Does this website provide any information to help you make a decision as to whether or not it is a good idea to start an antiviral remedy?

(1). Yes (2). No

3. Read one of the articles, and answer the following questions:

What is it's title?

When was it written?

What does the article suggest?

Appendix D. Experimental Tasks for Chapter 6 and 8

Please visit one of the following websites:

WebMD: www.webmd.com

Health24: www.health24.com

MedlinePlus: www.nlm.nih.gov/medlineplus

1. Which website did you visit?

Please complete the following tasks using your chosen website.

2. Identify a health related topic of interest to you. Then using your chosen website's search feature search for information on this topic: How relevant to you did you find the articles?

(A). Not at all relevant (B). Somewhat relevant (C). Relevant (D). Very relevant

3. Read one of the articles, and answer the following questions:

What is its title?

When was it written?

4. What information is required to register or sign up to your chosen website?

5. Does this website contain information on second-hand smoke?

(1). Yes (2). No

6. Imagine… You are visiting your elderly relative who lives alone, in another part of the country. On the second day of your visit, she carries several bags of groceries up two flights of stairs and stops with a pained expression on her face. When you press her to tell you what is wrong, she admits that she is having chest pain. She says that the pain feels as if something were squeezing her chest. She is also nauseous and out of breath. She lies down to rest. The discomfort lasts 2–3 minutes, after which the pain stops.

When you talk to her about this incident, she admits that for the past year, she has been troubled by periodic squeezing pain in her chest. Sometimes she can also feel the pain in her neck and shoulders. The pain usually happens after she does something physically active: climbs several flights of stairs, does some heavy housework, unloads groceries, etc. When this happens, she also often feels nauseous and out of breath. She also feels very tired. The pain typically lasts a few minutes and goes away after she rests a while.

Using your chosen website, try to identify what is the name of the condition your elderly relative suffers from?

7. Imagine… During a hike you are bitten by a tick. A red spot appears that increases. This is a sign you have been infected with Lyme borreliosis. A friend recommends starting with an antiviral (remedy against viral infections) immediately, since Lyme's disease can have very unpleasant consequences, especially when treatment starts too late! Answer the following question using your chosen website:

Does this website provide any information to help you make a decision as to whether or not it is a good idea to start an antiviral remedy?

(A). Yes (B). No (C). No information

Appendix E. Measurement Items for Chapter 5

Trust in Institutional Structures (McKnight et al., 2002; Gefen et al., 2003a)

INST1: This site has enough safeguards to make me feel comfortable using it to obtain personal health information.

INST2: I feel assured that legal and technological structures adequately protect me from problems on this website.

INST3: I feel confident that encryption and other technological advances on the Internet make it safe for me to obtain heath information from this site.

INST4: In general, the Internet is now a robust and safe environment in which to obtain health information.

INST5: I feel safe obtaining personal health information from this website because of its statements of guarantees.

Trust in Provider (Pavlou and Gefen 2004)

You chose to browse the health information website of one of the follows providers (WebMD, Health24, Mayoclinic, and MedlinePlus. At task 1 your chosen health information site's provider). The following questions relate to your perceptions of that provider. Based on my interaction with the site:

TRP1: I believe that the provider is in general trustworthy.

TRP2: I believe that the provider is in general dependable.

TRP3: I believe that the provider is in general honest.

TRP4: I believe that the provider is in general reliable.

Trust in Website (McKnight and Thatcher 2006)

TRW1: I think this website is very reliable.

TRW2: To me, this website is dependable.

TRW3: This website performs in a predictable way.*

TRW4: I think this website has the functionality I need.

TRW5: Overall, this website has the capabilities I need.

* dropped following initial PCA

Perceived Usefulness (Bhattacherjee and Premkumar 2004)

PU1: Using this website can be of benefit to me in managing my health.

PU2: Using this website can improve my performance in managing my health.

PU3: Using this website will be useful for my health.

PU4: Using this website can enhance my effectiveness in managing my health.

Perceived Risk (Corbitt et al., 2003)

PR1: Using this website to obtain health care advice is risky because the health information may be inferior.

PR2: Using this website to obtain health care advice is risky because the health information may be inaccurate.

PR3: Using this website to obtain health care advice is risky because the health information may not meet my needs.

PR4: Using this website to obtain health care advice is risky because the health information may lead to a loss for me.

Attitude (Hsu et al., 2006)

ATT1: I think using online health websites are good for me.

ATT2: I think using online health websites are appropriate for me.

ATT3: I think using online health websites are beneficial for me.

ATT4: I have positive opinion of online health website.

Continuance Intention (Bhattacherjee and Premkumar 2004)

INT1: I intend to continue using this website to obtain health information.

INT2: I plan to continue using this website to obtain health information.

INT3: I will continue using this website to obtain health information.

Appendix F. Measurement Items for Chapter 6

Perceived benefit (Bhattacherjee and Premkumar 2004)

PB1: Using this website can be of benefit to me in managing my health.

PB2: Using this website can improve my performance in managing my health.

PB3: Using this website will be useful for my health.

PB4: Using this website can enhance my effectiveness in managing my health.

Trust in provider (TRP) (t1/t2)

TRB1: (Benevolence) I expect this website information provider has good intentions toward me. (Hwang and Lee 2012).

TRB2: (Benevolence) I expect this website information provider is acting in my best interest (Thatcher et al., 2013).

TRB3: (Benevolence) I expect this website information provider is well meaning (Hwang and Lee 2012). *

TRI1: (Integrity) This website information provider is truthful in its dealings with me (Thatcher et al., 2013).

TRI2: (Integrity) I would characterize this website information provider as honest (Thatcher et al., 2013).

TRI3: (Integrity) This website information provider would keep its commitments to deliver quality information (Thatcher et al., 2013).

TRI4: (Integrity) This website information provider is sincere and genuine (Thatcher et al., 2013).

TRA1: (Ability) I believe this website information provider is effective in assisting me to search for health information.

TRA2: (Ability) This website performs its role of health information provider very well (Thatcher et al., 2013).

TRA3: (Ability) Overall, this website is a capable and proficient provider of health information (Thatcher et al., 2013).

TRA4: (Ability) In general, this website is a very knowledgeable provider of health information (Thatcher et al., 2013).

Perceived risk (PR) (t1/t2)

REP1: (Performance risk) The health information site is risky, because it may fail to deliver what it promises (Sun 2014).

REP2: (Performance risk) The health information site is risky, because it may provide information incorrectly (Lee 2009).

REP3: (Performance risk) The health information site is risky, because the information delivered may fail to meet my expectations (Corbitt et al., 2003).

RT1: (Time risk) It may take too much time to find appropriate information on the website (Forsythe et al., 2006).

RT2: (Time risk) Using the website may waste my time (Featherman and Pavlou 2003).

RPS1: (Psychological risk) The thought of using the health information site makes me feel psychologically uncomfortable (Liao et al., 2010).

RPS2: (Psychological risk) The thought of using the health information site gives me a feeling of unwanted anxiety (Liao et al., 2010).

RPS3: (Psychological risk) The thought of using the health information site causes me to experience unnecessary tension (Liao et al., 2010).

Continuance intention (INT) (t1/t2)

INT1: I intend to continue using this website to obtain health information (Bhattacherjee and Premkumar 2004).

ITN2: I plan to continue using this website to obtain health information (Bhattacherjee and Premkumar 2004).

INT3: I will continue using this website to obtain health information (Bhattacherjee and Premkumar 2004).

Self-Efficacy

ISE1: I feel confident exchanging messages with other users in online discussion (Hsu and Chiu 2004).

ISE1: I feel confident chatting on the WWW (Hsu and Chiu 2004).

ISE1: I feel confident downloading files from the Internet (Hsu and Chiu 2004).*

ISE1: I feel confident creating a web page for the World Wide Web (Hsu and Chiu 2004).

* dropped following initial PCA

Perceived Severity

PSE1: Not having access to health information is a serious problem for me (Ng et al., 2009).

PSE2: Suffering a loss by not having access to health information is a serious problem for me (Ng et al., 2009).

PSE3: Without access to health information, my daily life could be negatively affected (Ng et al., 2009).

Perceived Susceptibility

PSU1: My general health is in bad condition (Goonawardene et al., 2013).

PSU2: My health has major complications in my life (Goonawardene et al., 2013).

PSU3: My health condition may cause difficulties for me in my life (Goonawardene et al., 2013).

Appendix G. Measurement Items for Chapter 7

Perceived Usefulness (Bhattacherjee and Premkumar 2004) (t1/t2)

PU1: Using this website can be of benefit to me in managing my health.

PU2: Using this website can improve my performance in managing my health.

PU3: Using this website will be useful for my health.

PU4: Using this website can enhance my effectiveness in managing my health.

Subjective Norms (Venkatesh et al., 2011) (t1)

SN1: People who influence my behavior think that I should use health informatics website.

SN2: People who are important to me think that I should use health informatics website.

SN3: People who are in my social circle think that I should use health informatics website.

Trust in Provider (Pavlou and Gefen 2004) (t1/t2)

You chose to browse the health information website of one of the follows providers (WebMD, Health24, Mayoclinic, MedlinePlus. At task 1 your chosen health information site's provider). The following questions relate to your perceptions of that provider. Based on my interaction with the site:

TR1: I believe that the provider is in general trustworthy.

TR2: I believe that the provider is in general dependable.

TR3: I believe that the provider is in general honest.

TR4: I believe that the provider is in general reliable.

Habit (Limayem et al., 2007) (t2)

HAB1: Using the web has become automatic to me.

HAB2: Using the web is natural to me.

HAB3: When faced with a particular task, using the web is an obvious choice for me.

Continuance Intention (Bhattacherjee and Premkumar 2004; Kim et al., 2009a) (t1/t2)

INT1: I intend to continue using this website to obtain health information.

INT2: I plan to continue using this website to obtain health information.

INT3: I will continue using this website to obtain health information.

INT4: I am likely to return to this website for searching health care information.

INT5: I am likely to surf health care information from this website in the following months.

INT6: I intend to continue using this website rather than discontinue its use.

INT7: I will recommend this website to friends.

INT8: If I have any others health problems, I would like get the information from this website.

Habit (Limayem et al., 2007) (t2)

HAB1: Using the Web has become automatic to me.

HAB2: Using the Web is natural to me.

HAB3: When faced with a particular task, using the Web is an obvious choice for me.

Confirmation (Bhattacherjee and Premkumar 2004) (t2)

CON1: My experience with using this website was better than what I had expected.*

CON2: The information provided by this website was better than what I had expected.

CON3: Overall, most of my expectations from using this website were confirmed.

CON4: The expectations that I have about this website were correct.

* dropped following initial PCA

Satisfaction (Bhattacherjee and Premkumar 2004) (t2)

How do you feel about your overall experience of the surfing through this Website?

SAT1: Very satisfied.

SAT2: Very pleased.

SAT3: Very contented.

SAT4: Absolutely delighted.

Actual Use (Suh and Han 2002) (t2)

USE1: Over the past 7 week's period, how often did you use the health website? (Not at all, Less than once a week, About once a week, Two or three time a week, Several times a week)

USE2: In the last 7 weeks, approximately how many hours did you spend using the health website? (< 1hour, 1-5 hour, 5-10 hour, 10-15 hour, >15 hour)

1. Please circle your age with an O

(1). 18-19. (2). 20-22. (3). 23-25. (4). More than 25.

2. Please circle your gender

(1). Female. (2). Male.

3. Please indicate which of the following e-services you are currently using? (You can choose more than one)

(1). Online shopping. (2). Internet banking. (3). Mobile banking. (4). E-government service.

(5). Social networking service. (6). Health care e-service. (7). Online legal services.

(8). Others. For example: _____

4. If you have had experience of doing online shopping, what products/services do you usually buy?

_____

6. Before participating in this study did you have any previous experience with online health website?

(1). Yes. (2). No.

5. Do you own a smart phone?

(1). Yes. (2). No.

6. How many years of your mobile phone experience?

(1). 1-3. (2). 4-6. (3). 7-9. (4). More than 9 years.

7. How many years of your computer experience?

(1). 1-3. (2). 4-6. (3). 7-9. (4). More than 9 years.

Appendix H: Measurement Items for Chapter 8

Trust in provider (TRP) (t1/t2)

(TRP1) benevolence: I expect this website information provider has good intentions toward me. (Hwang and Lee, 2012).

(TRP2) benevolence: I expect this website information provider is acting in my best interest (Thatcher et al., 2013).

(TRP3) benevolence: I expect this website information provider is well meaning (Hwang and Lee 2012). *

(TRP4) integrity: This website information provider is truthful in its dealings with me (Thatcher et al., 2013).

(TRP5) integrity: I would characterize this website information provider as honest (Thatcher et al., 2013).

(TRP6) integrity: This website information provider would keep its commitments to deliver quality information (Thatcher et al., 2013).

(TRP7) integrity: This website information provider is sincere and genuine (Thatcher et al., 2013).

(TRP8) ability: I believe this website information provider is effective in assisting me to search for health information.

(TRP9) ability: This website performs its role of health information provider very well (Thatcher et al., 2013).

(TRP10) ability: Overall, this website is a capable and proficient provider of health information (Thatcher et al., 2013).

(TRP11) ability: In general, this website is a very knowledgeable provider of health information (Thatcher et al., 2013).

* dropped following initial PCA

Trust in website (TRW) (t1/t2)

Reliability1: I think this website is very reliable (Thatcher et al., 2013).

Reliability2: To me, this website is dependable (Thatcher et al., 2013).

Reliability3: This website performs in a predictable way (Thatcher et al., 2013).*

Capability1: I think this website has the functionality I need (Thatcher et al., 2013).

Capability2: This website has the ability to do what I want it to do (Thatcher et al., 2013).

Capability3: Overall, this website has the capabilities I need (Thatcher et al., 2013).

* dropped following initial PCA

Perceived risk (PR) (t1/t2)

Performance risk 1: The health information site is risky, because it may fail to deliver what it promises (Sun 2014).

Performance risk 2: The health information site is risky, because it may provide information incorrectly (Lee 2009).

Performance risk 3: The health information site is risky, because the information delivered may fail to meet my expectations (Corbitt et al., 2003).

Time risk 1: It may take too much time to find appropriate information on the website (Forsythe et al., 2006).

Time risk 2: Using the website may waste my time (Featherman and Pavlou, 2003).

Continuance intention (INT) (t1/t2)

(INT1) I intend to continue using this website to obtain health information (Bhattacherjee and Premkumar, 2004).

(ITN2) I plan to continue using this website to obtain health information (Bhattacherjee and Premkumar, 2004).

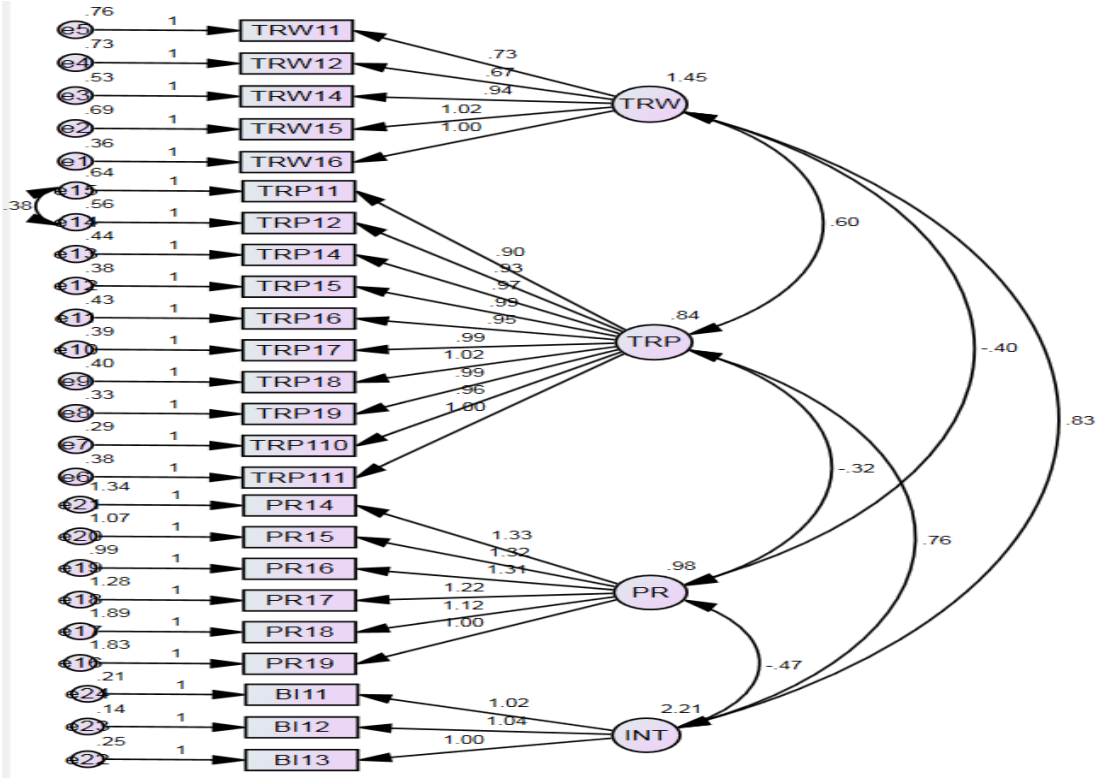
(INT3) I will continue using this website to obtain health information (Bhattacherjee and Premkumar, 2004).

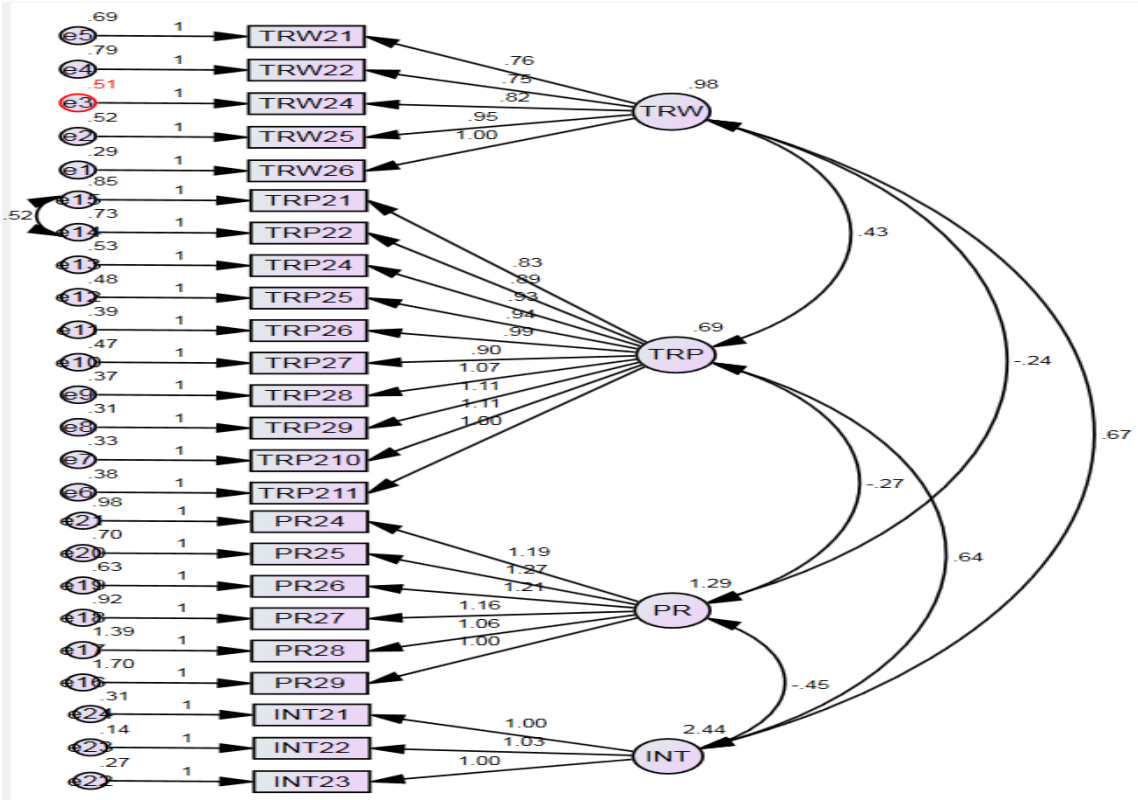
Appendix I: Studies Included in Chapter 4

Study	P/J	Object	Coding	Population	Coding	Country	Coding
Aldás-Manzano et al. (2009)	J	Internet Banking	C	Consumer	NS	Spanish	W
Azam et al. (2013)	J	E-Commerce	C	Student	S	China	E
Bansal et al. (2010)	J	Online Health Information	N	Student	S	US	W
Bhattacherjee (2002)	J	Online Firms	C	Consumer	NS	US	W
Chellappa (2008)	U	E-Commerce	C	Student	S	US	W
Chen and Dibb (2010)	J	Online Retail	C	Student	S	UK	W
Chen and Teng (2013)	J	Online Store	C	Consumer	NS	Taiwan	E
Chiu et al. (2009)	J	Online Shopping	C	Consumer	NS	Taiwan	E
Cho et al. (2007)	P	Internet Commerce	C	Student	S	Korea	E
Chun and Shin (2010)	J	Internet Shopping	C	Student	S	Korea	E
Curry (2011)	P	Wi-Fi Hotspots	N	Student	S	US	W
Davis et al. (2011)	J	Mobile Service Advertising	C	Consumer	NS	New Zealand	W
Dinev et al. (2006)	J	E-Commerce	C	Consumer	NS	Italy	W
				Consumer	NS	US	W
Eastlick and Lotz (2011)	J	Online Retailers	C	Consumer	NS	US	W
Fang et al. (2011)	J	Online Shopping	C	Consumer	NS	Taiwan	E
Gefen (2000)	J	E-commerce	C	Student	S	US	W
Gefen (2002)	J	E-Commerce	C	Student	S	US	W
Gefen and Straub (2003)	J	B2C e-service	C	Student	S	US	W
Gefen et al. (2003a)	J	Online Shopping	C	Student	S	US	W
Gefen et al. (2003b)	J	Online Stores	C	Student	S	US	W
Gu et al. (2009)	J	Mobile Banking	C	Consumer	NS	Korea	E
Hsieh (2013)	J	E-Return Service	C	Consumer	NS	Taiwan	E
Huang et al. (2006)	J	E-Commerce	C	Student	S	Taiwan	E
Johnson (2007)	J	Banking Service	C	Consumer	NS	US	W
Kassim and Abdullah (2010)	J	E-Commerce	C	Consumer	NS	Malaysia, Qatar	X
Kassim and Ismail (2009)	J	E-Commerce	C	Consumer	NS	Qatar	W
Katos (2012)	J	Online Transition	C	Consumer	NS	Greece	W
Kesharwani and Bisht (2012)	J	Internet Banking	C	Student	S	India	E
Kim and Park (2013)	J	Social Commerce	C	Consumer	NS	Korea	E
Klein (2007)	J	E-Health	N	Consumer	NS	US	W
Komiak and Benbasat (2006)	J	Web-Based Recommendation Agents	C	Student	S	Canada	W
Krasnova et al. (2010)	J	Social Networks	N	Student	S	Germany	W
Kuan and Bock (2007)	J	Online Shopping Intention	C	Consumer	NS	Singapore or Korea	E
Lee and Rao (2009)	J	E-Government	N	Student	S	US	W
Li et al. (2008)	J	New Technology	N	Student	S	US	W
Li et al. (2013)	J	Health Record Systems	N	Student	S	US	W
Li et al. (2007)	J	Internet Shopping	C	Student	S	China	E
Liu et al. (2009)	P	Mobile Banking	C	Consumer	NS	China	E
Luo et al. (2010)	J	Mobile Banking	C	Student	S	US	W
Lo (2010)	P	Social Networks	N	Student	S	US	W
Malhotra et al. (2004)	J	Internet	N	Consumer	NS	US	W
McKnight et al. (2004)	J	Web Business	C	Student	S	US	W
Pavlou (2001)	P	E-Commerce	C	Student	S	US	W
Pavlou and Gefen (2005)	J	Online Marketplaces	C	Consumer	NS	US	W
Qureshi et al. (2009)	J	Online Shopping	C	Student	S	New Zealand	W
				Student and Staff	NS	Northern Ireland	W

Ribbink et al. (2004)	J	E-Commerce	C	Consumer	NS	European	W
Shen et al. (2010)	J	Mobile Banking	C	Consumer	NS	Taiwan	E
Sia et al. (2009)	J	Internet Shopping	C	Student	S	Australia	W
Slyke et al. (2006)	J	Online Purchasing	C	Student	S	US	W
Teh and Ahmed (2012)	P	Social Commerce	C	Student	S	Malaysia	E
Teo and Liu (2007)	J	E-Commerce	C	Student	S	US	W
				Student	S	Singapore	E
				Student	S	China	E
Turel et al. (2008)	J	E-Customer Services	C	Student	S	US	W
Wen et al. (2011)	J	Online Shopping	C	Student	S	US	W
Xu et al. (2005a)	P	Location-Based Services	N	Consumer	NS	Singapore	E
Xu et al. (2005b)	P	P2P Information Sharing	N	Student	S	Singapore	E
Yi et al. (2013)	J	Web-Based Health Information	N	Consumer	NS	Korea	E
Zhou (2012)	J	Mobile Banking	C	Consumer	NS	China	E
Zhou (2011)	J	Location-Based Services	N	Student	S	China	E
Zhu et al. (2011)	J	Online Shopping	C	Student	S	Taiwan	E

Appendix J: Time 1 and Time 2 Measurement Models





Appendix K: Time 1 Reliability and Validity

		Estimate	(Est)*(Est)	error	CR	AVE	Cronbach-a
TRW1	TRW16	0.896	0.803	0.197	0.896	0.635	0.894
	TRW15	0.827	0.684	0.316			
	TRW14	0.840	0.706	0.294			
	TRW12	0.690	0.476	0.524			
	TRW11	0.710	0.504	0.496			
TRP1	TRP111	0.831	0.691	0.309	0.950	0.656	0.860
	TRP110	0.856	0.733	0.267			
	TRP19	0.846	0.716	0.284			
	TRP18	0.828	0.686	0.314			
	TRP17	0.823	0.677	0.323			
	TRP16	0.800	0.640	0.360			
	TRP15	0.827	0.684	0.316			
	TRP14	0.802	0.643	0.357			
	TRP12	0.753	0.567	0.433			
	TRP11	0.721	0.520	0.480			
PR1	PR19	0.590	0.348	0.652	0.862	0.513	0.951
	PR18	0.628	0.394	0.606			
	PR17	0.730	0.533	0.467			
	PR16	0.792	0.627	0.373			
	PR15	0.784	0.615	0.385			
	PR14	0.749	0.561	0.439			
INT1	BI13	0.948	0.899	0.101	0.972	0.920	0.972
	BI12	0.972	0.945	0.055			
	BI11	0.957	0.916	0.084			

Appendix L: Time 2 Reliability and Validity

		Estimate	(Est)*(Est)	error	CR	AVE	Cronbach-a
TRW2	TRW26	0.880	0.774	0.226	0.865	0.565	0.864
	TRW25	0.794	0.630	0.370			
	TRW24	0.750	0.563	0.438			
	TRW22	0.640	0.410	0.590			
	TRW21	0.669	0.448	0.552			
TRP2	TRP211	0.803	0.645	0.355	0.932	0.582	0.907
	TRP210	0.849	0.721	0.279			
	TRP29	0.855	0.731	0.269			
	TRP28	0.825	0.681	0.319			
	TRP27	0.735	0.540	0.460			
	TRP26	0.796	0.634	0.366			
	TRP25	0.746	0.557	0.443			
	TRP24	0.726	0.527	0.473			
	TRP22	0.653	0.426	0.574			
	TRP21	0.600	0.360	0.640			
PR2	PR29	0.657	0.432	0.568	0.908	0.623	0.934
	PR28	0.715	0.511	0.489			
	PR27	0.808	0.653	0.347			
	PR26	0.865	0.748	0.252			
	PR25	0.864	0.746	0.254			
	PR24	0.806	0.650	0.350			
INT2	INT23	0.948	0.899	0.101	0.969	0.912	0.969
	INT22	0.975	0.951	0.049			
	INT21	0.942	0.887	0.113			

Appendix M: Time 1 Four-Factor Loadings (PCA)

Rotated Component Matrix[a]

	Component			
	1	2	3	4
TRW11	.255	.714	-.189	.145
TRW12	.243	.731	-.110	.087
TRW14	.272	.790	-.137	.152
TRW15	.165	.831	-.102	.108
TRW16	.220	.854	-.095	.168
PR14	-.118	-.096	.778	-.046
PR15	-.152	-.006	.796	-.130
PR16	-.095	-.132	.817	.022
PR17	-.125	-.055	.791	.004
PR18	-.045	-.210	.687	-.108
PR19	-.142	-.138	.589	-.388
TRP11	.776	.170	-.050	.095
TRP12	.795	.156	-.067	.142
TRP14	.819	.119	-.128	.126
TRP15	.820	.193	-.151	.086
TRP16	.812	.144	-.122	.100
TRP17	.818	.170	-.141	.081
TRP18	.757	.182	-.141	.230
TRP19	.762	.229	-.127	.242
TRP110	.782	.251	-.081	.221
TRP111	.759	.198	-.092	.276
BI11	.305	.191	-.130	.888
BI12	.320	.197	-.128	.883
BI13	.289	.208	-.115	.883

Appendix N: Time 2 Four-Factor Loadings (PCA)

Rotated Component Matrix[a]

	Component			
	1	2	3	4
TRW21	.341	-.168	.663	.092
TRW22	.240	-.097	.692	.071
TRW24	.100	-.057	.785	.198
TRW25	.147	-.016	.820	.113
TRW26	.230	-.084	.834	.125
PR24	-.082	.831	-.056	.017
PR25	-.115	.870	-.030	-.010
PR26	-.080	.874	-.054	-.032
PR27	-.131	.837	-.047	-.040
PR28	-.057	.768	-.118	-.153
PR29	-.115	.693	-.128	-.289
TRP21	.699	-.035	.165	.012
TRP22	.744	.009	.146	.065
TRP24	.787	-.073	.103	.050
TRP25	.793	-.134	.067	.090
TRP26	.813	-.111	.116	.146
TRP27	.768	-.104	.073	.102
TRP28	.765	-.102	.199	.212
TRP29	.736	-.199	.296	.220
TRP210	.752	-.101	.267	.211
TRP211	.723	-.076	.218	.220
INT21	.232	-.147	.178	.902
INT22	.259	-.133	.204	.901
INT23	.247	-.102	.190	.904

Appendix O: A Summary of Prior Longitudinal Studies

Study	Journal	Model	IS	Time frame	Population	Description
Venkatesh and Davis (2000)	Management Science	TAM2	Study 1: proprietary system Study 2: Window based customer account management systems Study 3: Window based system Study4: new system for stock management	T1-t2: one month T2-t3: three months T3-t4: two months	Employees	Compare each time R^2 and β, and then use total data to test TAM2.
Hu et al. (2003)	I&M	TAM	PowerPoint training	4 weeks T1=138 T2=134 Panel data=107	Teacher	T1: training commencement T2: training completion. Use first round data fit proposed model, and second round data fit model again, compare the difference of two models.
Bhattacherjee and Premkumar (2004)	MISQ	Expectation Disconfirmation Theory (EDT)	Study 1: Computer-based tutorial (CBT) usage. Study 2: Rapid Application Development Tool Usage	Study 1: t1 (at the beginning of the semester, when finished the introduction of the training software, did the first round questionnaire) t2 (2 ~3 weeks later, do the second round questionnaire), t3 (9~10 weeks later, do the third round questionnaire). Study 2: two round data collection. t1 and t2	Study 1: IS students Study 2: graduate students, evening section.	Study 1: introduce this training software first, and then within 3 months do the 3rd round questionnaire. t1 (sample size: 189, t2: 175, t3: 172). Study 2: sample size 77.
Hsu et al. (2006)	Int. J Human-Computer Studies	TPB EDT	Online shopping	T1: at the beginning of April 2005. T2: three months later	Student	Were asked to shop in online store. Training first, for the research purpose and how to do online shopping, then visit a specific online shop, but do not need purpose. T1=250. Following months do online shopping then did the second round survey, t2=201.
Zahedi and Song (2008)	JMIS	Dynamic trust model	Health infomediaries	One month	Student	Required one month use of their selected web site t1=400, t2=209.

Bhattacherjee et al. (2008)	The Journal of Computer Information Systems	EDT	Document Management Systems	t1: after finish 3 days software training, did the first round questionnaire. t2: 3 months later.	Employees	Did 8 hours days training first, and then did the first round questionnaire. Sample size: 81.
Kim et al. (2009)	ISR	EDT and trust risk framework	e-commerce online shopping	t1: in the early weeks of the semester t2: three weeks later.	Student	Two round web-based surveys, the t1 survey aims to measure prepurchase intentions, t2, aims to measure post-purchase and future intentions. t1: 468. t2: 258.
Limayem et al. (2007)	MISQ	EDT Habit	WWW	Three rounds T1=week 10 T2=week 11 T3=week 13	Student	Week10: measure PU, CON, SAT, ISC, USC, FPB Week 11: IS usage Week 13: IS usage Three models comparisons
Limayem and Cheung (2008)	I&M	EDT Habit	Learning system	Two rounds week 1 introduction of backboard T1: after 4 weeks later(week 5) T2: week 9	Student	T1: for all the first year business faculty students

Note: PU: Perceived Usefulness; CON: Confirmation; SAT: Satisfaction; ISC: IS Continuance Intention; USC: Continuance Usage; FPB: Frequency of Past Behavior