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Factors Influencing the Adoption of Self-Service Technologies

A Study of the Benefits and Risks of Self-Service Technologies and Trust Beliefs of Service Providers

by

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Abstract

Self-service technologies (SSTs) are largely introduced and promoted to replace traditional service encounters and researchers have been investigating the influencers of SST adoption. This paper incorporates the fresh perspective of customer perceived value and trust beliefs of service provider with technology acceptance model and then proposes a conceptual model. An empirical study is conducted to test the model and study the SST adoption in digital post service context. Six benefits and seven risks of digital post service are identified based on literature review and the characteristics of digital post service, and, together with the three trust dimensions, their influences on SST adoption are tested in the survey. The data collected in the survey is validated and analyzed to detect the relationships between benefits, risks, trust beliefs and SST adoption. Three benefits and two risks are proven to have significant influence on attitude toward using digital post service. Integrity of service provider is also found to positively influence consumers' attitude. Besides, attitude toward using digital post service is a solid predictor of their intention to use the SST. Lastly the theoretical and managerial implications from the results are given as well as the suggestions for future research.

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Chapter 1 Introduction

For decades, scholars studying self-service technologies (SSTs) put their research focuses on the SST adoption theories. Rogers (1995, 2002) developed diffusion of innovations (DOI) theory and proposed five innovation attributes on which individual's decision on the adoption of an innovation is based. Another common approach to investigating the adoption of SSTs is the technology acceptance model (TAM) developed by Davis (1989). Applying the theory of reasoned action (TRA), Davis showed beliefs influence attitudes toward information technology, which lead to intentions and subsequently behaviors of actual technology usage. Later on, more factors have been proposed to extend the TAM and Davis (2000) also updated the TAM (TAM2).

Consumers strive to maximize the perceived value of their SST usage by assessing the tradeoffs between the benefits gained and the cost incurred. Thus, apart from the positive attributes that would encourage consumers to adopt SSTs, perceived risk is another aspect that has been extensively investigated. Curran and Meuter (2005) added perceived risk into TAM and found risk has negative influence on consumers' attitude toward SST adoption. Other studies also added risk as an antecedent of SST adoption and verified its influence (Jarvenpaa *et al.*, 2000; Meuter et al., 2005; Pavlou, 2003). Moreover, the role of trust play in SST adoption is still controversial. Many scholars believe it acts as antecedent of SST adoption (Bélanger and Carter, 2008; Pavlou, 2003) while trust has intertwining relations with risks in SST adoption (Lim, 2003). Therefore, this paper focus on the influences from benefits and risks of SST as well as trust on SST adoption.

1.1 Purpose and research questions

Combining TAM, customer perceived value and trust, this paper aims to further the understanding of factors influencing consumers' SST adoption. Customer perceived

value points out customer's assessment of benefits and loss when they make decisions and customers aim to maximize the value gained by using SSTs. Moreover, trust is commonly accepted to be able to mitigate the risks and uncertainties of SSTs and consumer's trust in service provider has been proven to be a significant influencer of SST adoption (Jarvenpaa *et al.*, 2000; Kim *et al.*, 2008; Pavlou, 2003). In addition, both benefits and risks of SSTs and the trust in service provider have been incorporated with TAM before to thoroughly investigate SST adoption and the combinations are useful in predicting the attitude and intention to SST adoption (Featherman and Pavlou, 2003; Horst *et al.*, 2007; Pavlou, 2003). Therefore, this paper focuses on the following research questions:

- What are the relationships between the benefits of SST and the SST adoption?
- What are the relationships between the risks of SST and the SST adoption?
- What are the relationships between consumers' trust in the service provider and the SST adoption?

1.2 Contribution

1.2.1 Theoretical contribution

The scholars have long investigated the factors influencing consumers' SST adoption and acknowledged the influence of SST's benefits and risks as well as consumers' trust in service provider on SST adoption. However, most studies followed the two research streams of diffusion of innovations (DOI) and technology acceptance model (TAM). DOI developed by Rogers (2002) proposes five innovation attributes to be important for SST adoption – relative advantage, compatibility, complexity, trialability, and observability. TAM developed by Davis (1989) proposes usefulness and ease of use are the fundamental determinants of SST adoption. Although TAM has been extensively explored and extended in various ways by many scholars, a clear customer perceived value perspective on SST adoption is rare. *This paper tries to extend TAM based on such perspective and thus incorporates the benefits and risks of SSTs into TAM.* The

benefits and risks identified are drawn from previous research and are tested in the similar context of the SST of interest in the paper. In particular, the specific risk aspects have not been extensively investigated before and *this paper summarizes the available findings of risks and empirically tested their validity*. Moreover, influence of the trust in service provider on SST adoption is recognized and verified in many studies, so TAM is also extended in this paper by adding trust in service provider as a determinant of SST adoption. In most previous studies of the influence of trust, however, the measurement scale of trust construct is often single and unidimensional. As Gefen (2002) argued, the trust construct should be multi-dimensional and at least in the context of e-commerce, different dimensions of trust have different effect on e-commerce adoption. Mayer *et al.* (1995) proposes the three characteristics of trustee, i.e. ability, benevolence and integrity, are antecedents to trust. Following Gefen (2002) and Lin (2011), *this paper continue to test how the three dimensions of trust would influence SST adoption*. Therefore, this paper would not only explore factors influencing SST adoption from customer perceived value perspective, but help understand role of trust in service provider plays in the process.

1.2.2 Managerial contribution

For service providers, SSTs have obvious financial advantage over service staff, and thus they have been largely introduced and promoted over the past decade. Service providers would always need to be informed and updated of the factors influencing SST adoption. *This paper provides a fresh perspective from customer perceived value and service providers could learn the viability of the perspective.* If the new perspective is useful for understanding SST adoption, it would be easier for service providers to leverage their strengths, compensate weakness, and adjust SST marketing strategy accordingly if necessary. Therefore, *this paper would help service provider understand factors influencing SST adoption and give suggestion for improvement.* Along with the influence from traditional critical factors on SST adoption, s*ervice providers would also know whether and how the trust in the brand could lead to positive effect on SST*

adoption. Service providers could learn which characteristic among the three trust beliefs would be most significant antecedent to SST adoption and thus put more advertising focus accordingly. In addition, the SST of interest in the paper is digital post service, which, to my best knowledge, has not been studied before from the perspective of SST adoption. Thus, the result of the paper would be of help for not only the service provider in the post industry, but other similar SST in the same category.

1.3 Outline

To properly address the topic of SST adoption, both empirical and conceptual studies in the related research field are reviewed. Chapter 2 provides the introduction and categorization of both SSTs in general and the SST of interest in the paper. In chapter 3, hypotheses are derived from the findings of literature review and then a research model is developed. Chapter 4 explains the data collection and validates the measures. In chapter 5, the data analysis is described, the hypotheses are tested and the corresponding results are presented. Lastly managerial and theoretical implications as well as suggestions for future research are provided in Chapter 6.

2. Self-service technologies

In this chapter, self-service technologies (SSTs) would first be defined and then the categorization of SSTs would be discussed. Later, the SST of interest in this paper will be introduced.

2.1 Definition and categorization

Self-service technologies (SSTs) are "technological interfaces that enable customers to produce a service independent of direct service employee involvement". (Meuter *et al.*, 2000, p. 50). Examples include automated teller machines (ATMs), airline check-in machines, automated hotel checkouts, package tracking systems, pay-at-the-pump terminals, self-ordering machines, and so on. In addition, many traditional Internet services, e.g. online banking, are also regarded as SST.

Meuter *et al.* (2000) also developed a categorization of SSTs from the perspectives of both companies and customers (See Figure 1). The columns of the matrix represent the types of interfaces companies are using in self-service encounters. The types of interfaces include telephone-based technologies and various interactive voice response systems, online and internet-based interfaces, interactive free-standing kiosks, and video or CD technologies. Sometimes these technologies are used in combination. For example, a customer could check the inventory of an item through an automated telephone system and then make the order through the website. The rows of the matrix represent the purposes of the interface in customers' opinions, i.e. what the customer can accomplish by using the SST. Many SSTs provide customer service such as frequently asked questions, delivery tracking and complaint submission. Moreover, SSTs also allow customers to do direct transactions with companies. For example, customers could easily buy a new fridge via Amazon.com. In addition, SSTs enable customers to learn, receive information, train themselves, and provide their own

services. For example, an interactive screen at the tourist information center would provide tourists detailed information about attractions and routes. Figure 1 provides the examples of SSTs in each categories (Meuter *et al.*, 2000).

	Interface			
Purpose	**Telephone/Interactive Voice Response**	**Online/ Internet**	**Interactive Kiosks**	**Video/ CD***
Customer Service	• Telephone banking • Flight information • Order status	• Package tracking • Account information	• ATMs • Hotel checkout	
Transactions	• Telephone banking • Prescription refills	• Retail purchasing • Financial transactions	• Pay at the pump • Hotel checkout • Car rental	
Self-Help	• Information telephone limes	• Internet information search • Distance learning	• Blood pressure machines • Tourist information	• Tax preparation software • Television/ CD-based training

*Video/ CD is typically linked to other technologies to provide customer service and transactions.

Figure 1 Categorization of SSTs by Meuter *et al*. (2000)

Later, Meuter *et al.* (2003) identified four clusters of SSTs based on usage and the categorization was derived from 14 SSTs studied in the article. The four SST clusters are: travel/business, daily use, Internet, and limited use. Travel/business cluster consists of the SSTs commonly used in travel and business context, such as automated hotel check out, package tracking, and tax preparation software. Daily use cluster includes automated teller machines (ATM), automated phone banking, and pay at the pump terminals. The examples of Internet cluster are Internet information search and Internet shopping, while the examples of limited use are electronic blood pressure machines and automated gambling machines.

Another method is the customer-based SSTs classification proposed by Cunningham *et al.* (2008). Applying multidimensional scaling technique, Cunningham *et al.* proposed two dimensions of customization and separability as the classification of SSTs. As shown in Figure 2, the two columns represent services that are either customized or standardized while the three rows represent categories of separability. The three levels are highly separated, moderately separable, and inseparable from the product/service, meaning the product is separable, moderately separable or inseparable from the service experience respectively. As for the difference between customization and standardization, customization may include personal contact in the delivery of an SST while standardization does not. For example, when a customer bid for an item via a SST, he or she experiences customized service. On the other hand, the item he or she bought is delivered from another seller other than the SST. Therefore, the service of online auction and the product are separable and customers receive customized service experience.

	Customized	**Standardized**
Separable from product/service	• Airline reservations • Online car buying • Online auctions	
Moderately separable	• Distance education • Online banking	• Pay at the pump • Retail self-scanning • Internet search • Tax software • ATMs
Inseparable from product/service	• Online brokerage	• Interactive phone

Figure 2 Categorization of SSTs by Cunningham *et al.* (2008)

2.2 Introduction of Digipost

The SST of interest in this paper is Digipost, developed and introduced by Norwegian post company Posten. Digipost enables the users to receive all kinds of mail digitally from other people, businesses and public sector and to have access to mailbox everywhere all the time. Until now, Digipost has 700,000 users in Norway, 3000 senders

and 4500 merchants (Digipost, 2016). Digipost requires users to log in via Norwegian BankID or Buypass and the Digipost account is linked with Norway Post address. In this way, unlike regular mails that may end up lost on the way or delivering to the wrong recipient, Digipost assures that the digital post would be sent to the right recipient because everyone in the system has verified their identities. Moreover, Digipost is created with the same security for online bank. User's log-in takes place via an encrypted connection (SSL) and all letters and personal data are stored in accordance with the Norwegian personal data regulations. In addition, users could receive electronic receipts in Digipost by connecting payment card to the service and users could also pay the invoice received at Digipost via the invoice payment function in Digipost (only available on Digipost website). Now not only have major banks, grocery stores, insurance companies, hospitals adopted Digipost to send letters and documents, but all government agencies are required to begin sending mail digitally within the first quarter of 2016. Users, on the other hand, could have access to Digipost via website and Digipost's app for iOS and Android. Digipost is free of charge and a user can send up to 100 secure letters free per month and save up to 1GB free.

Based on the introduction of Digipost above, the SST category of Digipost is discussed in the following. According to the categorization of Meuter *et al.* (2000), the interface of Digipost is online/Internet while users' purposes are multiple. First, users could find the letters and documents they kept and uploaded in Digipost whenever they need it. Another example of the customer service that Digipost offers its users is that Digipost provides receipts from merchants for users to keep track of. Second, Digipost connects users with their banks and allows users to pay bills. Thus, users could directly transact via Digipost. Third, the digital posts from public sectors could enable users to learn and receive information like municipal decisions. In conclusion, Digipost belongs to the SST category that is an online/Internet SST with multiple purposes. According to the clustering of SSTs in Meuter *et al.* (2003), Digipost is a daily use SST because it replaces the traditional post with digital post and the posts deliver every day. According to Cunningham *et al.* (2008), Digipost offers customized experience to every users

since everyone would receive their own posts and receipts. As for separability, Digipost provides the post service digitally and thus the product of Digipost is inseparable from service – Digipost incorporates service in the SST. In conclusion, Digipost belongs to the category of SST that is customized and inseparable of product and service. In summary, Digipost is an online, daily use, customized and inseparable SST with multiple purposes.

3. Theory and hypotheses

In this chapter, the related theories of SST adoption are first reviewed and then based on the research questions proposed in chapter 1, 16 hypotheses are raised to study the relationships between benefits and SST adoption, the relationships between risks and SST adoption and the relationships between trust and SST adoption. In the end, a research model would be presented.

3.1 Related theories of SST adoption

SST adoption is the acceptance and use of SST. According to the Attitude-Behavior paradigm, actual behavior is declared through intention toward the behavior and the intention is influenced by attitude (Fishbein and Ajzen, 2011, p. 20). Intention is defined as a person's estimate of the likelihood or perceived probability of performing a given behavior (Fishbein and Ajzen, 2011, p. 39). The attitude toward performing the behavior is a person's positive or negative evaluation of performing the specific behavior (Fishbein and Ajzen, 2011, p. 20). Although there were controversies of the viability of attitude-behavior relationship, the correlation has been explored in different behavioral domains for more than a decade (U.S. presidential voting, Greenwald *et al.*, 1987; health, Levav and Fitzsimons, 2006; consumer behavior, Morwitz *et al.*, 1993). Moreover, as can be seen from the following section, the fundamental social psychology models Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB) as well as the most popular model in technology acceptance field Technology Acceptance Model (TAM) also included and recognized the attitude-behavior relationship.

3.1.1 Theory of Reasoned Action (TRA)

Following the attitude-behavior correlation, Ajzen and Fishbein (1975, 1980) developed the Theory of Reasoned Action (TRA) in an attempt to provide a model to

understand how a person's attitude affects his or her behavior. According to the TRA, a person's performance of a specified behavior is determined by his or her behavioral intention to perform the behavior, and the intention is jointly determined by the person's attitude toward performing the behavior and subjective norm. Attitude is determined by a set of behavioral beliefs about the consequences of performing the behavior and the evaluation of those consequences. Subjective norm is determined by normative beliefs about what others will think about the behavior and one's motivation to comply with these referents.

3.1.2 Theory of Planned Behavior (TPB)

Theory of Planned Behavior (TPB) is extended from TRA to predict and explain goal-directed behaviors over which an individual has only limited volitional control (Ajzen, 1985, p. 12). Ajzen (1991, p. 182) argued that people's actual control over a target behavior is the extent that a person has the required opportunities and resources to perform the behavior and that behavioral achievement depends jointly on motivation (intention) and ability (behavioral control). The perception of behavioral control and its impact on intention and action, however, is of greater psychological interest and the difference between TPB and TRA is the addition of perceived behavioral control. Perceived behavioral control refers to people's perception of the ease or difficulty of performing the behavior of interest (Ajzen, 1991, p. 183). TPB postulated that a person's behavior is determined by his or her behavioral intention to performing the behavior and the intention is determined together by attitude toward the behavior, subjective norm and perceived behavioral control. TPB shares with TRA the same definitions of the common determinants.

3.1.3 Technology Acceptance Model (TAM)

In SST adoption field, Davis (1989), adapting TRA, developed Technology Acceptance Model (TAM) to explain employees' acceptance of computer technology at workplace. Davis showed two key beliefs (perceived usefulness and perceived ease of use)

influence users' attitudes toward information technology, which leads to intentions and subsequently behaviors of actual technology usage. Davis defines the two determinants as followed. Perceived usefulness is "the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organizational context" (Davis *et al.*, 1989, p. 985). Ease of use is "the degree to which the prospective user expects the target system to be free of effort" (Davis *et al.*, 1989, p. 985). TAM did not include TRA's subjective norm as a determinant of behavioral intention in order to avoid the confusion from the intertwining effect of attitude and subjective norm. Although TAM has been verified by many studies and the two determinants are proven to be reliable influential factors, they are unable to account for all the variance in SST adoption. Thus, many other factors have been proposed to extend the TAM. For example, the original TAM has been extended by the factor "fun" (Dabholkar & Bagozzi, 2002; Weijters *et al.*, 2007). Both Dabholkar & Bagozzi (2002) and Weijters *et al.* (2007) found fun has direct positive effects on consumers' attitude toward using the SST.

3.1.4 Diffusion of Innovation (DOI)

Another commonly used approach to investigating SST adoption is Diffusion of Innovations theory (DOI) by Rogers (1995). DOI argues that individual's decision on the adoption of an innovation is based on their perceptions of the innovation characteristics and five innovation attributes – relative advantage, compatibility, complexity, trialability, and observability – were proposed to be important (Rogers, 2003). However, empirical studies provided differing results with regard to the importance of the five innovation attributes. For example, Meuter *et al.* (2005) investigated the adoption of prescription refill ordering through an interactive voice response (IVR) telephone system or an Internet-based system. It is found that relative advantage and compatibility are positively related to the trial of both IVR-based SST and Internet-based SST. However, trialability only have significantly positive influence on the trial of IVR-based SST while complexity is only negatively related to the trial of

Internet-based SST. In addition, observability does not show a significant influence on the SST trial in this study.

3.1.5 Customer Perceived Value

While DOI and TAM have been the research focus of SST adoption in the past decade, customer perceived value perspective has not yet gained much attention in SST context. Value is broadly defined as the tradeoff between total benefits received and total sacrifices (Kim *et al.*, 2007, p. 112) and the principles of cost-benefit analysis are exemplified in this concept. When making purchase decisions, consumers are striving for value maximization and they choose the behavior that leads to the highest payoff. Rather than the actual monetary price, perceived value is widely accepted to be defined as the consumer's overall assessment of the utility of a product based on perceptions of what is received and what is given (Zeithaml, 1988, p. 14). Like the definition of value, the definition of perceived value also emphasizes the benefit component and sacrifice component in the value concept. In service environment, perceived value has been considered and verified to positively influence customer satisfaction, purchase intention and behavior (Cronin *et al.*, 2000; Eggert and Wolfgang, 2002; Petterson and Spreng, 1997; Ryu *et al.*, 2012; Zeithaml, 1988). Petterson and Spreng (1997) confirmed customer perceived value has a direct positive relationship with customer satisfaction in consultancy setting, and so did Ryu *et al.* (2012) in a Chinese restaurant context. Moreover, Eggert and Wolfgang (2002) observed customer perceived value positively influence buying behavior through mediating effect of customer satisfaction in a B2B context. Then Chen and Dubinsky (2003) first explored perceived customer value in a web-based business context and found perceived customer value plays an important positive role in determining a consumer's purchase intention in an online setting. Kim *et al.* (2007) also verified perceived value is significantly related to adoption intention in mobile commerce context. Based on the customer perceived value studies above, it is assumed that the tradeoff between what is given up and what is received in return also applies when consumers make the decision to adopt the SST. Consumers estimate

the value of the choice object by considering all relevant benefit and sacrifice factors and value represents an overall estimation of the choice object. TAM, in contrast, has not considered the overall estimation of the adoption object but only two factors usefulness and ease of use. Therefore, customer perceived value would be combined with TAM in this paper in order to address the topic of SST adoption. Consumers appreciate the benefits from using SSTs and they also need to evaluate the loss from using SSTs. Therefore, the influence of both benefits and risks of using SST would be discussed later.

3.2 Hypotheses

Combining the customer perceived value and TAM, 16 hypotheses are proposed in this section to study the research questions raised in Chapter 1.

3.2.1 Role of benefits

Perceived benefit is defined as a consumer's belief about the extent to which he or she will become better off from the use of SST (*Kim et al.*, 2008, p. 547). Consumers have gained benefits from using SSTs and some studies found the benefits would increase consumers' satisfaction and future intention to use SSTs (Gilbert *et al.*, 2004; Forsythe *et al.*, 2006). Nonetheless, the exact kinds of benefits consumers gain from the use of a particular SST are still under discussion and usually vary according to the category of SSTs. In TAM, Weijters *et al.* (2007, p. 5) think perceived usefulness "refers to the benefits customers associate with using the SSTs", while Forsythe *et al.* (2006) included one of the determinants ease of use (ease of shopping) as one of the four benefits of online shopping. Therefore, it is possible that the two determinants in TAM, i.e. usefulness and ease of use, represent a part of the benefits of SSTs and thus they could not explain all the variance in SST adoption. On the other hand, the whole set of benefits of the particular SST may account for all the variance in technology usage intention and help further the understanding SST adoption. Therefore, potential benefits of the SST of digital post service need to be identified first in order to develop a complete TAM.

Drawing from previous SST adoption research and taking the nature of digital post service into consideration, six benefits are proposed to amplify the original TAM. The six benefits are: ease of use, functionality, accessibility, experience, time efficiency, and environmental benefit.

Ease of use is the degree to which a user would find the use of a particular technology to be free from effort on their part (Curran & Meuter, 2005, p. 105). From customer perceived value perspective, SSTs' ease of use needs to be superior to its traditional service channel counterpart and only in this way, customers would consider using SST due to the net gain from SSTs. Thus, ease of use is a benefit of SSTs for customers and as one of the fundamental determinants in TAM, ease of use has been proven important in the positive influence on SST adoption (Carter and Bélanger, 2005; Curran and Meuter, 2005; Lin, 2011; Weijters *et al.*, 2005). Ease of use positively influences consumers' attitude toward and intention to use different kinds of SSTs, including online banking, e-government service and self-scanning at retail stores. These SSTs share at least one of categorization dimensions with digital post service. Moreover, when studying online shopping, Forsythe *et al.* (2006) included ease of use (ease of shopping) as one of benefits of online shopping and ease of use is proven to be positively related to future usage intention. Online shopping shares most categorization dimensions with digital post service (online, customized, and direct transaction); therefore, it is hypothesized:

Hypothesis 1a. Ease of use has a positive influence on attitude toward using digital post service.

Functionality is the availability of a wide range of services provided by a particular SST and the information to the services (Forsythe *et al.*, 2006, p. 60). In the utilitarian view, consumers use SSTs to achieve certain goals, e.g. online transaction, and thus the available functions provided by SSTs are the most obvious and direct benefits for SST users. However, the range of functions needs to intersect with consumers' needs and

consumers need to be informed of the available functions. In this way, consumers could appreciate the functions provided by SSTs and develop favorable attitude toward the SST. In contrast, a consumer may be dissatisfied if the SST does not provide the function he or she is looking for. Meuter *et al.* (2000) confirmed in the qualitative study that users are satisfied when they see SST is reliable and "did its job". Moreover, Forsythe *et al.* (2006) empirically proved the positive influence of functionality on SST adoption in online shopping and online shopping shares most category characteristics with digital post service – online, customized, and direct transaction. Therefore, it is hypothesized:

Hypothesis 1b. Functionality has a positive influence on attitude toward using digital post service.

Accessibility is the nature of a particular SST to allow users access to services at the time and location convenient for them (Yen, 2005, p. 645). Many SSTs free users from the restrains of time and location, e.g. mobile banking, so the benefit of accessibility make consumers prefer SSTs over traditional channels. One similar construct called convenience has been investigated (Forsythe *et al.*, 2006; Yen, 2005) and thus the definition of accessibility derived from the definition of convenience by Yen (2005). Forsythe *et al.* (2006) investigated accessibility in the study of online shopping and the research showed accessibility (convenience) positively affects consumers' attitude toward online shopping. Online shopping shares most categorization dimensions with digital post service (online, customized, and direct transaction); therefore, it is hypothesized:

Hypothesis 1c. Accessibility has a positive influence on attitude toward using digital post service.

Experience is the fun and excitement experienced by trying new experiences of a particular SST (Forsythe *et al.*, 2006, p. 61). Apart from the utilitarian benefits of SSTs,

hedonic aspect of using SSTs may also motivate consumers. The fun experience of using SSTs may lead consumers to develop favorable attitude toward using SSTs and thus influence SST adoption. Moreover, many studies showed strong evidence for the significant effect from fun experience on the attitude formation toward using SSTs. Childers *et al.* (2001) proved shopping enjoyment to be a significant predictor of attitude toward online shopping and Dabholkar and Bagozzi (2002) also found fun has direct positive effects on attitude toward using the self-service ordering. Online shopping and self-service ordering share category characteristics with digital post service such as online, daily use, and customized. Therefore, it is hypothesized:

Hypothesis 1d. Experience has a positive influence on attitude toward using digital post service.

Time efficiency is the degree to which a user would find the use of a particular SST save his/her time. In utilitarian view, time saving is one of the most direct and obvious benefits of SSTs. Thus, it is postulated that the reduce of waiting time could help gain customer satisfaction with using SSTs and ultimately attract more SST users. Many studies also reported time saving as major reason for consumers to choose SST over traditional service channels (Bateson, 1985; Meuter *et al.*, 2000; Howard and Worboys, 2003). For example, Meuter *et al.* (2000) found that users feel satisfied with the SST option because of its capability of performing transaction quicker than interpersonal alternative. One particular comment mentioned in the article illustrates the benefit of time efficiency – users are able to get information more quickly from the Internet than if they have to wait for it to be mailed. Lin (2010) verified the positive influence of perceived relative advantage on SST adoption in mobile banking and the perceived relative advantage identified in this paper is mostly time efficiency. Mobile banking shares most category characteristics with digital post service – online, customized, and direct transaction; therefore, it is hypothesized:

Hypothesis 1e. Time efficiency has a positive influence on attitude toward using digital

post service.

Environmental benefit is the degree to which a user would find the use of a particular SST have a lower impact on the environment (Mont, 2002, p. 239). Although, to my best knowledge, environmental benefits have not been mentioned or studied in SST context, the concept of sustainable product-service systems has come to spotlight recently. A product-service system (PSS) is defined as "a system of products, services, supporting networks and infrastructure that is designed to be: competitive, satisfy customer needs and have a lower environmental impact than traditional business models" (Mont, 2002, p. 239). As Roy (2000) pointed out, the key to sustainable PPS is that PPS is designed and marketed to provide customers with a particular result or function without customers necessarily having to own physical products. For example, in order to get the result of clean clothes, self-service laundry that requires fewer machines could be used instead of domestic washing machines. In this way, sustainability is achieved by reducing the amount of materials consumed in manufacture as well as the cost of machine distribution and disposal. The sustainable PPS concept could also applies to digital post service. Digital post service provides users with the result of post – content of letters and documents, while customers don't have to own the physical products – hard copy of the letters. As digital post could fully replace the traditional post, users would gain environmental benefit by reducing the cost of paper, transportation, operation, and so on. As consumers are gradually concerned about environmental issues and willing to pay extra for green products, they may also favor the environmental benefits provided by SSTs. Olsen *et al.* (2014) verified that the introduction of green new products could significantly improve brand attitude in fast moving consumer goods industries. Although there may be difference between industries and product and service, digital post services offer outstanding environmental benefits and it is assumed the findings from other industry are applicable to SSTs as well. Therefore, it is hypothesized:

Hypothesis 1f. Environment benefit has a positive influence on attitude toward using

digital post service.

Based on the review of previous SST adoption studies and the nature of digital post service, six benefits that would positively influence consumers' attitude toward using digital post services are identified above and they are included in the extended TAM proposed in this paper. Combined with the findings of benefits' effect on consumers' attitude toward using SSTs, it is hypothesized:

Hypothesis 1. The benefits of digital post service has a positive influence on attitude toward using digital post service.

3.2.2 Role of risks

Based on the customer perceived value perspective, risks would also be added to TAM in order to further investigate SST adoption. Extant SST adoption research has focused primarily on the positive attributes leading to SST adoption; in comparison, little is known about how negative attributes would influence SST adoption. Curran and Meuter (2005) added risk in the TAM and found risk negatively influences consumers' attitude toward online banking but not ATM or telephone banking. On the other hand, De Ruyter *et al.* (2001) found risk is negatively related to consumers' attitude toward and intention to use e-service. Nonetheless, risk has been studies as an aggregated construct in both studies above. For example, Curran and Meuter (2005) measured risk construct using the four items adapted from three other researches. Thus, the exact kinds of risks, in other words what costs would hinder consumers adopting SSTs, still lack of empirical investigation and test. Next, the risk facets used in this paper will be explained.

Perceived risk is defined as "consumer's perception of the uncertainty and concomitant adverse consequences of buying a product or service" (Chen & Dubinsky, 2003, p. 332). Cunningham (1967) classified perceived risk into six dimensions: performance, financial, opportunity/time, safety, social, and psychological loss. Adapting the six

dimensions, Featherman and Pavlou (2003) replaced safety with privacy in their study of e-service adoption. They found strong internal reliability among the six risk facets and each risk facet negatively influence adoption intention. Luo *et al.* (2010), however, included all the six dimensions together with the privacy as risk facets in the study of mobile banking adoption. The research context in Luo *et al.* (2010) mobile banking shares most category characteristics with digital post service – online, customized, and direct transaction. Combining the previous research at hand and the SST categorization of digital post service, seven potential risks of digital post service hindering SST adoption are identified. They are functional, time, financial, privacy, security, psychological, and social risks.

Functional risk is the possibility of the product malfunctioning and not performing as it was designed and advertised and therefore failing to deliver the desired benefits (Featherman and Pavlou, 2003, p. 455). It is easy to imagine malfunctioning and technical errors could dissatisfy or even irritate SST users, especially the ones in real need. Thus, consumers are taking functional risk when using SSTs and they may not like to use SSTs due to the concern of such risk. Functional risk, also named as performance risk in previous literature, was posited to be the origin of all risk facets by Cunningham (1967) and it has been proven to be the most significant risk facet in negatively influencing consumers' adoption intention of Internet-based bill payment service (Featherman and Pavlou, 2003). Moreover, in the context of other similar SST category e.g. online banking and mobile banking, functional risk has also been verified as a significant negative influence on consumers' attitude toward SST adoption (Lee, 2009; Luo *et al.*, 2010). These SSTs share the category characteristics with digital post service, such as online, daily use, customized and direct transaction; therefore, it is hypothesized:

Hypothesis 2a. Functional risk has a negative influence on attitude toward using digital post service.

Time risk is 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 (Featherman and Pavlou, 2003, p. 455). Time efficiency is supposedly a benefit of SSTs; however, the risk of losing time due to using SSTs is not only a risk itself but undermines the benefit of time efficiency. As a result, consumers is not happy to use SSTs because of the time risk. Time risk is ranked as the second significant risk facet in negatively influencing consumers' adoption intention to e-billpay in the study by Featherman and Pavlou (2003). Time risk has also been proven significant in similar SST category of online banking and mobile banking (Lee, 2009; Luo *et al.*, 2010). Both SSTs have category commonalities with digital post service such as online, daily use, customized and direct transaction; therefore, it is hypothesized:

Hypothesis 2b. Time risk has a negative influence on attitude toward using digital post service.

Financial risk is the potential monetary outlay associated with the initial purchase price as well as the subsequent maintenance cost of the product (Featherman and Pavlou, 2003, p. 455). It is obvious that the monetary loss associated with the use of SSTs would prevent consumers from using SSTs at all, not to mention the unfavorable feeling caused because of the financial cost. Therefore, consumers who are concerned about the financial risk of SSTs may be reluctant to use SSTs. In similar category as digital post service, Featherman and Pavlou (2003) found financial risk ranks as the third significant risk facet in negatively influencing consumers' adoption intention to e-billpay and Lee (2009) found financial risk to be the second most important inhibitor to the adoption of online banking. E-billpay and online banking share the category similarities with digital post service such as online, daily use, customized and direct transaction; therefore, it is hypothesized:

Hypothesis 2c. Financial risk has a negative influence on attitude toward using digital

post service.

Privacy risk is the potential loss of control over personal information, such as when information about you is used without your knowledge or permission (Featherman and Pavlou, 2003, p. 455). It is possible that when a SST requires personal information for registration and then somehow the information is leaked. This kind of privacy risk would probably worry SST users and stop consumers from SST adoption. Academic study confirmed such speculation. Featherman and Pavlou (2003) stated participants in a focus group expressed their "concern for the theft of their private information, or simply its misuse by the company collecting it". Moreover, this focus group also indicated privacy risk as a common concern that inhibited adoption. In another similar SST category online banking, Lee (2009) found privacy risk to be the most important inhibitor to the SST adoption and concerns about fraud and identity theft are foremost in the minds of Internet users. As digital post service is similar to e-billpay and online banking in that they all are online, daily use, customized and direct transaction SST, it is hypothesized:

Hypothesis 2d. Privacy risk has a negative influence on attitude toward using digital post service.

Security risk is the potential circumstance, condition, or event to cause economic hardship to data or network resources in the form of destruction, disclosure, modification of data, denial of service, and/or fraud, waste, and abuse (Bélanger *et al.*, 2002, p. 249). Security risk used to refer to the potential threat to users' physical condition (Cunningham, 1967; Lim, 2003), but as Featherman and Pavlou (2003) argued, e-services does not incur any threat to human life. On the other hand, Bélanger *et al.* (2002) stated security in B2C electronic commerce is reflected in the technologies used to protect and secure consumer data and they also argued the economic hardship of security risk encompasses damages to privacy as well as theft of credit information. Miyazaki and Fernandez (2001) also agreed the secure storage and transmission of

consumer information is seen as an integral step in maintaining privacy in the context of online shopping. With increasing number of Internet fraud these days, consumers are worried about Internet security and may not use SSTs because of security risk. Moreover, Bélanger *et al.* (2002) empirically tested security features is significantly more valued than privacy seals or statement by e-commerce consumers. Digital post service is similar to e-commerce in that they are both online, daily use, customized SSTs involving direct transaction. Therefore, it is hypothesized:

Hypothesis 2e. Security risk has a negative influence on attitude toward using digital post service.

Psychological risk is the potential loss of self-esteem (ego loss) from the frustration of not achieving a buying goal (Featherman and Pavlou, 2003, p. 455). When consumers plan to achieve a goal by using SSTs and only to find they are intelligently incapable of doing so, they may be disappointed in themselves and would not like the SST. Empirical studies also agree with the influence of psychological risk. In spite of little influence, Featherman and Pavlou (2003) observed negative effect from psychological risk on the adoption of Internet-based bill payment service. Moreover, in another similar SST category mobile banking, Luo *et al.* (2010) also found psychological risk is a significant risk facet. Both Internet-based bill payment service and mobile banking share category characteristics with digital post, such as service online, daily use, customized and direct transaction; therefore, it is hypothesized:

Hypothesis 2f. Psychological risk has a negative influence on attitude toward using digital post service.

Social risk is the potential loss of status in one's social group as a result of adopting a product or service, looking foolish or untrendy (Featherman and Pavlou, 2003, p. 455). In empirical studies, Featherman and Pavlou (2003) did not report social risk to be significant in their study of e-billpay, or did Kim *et al.* (2010) in the research of mobile

banking adoption. Lee (2009) only found social risk to be a negative factor in the intention to adopt online banking, but not as a significant factor. Lee (2009) proposed one interpretation that online banking is already very common and has earned favorable perception. As digital post service is still in the early phase and has not yet gained popular usage and perception, it is possible social risk may have significant influence on its adoption. For example, consumers may be afraid that digital post would underrated themselves because the others would believe the sender of digital post is not capable of sending a proper hard copy letter. Or the recipient of a digital post would be irritated because it means he or she is not worth of time and effort of sending a written letter. Therefore, it is hypothesized:

Hypothesis 2g. Social risk has a negative influence on attitude toward using digital post service.

Based on the previous SST adoption studies and the nature of digital post service, seven risks that would negatively influence consumers' attitude toward using digital post service are identified above and they are included in the extended TAM proposed in this paper. Combined with the findings of risks' effect on consumers' attitude toward SST, it is hypothesized:

Hypothesis 2. The risks of digital post service has a negative influence on attitude toward using digital post service.

3.2.3 Role of trust

Added more benefits and included risks, an extension of TAM from customer perceived value perspective seems to be completed above. However, many researches have also recognized the influence from trust on SST adoption because trust is a fundamental way to mitigate the uncertainty and risks of SST adoption (Ba and Pavlou, 2002; Gefen *et al.*, 2003; Pavlou, 2003, Pavlou and Fygenson, 2006). Trust is defined as "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" (Mayer et al., 1995, p. 712). In the context of SST, trustor is SST users while trustee is SST providers, for example the bank providing mobile banking. Sometimes, the trust in SST, Internet, and other technologies and infrastructures have also been defined as "trust" and were investigated in SST adoption before (Carter and Bélanger, 2005; Kim and Prabhakar, 2004). However, many scholars came to recognize that service providers would be able to improve Internet condition and solve technical problems and thus the trustee in the context of SST adoption should be SST providers. Previous studies have also integrated trust into TAM and showed "trust is as important to online commerce as the widely accepted TAM use-antecedents, perceived usefulness and perceived ease of use" (Gefen *et al.*, 2003, p. 51). In the context of e-commerce, Pavlou (2003) found trust in web retailer has direct positive influence on intention to transact and Gefen *et al.* (2003), Ha and Stoel (2009), Jarvenpaa *et al.* (2000), and Kim *et al.* (2008), saw direct positive linkage between trust in the e-vendor and attitude toward online shopping. In similar SST category, Lin (2011) and Carter and Bélanger (2005) also found trust in the service provider has positive significant impact on attitude toward mobile banking and intention to use e-government service respectively. Apart from trust's influence on attitude toward SST adoption, its relationship with risk is observed as well. Jarvenpaa *et al.* (2000), Kim *et al.* (2008) and Pavlou (2003) discovered trust in the e-vendor has significant impact on perceived risk and ultimately attitude toward online shopping. Lim (2003) summarized the four types of relations between trust and perceived risk in the context of online shopping and internet banking identified by researchers. The four types of relations includes perceived risk as moderating factor on the relation between consumers' trust in a website and their willingness to purchase, trust as antecedent of perceived risk, perceived risk as antecedent of trust, and so on. Therefore, given the important influence of trust on SST adoption, trust would be included in the model in this paper in order to achieve a complete and useful TAM.

In order to correctly measure trust in TAM, the dimensions of trust need to be decided first. Unlike most of the trust studies mentioned above regarding trust as a single conceptual construct, Gefen (2002) argued trust should be examined as a multi-dimensional construct in the case of e-commerce adoption and the different dimensions of trust have different effects on e-commerce adoption. The study also verified the three dimensional scale of trust introduced by Mayer *et al.* (1995) in the context of e-commerce adoption and Lin (2011) also employed the same model of trust in the study of mobile banking. Thus, the three dimensional measurement of trust is useful for the study of SST adoption and is applied in this paper as well. Mayer *et al.* (1995) proposed that ability, benevolence and integrity are the three elements of trust and they believed these three characteristics of a trustee explained a major portion of trustworthiness. Ability is the belief in the trustee's ability to perform as expected by the trustor (Pavlou and Fygenson, 2006, p. 123). In the context of digital post service, ability belief refers to user's perceptions that the service provider have necessary skills, competencies and expertise to understand and satisfy their needs of posts. If the service provider assures users of its ability to provide and function SSTs, consumers would be more likely to trust the service provider and ultimately adopt the SST. Lin (2011) found ability has a significant positive influence on attitude toward adopting mobile banking and mobile banking is a similar SST category as digital post service due to the commonalities of online, daily use, customized and direct transaction. Therefore, it is hypothesized:

Hypothesis 3a. Ability of the service provider has a positive influence on attitude toward using digital post service.

Benevolence is the belief that the trustee will not act opportunistically, even given the chance (Pavlou and Fygenson, 2006, p. 123). In the context of digital post service, benevolence belief refers to user's perception that the service provider care about them and acts in their interest. If the service provider convinces users of their good will, consumers would be more likely to trust the service provider and subsequently adopt the SST. Gefen (2002) found e-vendor's benevolence increases online consumers'

intention to purchase from that e-vendor. E-commerce shares with digital post service the category characteristics of online, daily use, customized and direct transaction; therefore, it is hypothesized:

Hypothesis 3b. Benevolence of the service provider has a positive influence on attitude toward using digital post service.

Integrity is the belief that the trustee will be honest and keep its promises (Pavlou and Fygenson, 2006, p. 123). In the context of digital post service, integrity belief refers to user's perception that the service provider adheres to a set of principles generally accepted by the users. If the service provider proves to be honest and keep its promises, consumers would be more likely to trust the service provider and then adopt the SST. In the study of mobile banking, Lin (2011) employed found integrity has a significant positive effects on attitude toward adoption. Gefen (2002) also found integrity is a significant antecedent of purchase intention in e-commerce. Mobile banking and e-commerce share several category characteristics with digital post service, including online, daily use, customized and direct transaction. Therefore, it is hypothesized:

Hypothesis 3c. Integrity of the service provider has a positive influence on attitude toward using digital post service.

Based on the previous studies of trust's impact on SST adoption and the nature of digital post service, three trusting characteristics of service provider that would positively influence consumers' attitude toward using digital post service are demonstrated above and they are included in the extended TAM proposed in this paper. Combined with the findings of trust's effect on consumers' attitude toward SST, it is hypothesized:

Hypothesis 3. Trust has a positive influence on attitude toward using digital post service.

3.2.4 Attitude-behavior intention relationship

In the original TAM, attitude toward using the technological system is postulated to lead to behavioral intention to use the system. In other words, the attitude-behavior intention relationship represented in TAM means people form intentions to perform behavior toward which they have positive feeling. This relationship is also fundamental to TAM's precedents TRA and TPB and extant research contains empirical evidence in favor of the attitude-behavior intention relationship in the TAM in the context of SST adoption. Dabholkar and Bagozzi (2002) found attitude toward using a self-service ordering has a direct positive effect on intention to use the technology-based self-service. Lin (2011) also demonstrated attitude toward using mobile banking has a significant positive effect on behavioral intention to use mobile banking. In addition, Lee (2009) found attitude toward using online banking has a direct positive effect on intention to use online banking. All of the SSTs mentioned above, self-service ordering, mobile banking and online banking, have similar SST category characteristics as digital post service, such as online, daily use, customized and so on. Thus, the attitude-behavior intention relationship is probably also applicable to the SST of digital post service. Therefore, it is hypothesized:

Hypothesis 4. Attitude toward using digital post services has a positive influence on intention to use digital post service.

3.3 Conceptual model – an extension of TAM

Based on the theoretical reviews and hypotheses above, an extended TAM including more benefits, risks and trust factors is presented in the Figure 3 below.

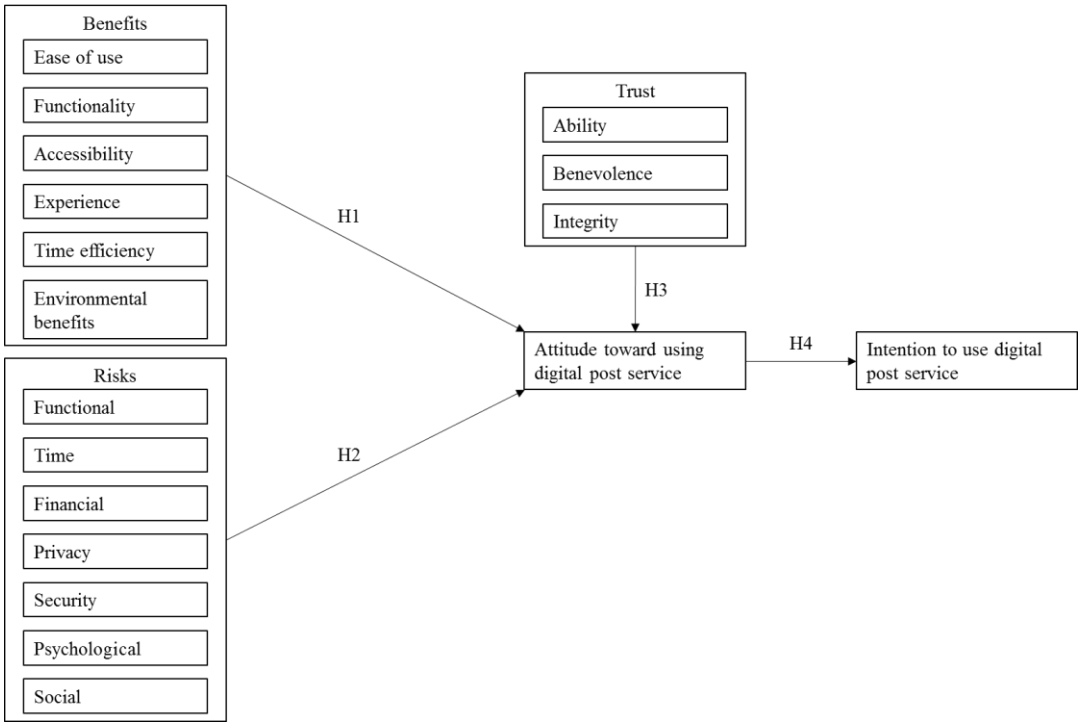

Figure 3 Conceptual model – an extension of TAM

Six identified benefits are derived from the two determinants in original TAM and previous research of similar SST category as digital post service. It is hypothesized that the each six benefits has a positive influence on attitude toward using digital post service. Seven risks facets are adapted from Cunningham (1967) and Featherman and Pavlou (2003) and it is hypothesized that each seven benefits has a negative influence on attitude toward using digital post service. Applying the three dimensions of trust by Mayer *et al.* (1995), it is hypothesized that each trust beliefs of the digital post service provider has a positive influence on attitude toward using digital post service. Following the original TAM, attitude-behavior intention relationship is also hypothesized to be applicable in the context of digital post service. In summary, the research model is an extension of original TAM and it is tailored to the SST category of digital post service.

Chapter 4 Method

In order to answer the research questions and test the conceptual model proposed above, an empirical study was conducted. In this chapter, the procedure of data collection is first explained and sample demographics is described. Then all the measures of the constructs are presented and validated, and the assumptions of analyses are tested.

4.1 Data collection procedure

The data was collected through a traditional e-mail survey that was administered by Posten Norge AS in Norway. Posten Norge is a Nordic mail and logistics group and it has launched Norway's new digital postal service, Digipost on 4th April, 2011. Posten Norge recruited participants in the survey by e-mailing a sample of 3000 customers who were not registered as user of Digipost. The survey email was distributed on 12th December, 2014 and a reminder about the survey was sent out to customers on 14th January, 2015. A total number of 214 respondents out of the random sample of 3000 customers completed the survey and thus the response rate of the survey is approximately 7.13%.

The layout of the survey is demonstrated below. As the respondents were not yet using Digipost, the following text was first given as an informative introduction to the questions in the survey.

Digipost is a digital mail box for electronic storing and organization of mail. Many customers think of the use of digital services such as Digipost as risky. Some are worried it will take a lot of time to use the service, while others are questioning the safety of storing mail with personal information online. In the questions below we ask you about various types of risks. Imagine that you want to start using Digipost; which types of risks do you believe you will experience? Base your answers on your

knowledge of Digipost and other similar digital services. Remember that this is about how you believe you will experience the use of Digipost. There are no right or wrong answers.

Please indicate the degree to which you agree with the following questions (1 = Totally disagree / 7 = Totally agree)

Then questions about risks were presented.

We also want to know if you associate Digipost with any benefits. Please indicate the degree to which you agree with the following questions (1 = Totally disagree / 7 = Totally agree)

Then questions about benefits were presented.

Similar introductions/specifications were also given before the questions related to trust, attitude and intention.

A few other questions that are not reported here were also included in the questionnaire.

4.2 Sample demographics

The gender ratio of the respondents is nearly one to one – 42.5% female participants and 57.5% male participants. The average age of the respondents was 46 years old. The survey was completed by Posten Norge's customers all around Norway; however, the top three geographical areas with high response rate are: Oslo (18.7%), Akershus (14.0%), and Hordaland (12.1%). Most respondents have high education level and only 13.5% of participants have education level of lower than high school. Table 1 below summarizes the profile of survey respondents.

Age	46 (average)	
Gender	Female	42.5%
	Male	57.5%
Education	More than 4 years of higher education	42.2%
	1-4 years of higher education	39.2%
	Upper secondary education	12.6%
	Below upper secondary education	0.9%

Table 1 Summary of survey respondent profile

4.3 Measures

In order to test the conceptual model, all the constructs in the model except attitude were measured using a seven-point Likert scale. Attitude toward using digital post service was measured with seven-point Likert scales of bipolar adjectives, i.e. semantic differential scale. In order to avoid the influence from single measurement, each benefit, risk and trust factors were measured with three items and attitude toward using Digipost and intention to use Digipost were also measured with more than one items. Each benefits except environmental benefits was measured using three items that are adapted from Forsythe *et al.* (2006) and Nysveen *et al.* (2005). The wordings of the items of accessibility, functionality and experience are inspired by the work of Forsythe *et al.* (2006), corresponding to shopping convenience, product selection and hedonic/enjoyment. Items of ease of use and time efficiency are derived from Nysveen *et al.* (2005). In particular, the wording of time efficiency is inspired by the usefulness variable in Nysveen *et al.* (2005), which features in saving time and improving efficiency. The items of environmental benefits are established together with Posten Norge AS for the purpose of this study. Each risks was measured using three items adapted from Aldas-Manzano *et al.* (2011), Crespo *et al*. (2009) and Stone and Grønhaug (1993). The measures of time risk, financial risk, privacy risk, psychological risk, and social risk are similar to Crespo *et al.*'s (2009) original items and functional risk is measured adapting the three items used in Stone and Grønhaug (1993). The

measure of security risk is inspired by Aldas-Manzano *et al.* (2011). The three items used in this paper are about safety, security and concern for hacking, and they derive from the first, second and sixth items out of the eight items used for security risk measurement in Aldas-Manzano *et al.* (2011). To measure trust, respondents rated three items for each trust beliefs and the items were extracted from Hwang and Lee (2012), Schlosser *et al.* (2006) and Xie and Peng (2009). The measures of attitude toward using Digipost and intention to use Digipost are almost identical to the measures applied by Nysveen *et al.* (2005). While items and wording are kept as similar as possible, the wording of the items are also adapted to the service studied — digital post service. Appendix A exhibits all the measures in the survey.

To analyze the data of the measures, the statistical program IBM SPSS Statistics, version 23 is used in this paper and following sections discuss the validity and reliability of the data collected.

4.3.1 Validity assessment

Peter (1981, p. 134) defined construct validity as "the degree to which a measure assesses the construct it is purported to assess." In this paper, construct validity is examined by assessing convergent validity and discriminant validity. Next, the convergent and discriminant validity of each measures will be examined. Confirmatory factor analysis is applied here to check if the expected pattern based on theory is confirmed by the data collected. In other words, the number of factors were fixed when performing factor analyses for each variables, i.e. seven factors for risk variable, six factors for benefit variable and three factors for trust variable. The purpose of factor analysis is to investigate the internal consistency of the measures and thus the criteria emphasized by Rust *et al.* (2004) is adopted in this paper. Rust *et al.* (2004) used an eigenvalue cutoff of 0.5 and they believed this threshold provided the best tradeoff between parsimony and managerial usefulness for their study. As Kaiser (1960), who proposed the 1.0 eigenvalue cutoff, pointed out, the most important viewpoint for

choosing the number of factors is psychological meaningfulness, and Rust *et al.* (2004) also argued the cutoff should be chosen for results to be substantively meaningful. Therefore, taking the criteria of parsimony, managerial usefulness and psychological meaningfulness into consideration, the number of factors of the factor analyses in this paper will not be limited by the 1.0 eigenvalue cutoff but based on the theoretical basis for each measures. Moreover, assuming correlation between variables, fixed factor analyses (maximum likelihood) with oblimin rotation were conducted for each measures. The reasoning for applying maximum likelihood with oblimin rotation is as followed. As Fabrigar *et al.* (1999) argued, if data are relatively normally distributed, maximum likelihood is the best choice because "it allows for the computation of a wide range of indexes of the model [and] permits statistical significance testing of factor loadings and correlations among factors and the computation of confidence intervals" (p. 277). When a distribution is perfectly normal, the values of skewness and kurtosis are zero, which is rather an uncommon occurrence in the social sciences. According to Hair *et al.* (2014, p. 54), a general guideline for skewness is that "if the number is greater than +1 or lower than –1, this is an indication of a substantially skewed distribution" and the same threshold applies to kurtosis – if the number is greater than +1, the distribution is too peaked while a kurtosis of less than –1 indicates a distribution that is too flat. Table 7 in section 4.3.3 shows the majority of measures have the skewness and kurtosis values between -1 and 1. Thus, maximum likelihood extraction method is used for factor analysis. Oblique rotations allow the factors to correlate and some correlations among factors are generally expected in the social sciences (Costello and Osborne, 2005, p. 3). Therefore, since in this study, the data is normally distributed and correlation among factors is expected, the factor analysis method of maximum likelihood with oblimin rotation is applied. Following sections show the outputs of the Pattern matrix of each factor analyses and in all tables, the coefficient values of lower than 0.3 were suppressed.

Risk measures

Appendix B shows a seven-factor analysis (maximum likelihood) with oblimin rotation which reported the item "I am worried that my use of Digipost increases the chances of receiving mail that I have not requested" had a loading of 0.478. According to Hair *et al.* (2006), the factor loadings to observed variable should be above 0.5 in order to conform to the convergent validity test. Therefore, the item "I am worried that my use of Digipost increases the chances of receiving mail that I have not requested" is removed from risk measures due to low convergent validity. Table 2 below shows the result of seven-factor analysis with loadings lower than 0.3 suppressed when the item mentioned above is removed. The last three factors had eigenvalues of lower than 1, especially the last factor had only 0.392. According to Breivik (2014), the reason behind is that in extracting factors, statistical programs start out with fitting a first factor to the observations that will explain most of the variance. Then extract a second factor that explains most of the remaining variance until it reaches the predefined number of factors (in this case seven). Thus, the low eigenvalues of last three factors may result from their correlations with the factors before since oblimin rotation allows correlation among factors. In this factor analysis, a total of 88.75% variance are explained and all items have good convergent validity. Moreover, discriminant validity is confirmed when the indicator loading is at least 0.2 greater than all of its cross-loadings (Hair *et al.*, 2006). Since all other items had a factor loading of more than 0.5 and no cross-loading higher than 0.2 is shown, the risk measures also have good discriminant validity.

Risk measures – Factor analysis results

	Privacy	Psychological	Time	Social	Functional	Security	Financial
I think my use of Digipost is time-consuming			.779				
I think I waste much time when I use Digipost			.959				
I feel that using Digipost is inefficient use of my time			.907				
I am sometimes concerned if Digipost work as it is supposed to					-.852		
I think there is a significant chance that Digipost will not work as well as it is supposed to					-.927		
I am unsure if the technological solutions in Digipost work as it is supposed to					-.857		
I may feel uneasy when I use Digipost		-.642					
Using Digipost may give me a feeling of anxiety		-1.017					
I feel a little nervous when using Digipost		-.909					
I think there is a significant chance that my personal information can be lost when I use Digipost	.502						
I am afraid that my use of Digipost increases the chances that my personal information can be used for other purposes	.966						
I think I can lose money by using Digipost							.747
I think I can lose control over bank accounts and credit cards by using Digipost							.707
I am worried about financial losses due to system failures resulting in that I do not receive certain mail							.757
People who mean a lot to me think it is a bad idea to use Digipost				.788			
My acquaintances think it is unwise to use Digipost				.942			
My use of Digipost gives a negative impression on my friends				.855			
I do not think that the digital service Digipost is secure						-.901	
I do not think that Digipost is well protected from hacking						-.929	
I sometimes wonder if it is safe to use Digipost						-.715	
Eigenvalues	10.742	2.261	1.594	1.217	.777	.767	.392
Variance explained	53.711	11.306	7.970	6.085	3.886	3.837	1.958

Table 2 Factor analysis – risk measures

Benefit measures

As shown in Appendix C, a six-factor analysis (maximum likelihood) with oblimin rotation reported the item "Digipost makes everyday life easier" had a loading of 0.494. Therefore, the item "Digipost makes everyday life easier" is removed from the measurement due to its low convergent validity. Another six-factor analysis (maximum likelihood) with oblimin rotation without the problematic item was conducted and the result with coefficient value larger than 0.3 is shown below in Table 3. Although the last two factors had eigenvalues of lower than 1, the possible reason is explained above, i.e. the correlation among variables. Moreover, considering the criteria of meaningfulness, the 1.0 eigenvalue cutoff is not strictly applied here either. 86.89% variance is explained and the convergent and discriminant validity of the purified benefit measures was confirmed because all items had a factor loading of more than 0.5 and no cross-loading problem.

Benefit measures – Factor analysis results

	Experience	Accessibility	Environment	Time efficiency	Ease of use	Functionality
Digipost provides access to my mail wherever I am		.898				
Digipost provides access to my mail whenever I need it		.965				
Digipost has the functionality that I need						.834
There are many functions available at Digipost						.750
Digipost gives me sufficient information about the functions and opportunities offered						.640
Digipost is easy to learn for me					.901	
It is easy for me to get Digipost to work the way I want					.726	
Using Digipost is easy and understandable					.858	
Digipost gives me new experiences	.602					
It feels exciting to receive mail through Digipost	.953					
It is fun to use Digipost	.952					
I save time by using Digipost				-.866		
Digipost is quicker compared to how I previously handled my mail				-.879		
By using Digipost I have time left for other things				-.578		
Digipost contributes to saving the environment			.789			
Digipost contributes to saving cost for the society			1.016			
Digipost contributes to more effective work processes			.711			
Eigenvalues	8.378	2.400	1.339	1.199	.805	.651
Variance explained	49.280	14.120	7.878	7.052	4.735	3.827

Table 3 Factor analysis – benefit measures

Trust measures

Table 4 below shows the result of three-factor analysis (maximum likelihood) with oblimin rotation and the coefficient values of lower than 0.3 are suppressed. In the factor analysis, around 90.50% variance is explained. However, only ability variable had an eigenvalue of greater than 1, and as explained above, this may be due to the correlation among the three trust dimensions. Moreover, all items had a factor loading of more than 0.7 and thus shows strong convergent validity (Bagozzi and Yi, 1988). Discriminant validity of trust measures are confirmed as the difference between indicator loading and cross-loadings are more than 0.2.

Trust measures – Factor analysis results

	Ability	Integrity	Benevolence
I think Posten is honest		.745	
To me, Posten is reliable		.993	
Posten keeps their promises		.914	
Posten has high competence	.941		
Posten has a high degree of expertise	.969		
Posten has a high degree of knowledge and abilities	.965		
Posten seems to be concerned with what is best for me as a customer			.845
I think Posten considers my welfare besides making profit			.985
I am sure that if I have a problem, Posten will respond constructively and care about me			.779
Eigenvalues	6.590	.946	.609
Variance explained	73.226	10.507	6.762

Table 4 Factor analysis – trust measures

Attitude and intention measures

Two-factor analyses (maximum likelihood without rotation) were conducted for both measures. Table 5 below shows the result and the coefficient values of lower than 0.3 are suppressed. As can be seen, all the four items of attitude measure had a high factor

loading of more than 0.8; therefore, attitude measures are confirmed to have high convergent validity. Regarding intention measures, the two items both had a loading of more than 0.7. Therefore, high convergent validity of intention measures is also confirmed.

Attitude and intention measures – Factor analysis results

	Attitude	Intention
I think using Digipost is: bad ----- good	.821	
I think using Digipost is: unreasonable ----- reasonable	.931	
I think using Digipost is: unfavorable ----- favorable	.973	
I think using Digipost is: negative ----- positive	.961	
I will use Digipost next month		-.728
I will frequently use Digipost in the future		-1.022
Eigenvalues	4.636	.754
Variance explained	77.272	12.854

Table 5 Factor analysis – attitude and intention measures

In conclusion, the item of accessibility measure "Digipost makes everyday life easier" and the item of privacy measure "I am worried that my use of Digipost increases the chances of receiving mail that I have not requested" are removed due to their low convergent validity. Therefore, these items will not be used next to test the hypotheses and conceptual model. Trust, attitude and intention measures are confirmed to have high convergent validity and thus will all be used later.

4.3.2 Reliability assessment

Reliability is to assess internal consistency among multiple measures and internal consistency refers to the interrelatedness among the measures. Since Cronbach's alpha is by far the most popular measure of reliability, Table 6 below illustrates the Cronbach's alpha of all measures that will be used in the final analysis. Cronbach's alpha ranged from 0.870 to 0.950 for the measures of benefits, from 0.868 to 0.946 for the measures of risks, and from 0.922 to 0.981 for the measures of trust. According to Hair *et al.* (2006), the lower limit for Cronbach's alpha value is 0.70. Since the

Cronbach's alpha of all measures are more than 0.8, good internal consistency among measures is confirmed.

All measures – Cronbach's alpha

Measure	Cronbach's alpha	Measure	Cronbach's alpha
Time risk	0.939	Accessibility	0.950
Functional risk	0.943	Functionality	0.870
Psychological risk	0.946	Easy to use	0.884
Privacy risk	0.902	Experience	0.935
Financial risk	0.868	Time efficiency	0.928
Social risk	0.926	Environmental benefits	0.914
Security risk	0.944	Integrity	0.922
Attitude	0.963	Ability	0.981
Intention	0.864	Benevolence	0.932

Table 6 Cronbach's alpha – all measures

4.3.3 Descriptive statistics

The descriptive statistics including minimum, maximum, mean, 5% trimmed mean, standard deviation, skewness and kurtosis were conducted for all the variables. As shown in Table 7, all variables have a minimum and a maximum of 7, which means the respondents used the provided Likert scale ranging from 1 to 7 to express their opinions and attitudes. 5% trimmed mean is a new recalculated mean value by removing the top and bottom 5 percent of the cases. The outlier and its influence could be investigated by comparing the original mean and this new trimmed mean and the comparison shows the data does not have outlier problem. The standard deviation of all the variables range from 1.37 to 1.78, which indicates a rather standard distribution of the answers in the results. The variables of risk measures all have positive skewness and low mean scores of lower than 4. Thus, it can be concluded that most answers of the risk measures were clustered around the lower part of the scale. The kurtosis of all the variables except

financial risk and social risk are below 0, showing platykurtic distribution; however, the distribution of both variables has heavier tails than normal distribution. On the other hand, the variables of experience and time efficiency among the benefit measures have positive skewness and relatively low mean scores while the rest have negative skewness and higher mean scores. Thus, it can be deducted that most answers of the two variables were lower on the scale; in contrast, the rest variables were upper on the scale. The kurtosis of all benefit measures are below 0, which means the distribution of results is rather flat. As for trust measures, negative skewness and relatively high mean indicate respondents answered on upper scale, and the kurtosis ranged from -0.295 to 0.549 suggest somewhat normal distribution of the answers. Respondents reported high mean score for attitude measures and the negative skewness supported that most answers were upper on the scale. However, their answers of intention had relatively low mean and positive skewness, showing the answers were mostly at lower part of the scale. The kurtosis of both attitude and intention variables are close to 0, meaning nearly normal distribution of the results.

All variables – descriptive statistics

	Minimum	Maximum	Mean	5% Trimmed Mean	Std. Deviation	Skewness	Kurtosis
time risk	1.00	7.00	3.8380	3.8200	1.73031	.286	-.790
functional risk	1.00	7.00	3.8847	3.8719	1.73978	.215	-.875
psychological risk	1.00	7.00	2.9657	2.8508	1.74267	.829	-.153
privacy risk	1.00	7.00	3.8583	3.9663	1.62664	.240	-.893
financial risk	1.00	7.00	2.8333	2.7096	1.51217	1.065	.762
social risk	1.00	7.00	2.2508	2.1052	1.46207	1.246	1.098
security risk	1.00	7.00	3.8271	3.8079	1.77818	.250	-.927
accessibility	1.00	7.00	5.0678	5.1724	1.65904	-.640	-.430
functionality	1.00	7.00	3.8629	3.8652	1.40084	-.083	-.149
ease of use	1.00	7.00	4.5935	4.6582	1.54513	-.426	-.316
experience	1.00	7.00	2.7508	2.6260	1.63847	.784	-.109
time efficiency	1.00	7.00	2.9922	2.9081	1.60022	.422	-.625
environmental benefits	1.00	7.00	4.4704	4.5227	1.78000	-.347	-.800
integrity	1.00	7.00	5.2741	5.3728	1.37821	-.935	.549
ability	1.00	7.00	4.6900	4.7608	1.57444	-.597	-.295
benevolence	1.00	7.00	3.9548	3.9557	1.60025	-.127	-.840
attitude	1.00	7.00	4.0327	4.0363	1.61877	-.123	-.414
intention	1.00	7.00	2.7033	2.5810	1.66066	.767	-.357

Table 7 Descriptive statistics – all variables

A Pearson bivariate correlation analysis was also conducted to evaluate the relationships between the variables in the model. As shown in Table 8, risk variables have negative correlations with benefit variables, trust dimensions, and the variables of attitude and intention. This means the higher the risks of digital post service were evaluated, the lower the consumers evaluated the benefits of digital post service, the trust in service provider, and attitude and purchase intention to digital post service. According to Cohen (1988), $0.1 < |r| < 0.3$ represents a weak association between the two variables, $0.3 < |r| < 0.5$ represents a moderate association, and $0.5 < |r|$ represents a strong association. Most of the relationships are significant ($p < 0.05$); however, only relationship between risk variables and attitude is mostly strong ($r > 0.5$). The majority of the relationship between risk variables and benefit variables are moderate, except the correlation with experience is rather weak. The association with trust dimensions is also weak. Within risk variables, security risk and privacy risk has the highest correlation ($r = 0.763$) and this probably results from the subtle similarity and connection between the two variables. That is, when the SST is insecure, users' personal information is also at risk. In contrast of risk variables, benefit variables have positive correlations with trust dimensions and the variables of attitude and intention, which means the higher benefit variables were evaluated, the more positive consumers evaluated their trust in service provider, and attitude and purchase intention to digital post service. The majority of the relationships are significant ($p < 0.05$) but they are stronger in the correlations with the variables of attitude and intention than with trust dimensions. Within benefit variables, time efficiency and experience has the highest correlation ($r = 0.731$) and the reason behind may be customers' SST experience is most directly reflected by the time saved via the use of SST. Moreover, trust dimensions have significant positive correlations with attitude and intention, and the relationships are moderate ($0.3 < r < 0.5$). Ability and benevolence of trust variables are highly correlated ($r = 0.782$) and this is probably because consumers regard ability and benevolence as complementary to each other. The service provider is not competent without its caring for consumers and it could not care for consumers unless it has the ability to do so. At last, attitude has a strong significant positive correlation with intention, with $p < 0.05$

and $r > 0.5$.

	time risk	psychological risk	privacy risk	social risk	security risk	financial risk	functional risk	accessibility	functionality	ease of use	experience	time efficiency	environmental benefits	integrity	ability	benevolence	attitude	intention
time risk	1	.429**	.440**	.439**	.394**	.569**	.519**	-.429**	-.556**	-.432**	-.350**	-.493**	-.452**	-.171*	-.200**	-.238**	-.639**	-.542**
Psychological risk	.429**	1	.600**	.466**	.580**	.564**	.653**	-.306**	-.405**	-.386**	-.144*	-.266**	-.277**	-.105	-.088	-.069	-.496**	-.268**
Privacy risk	.440**	.600**	1	.391**	.763**	.593**	.678**	-.238**	-.411**	-.340**	-.263**	-.367**	-.379**	-.215**	-.221**	-.252**	-.535**	-.324**
Social risk	.439**	.466**	.391**	1	.465**	.671**	.445**	-.289**	-.305**	-.343**	-.071	-.160*	-.291**	-.091	-.053	-.051	-.415**	-.249**
Security risk	.394**	.580**	.763**	.465**	1	.530**	.700**	-.146*	-.365**	-.311**	-.206**	-.336**	-.341**	-.223**	-.254**	-.244**	-.490**	-.281**
Financial risk	.569**	.564**	.593**	.671**	.530**	1	.585**	-.404**	-.512**	-.395**	-.215**	-.348**	-.352**	-.165*	-.163*	-.187**	-.544**	-.346**
functional risk	.519**	.653**	.678**	.445**	.700**	.585**	1	-.263**	-.468**	-.434**	-.236**	-.364**	-.335**	-.183**	-.228**	-.239**	-.542**	-.360**
accessibility	-.429**	-.306**	-.238**	-.289**	-.146*	-.404**	-.263**	1	.574**	.409**	.329**	.350**	.399**	.145*	.081	.133	.437**	.319**
functionality	-.556**	-.405**	-.411**	-.305**	-.365**	-.512**	-.468**	.574**	1	.555**	.510**	.617**	.547**	.306**	.325**	.360**	.701**	.563**
ease of use	-.432**	-.386**	-.340**	-.343**	-.311**	-.395**	-.434**	.409**	.555**	1	.246**	.350**	.332**	.213**	.111	.197**	.495**	.355**
experience	-.350**	-.144*	-.263**	-.071	-.206**	-.215**	-.236**	.329**	.510**	.246**	1	.731**	.545**	.178**	.308**	.446**	.557**	.618**
time efficiency	-.493**	-.266**	-.367**	-.160*	-.336**	-.348**	-.364**	.350**	.617**	.350**	.731**	1	.587**	.188**	.406**	.484**	.717**	.672**
environmental benefits	-.452**	-.277**	-.379**	-.291**	-.341**	-.352**	-.335**	.399**	.547**	.332**	.545**	.587**	1	.305**	.327**	.405**	.700**	.519**
integrity	-.171*	-.105	-.215**	-.091	-.223**	-.165*	-.183**	.145*	.306**	.213**	.178**	.188**	.305**	1	.693**	.665**	.337**	.246**
ability	-.200**	-.088	-.221**	-.053	-.254**	-.163*	-.228**	.081	.325**	.111	.308**	.406**	.327**	.693**	1	.782**	.342**	.339**
benevolence	-.238**	-.069	-.252**	-.051	-.244**	-.187**	-.239**	.133	.360**	.197**	.446**	.484**	.405**	.665**	.782**	1	.421**	.414**
attitude	-.639**	-.496**	-.535**	-.415**	-.490**	-.544**	-.542**	.437**	.701**	.495**	.557**	.717**	.700**	.337**	.342**	.421**	1	.682**
Intention	-.542**	-.268**	-.324**	-.249**	-.281**	-.346**	-.360**	.319**	.563**	.355**	.618**	.672**	.519**	.246**	.339**	.414**	.682**	1

Table 8 Pearson bivariate correlation – all variables

4.3.4 Common method bias

According to Podsakoff *et al.* (2003), common method variance (i.e. variance that is attributable to the measurement method rather than to the constructs the measures represent) is a form of systematic error variance and can bias observed correlations among variables. Thus, common method bias refers to the degree to which correlations are altered due to a methods effect (Meade *et al.*, 2007, p. 1). Common method bias is serious because, as one of the main sources of systematic measurement error, it poses a rival explanation for the observed relationships between measures. Podsakoff *et al.* (2003) summarized the potential sources of common method biases and proposed procedural and statistical techniques for controlling common method biases. The four major types of potential sources are: common rater effects (e.g. consistency motif); item characteristic effects (e.g. item ambiguity); item context effects (e.g. context-induced mood); measurement context effects (e.g. simultaneous measurement of predictor and criterion variables). The survey analyzed in this paper may suffer the common method bias from common rater effects and measurement context effects because all variables were collected from the same respondents and through the same medium. In addition, context-induced mood and scale length of the item context effects may be present in the survey. The first set of questions about risks of using Digipost may induce negative mood and measures with three items allowed responses to previous items influencing responses to current items. Nonetheless, the survey may be protected from item characteristic effects because the different scale format for attitude measurement prevent the common method bias such as common scale formats and common scale anchors. Therefore, the survey in this paper is confronted with three potential sources of common method bias. Podsakoff *et al.* (2003) also suggested seven statistical techniques of assessing and controlling for common method bias. Among the seven methods, Harman's single-factor test is one of the most widely used techniques to address the issue of common method variance. The basic assumption of this technique is if a substantial amount of common method variance is present, it is expected that

either a single factor will emerge from the factor analysis or one general factor will account for most of the covariance among the measures. Therefore, a Harman's single-factor test was conducted for the measures that will be used later to testify the conceptual model. By applying single factor analysis (maximum likelihood), the single factor was found to account for 36.361% of variance, which is lower than 50% and thus common method bias do not seem to impose a significant threat in this study.

4.4 Assumptions of analyses

Before moving on to testify hypotheses by using different statistical techniques, it is necessary to assess whether the data collected conform to the statistical assumptions. Hair *et al.* (2006, p. 79) mentioned assumption tests are needed, especially in case of multivariate techniques. Since multivariate techniques are very complex, assumption violations may be unobvious and cause large bias. Therefore, the following sections test assumptions of both factor analysis and multiple regression.

4.4.1 Assumptions of factor analysis

Factor analysis is not designed to test hypotheses but used as a data reduction technique (Pallant, 2004). Pallant (2004) suggested several assumptions of a factor analysis: sample size, factorability of the correlation matrix, linearity, and outliers among cases. First, there are 214 participants in the survey, and thus pass the threshold of sample size, i.e. 150 cases. Second, the majority of the correlation coefficients in the correlation matrices are greater than 0.3 (See Appendix D). Third, the assumption of linearity is not necessary to test due to adequate sample size and unlikelihood of a curvilinear relationship. Lastly, the assumption of outliers is not violated because as shown in Table 7, a careful comparison between original mean and 5% Trimmed Mean indicates no significant influence from extreme scores on the mean. In conclusion, the data meet all the assumptions of factor analysis.

In addition, Hair *et al.* (2006) emphasize that it is more important for the factor analysis

to meet the underlying conceptual assumptions than the statistical ones. As all the measures used in the survey have been discussed thoroughly in the literature review, the results from the factor analysis are also theoretically supported.

4.4.2 Assumptions of multiple regression

As multiple regression will be used later to test hypotheses, the assumptions of multiple regression are now discussed. Tabachnick and Fidell (2013) suggested four assumptions of multiple regressions: sample size; absence of outliers; absence of multicollinearity and singularity; normality, linearity and homoscedasticity of residuals. Therefore, these assumptions will be tested in the following.

Sample size

Small sample may cause the problem of generalizability and according to Tabachnick and Fidell (2013, p. 123), the recommended formula for calculating required sample size is $N \geq 50 + 8m$ (m is the number of independent variables). Since all benefit, risk and trust measures will be used as independent variables to test hypotheses, the $m = 16$ in this paper. Thus 50 + 8*16 = 178 cases are needed to test regression. The survey received 214 responses, so it meets the requirement of sample size (178 cases).

Absence of outliers

Multiple regression is very sensitive to outliers because extreme cases have too much impact on the regression solution and the precision of estimation of the regression weights. Pallant (2004) suggested both dependent and independent variables used in regression analysis need to be tested for outliers. Since outliers have been investigated in the 4.4.1 assumptions of factor analysis and Table 7 shows no problem of outlier, it would not be discussed again here.

Absence of multicollinearity and singularity

Multicollinearity and singularity refer to the inter-correlated relationships among the independent variables and they would lead to problematic multiple regression. As shown above in Table 8, three correlations between independent variables are higher than 0.7, indicating potential multicollinearity problem. However, according to Tabachnick and Fidell (2013), the threshold of bivariate correlation of 0.7 indicates the logical problem created by multicollinearity, i.e. include redundant variables in the same analysis. Tabachnick and Fidell stated that the statistical problems created by multicollinearity occur at much higher correlations (0.9 and higher). Moreover, multicollinearity can also be detected by examining the tolerance in collinearity diagnostics. When tolerance is lower than 0.1, it indicates the multiple correlation with other variables is high and thus the possibility of multicollinearity. Another value VIF (variance inflation factor) is just the inverse of the tolerance value (1 divided by tolerance). Thus, VIF values above 10 would indicate multicollinearity (Pallant, 2004). As shown in Table 9 and Table 10, all tolerance are more than 0.1 and all VIF values are smaller than 10, suggesting no problem of multicollinearity. Therefore, absence of multicollinearity assumption does not seem to be violated in the analysis. Singularity is not a problem of the multiple regression in this paper either, because singularity would abort the running of multiple regression in SPSS. Yet, the outcome of multiple regression is shown in the software.

Normality, linearity and homoscedasticity of residuals

This assumption means that the residuals are normally distributed about the predicted dependent variable scores, that residuals have a horizontal-line relationship with predicted dependent variable scores, and that the variance of the residuals about predicted dependent variable scores is the same for all predicted scores (Tabachnick and Fidell, 2013, p. 125). The assumption can be evaluated by examining the scatterplot of the standardized residuals. If all assumptions are met, the residuals will be roughly

rectangularly distributed with a concentration of scores in the center (along the 0 point). The scatterplots of the multiple regression used in this paper show the residuals are not normally distributed (Appendix F); however, according to Tabachnick and Fidell (2013), such failure of normality is not as serious as the problems of nonlinearity and heteroscedasticity.

Chapter 5 Results

Two multiple regression analyses were performed to test the hypotheses proposed in this paper. One explored how all benefit, risk and trust measures predicted the attitude variable, testing *H1, H2* and *H3*; the other set intention as dependent variable with the rest measures as independent variables to test *H4*. In this chapter, the results will be briefly reported and the hypotheses will be testified.

5.1 Multiple regression analysis of attitude as dependent variable

In the analysis, the adjusted R Square is 0.757, meaning the model explains 75.7% of the variance in the dependent variable attitude. The model also reaches statistical significance because in the ANOVA table, F (16,197) = 42.583, Sig = .000, meaning p < .0005. The following Table 9 exhibits the result of the multiple regression analysis of attitude as dependent variable. As no independent variable has the tolerance smaller than 0.1, the analysis did not violate the assumption of multicollinearity.

Hypothesis	Variables	Standardized Coefficients Beta	t	Sig.	Tolerance	VIF
	(Constant)		4.750	.000		
H2b	time risk	-.146	-3.065	.002	.502	1.994
H2f	psychological risk	-.110	-2.202	.029	.457	2.189
H2d	privacy risk	-.081	-1.296	.196	.288	3.468
H2g	social risk	-.086	-1.744	.083	.466	2.148
H2e	security risk	.028	.446	.656	.284	3.516
H2c	financial risk	-.003	-.048	.962	.355	2.820
H2a	functional risk	-.028	-.483	.630	.348	2.873
H1c	accessibility	-.046	-1.049	.295	.584	1.714
H1b	functionality	.151	2.646	.009	.352	2.842
H1a	ease of use	.038	.875	.383	.596	1.677
H1d	experience	.013	.247	.805	.412	2.429
H1e	time efficiency	.333	5.439	.000	.304	3.287
H1f	environmental benefits	.256	5.450	.000	.517	1.935
H3c	integrity	.155	2.919	.004	.402	2.486
H3a	ability	-.097	-1.582	.115	.303	3.305
H3b	benevolence	-.002	-.026	.979	.287	3.481

Table 9 Multiple regression – attitude as dependent variable

Table 9 shows that among the risks of using Digipost, time risk and psychological risk have significant negative influence on consumers' attitude toward Digipost. The other risk measures all reported the Sig. values more than 0.05, indicating nonsignificant influence. Thus, hypotheses *H2b* and *H2f* are supported. Among the benefits of using Digipost, time efficiency, environmental benefits and functionality have significant positive influence on consumers' attitude toward Digipost. Thus, the hypotheses *H1e*, *H1f* and *H1b* are supported. In addition, only integrity among the three trust dimensions has a significant positive influence on consumers' attitude toward Digipost. Thus hypothesis *H3c* is supported. Therefore, *Hypothesis 1*, *Hypothesis 2*, and *Hypothesis 3* are partially confirmed.

5.2 Multiple regression analysis of intention as dependent variable

The model explains 55.8% of variance according to the adjusted R square of 0.558. The model is also statistical significant because of the F (17,196) = 16.792, Sig. value of 0.000. As shown in the following Table 10, all independent variables have tolerant larger than 0.1, so the analysis did not violate the assumption of multicollinearity.

Variables	Standardized Coefficients Beta	t	Sig.	Tolerance	VIF
(Constant)		.437	.663		
time risk	-.185	-2.811	.005	.479	2.089
psychological risk	.020	.291	.771	.446	2.243
privacy risk	.028	.333	.740	.286	3.498
social risk	-.069	-1.028	.305	.458	2.181
security risk	.069	.810	.419	.284	3.520
financial risk	.062	.812	.418	.355	2.821
functional risk	-.030	-.389	.698	.348	2.877
accessibility	-.058	-.965	.336	.580	1.723
functionality	.068	.874	.383	.340	2.943
ease of use	.008	.131	.896	.594	1.684
experience	.252	3.546	.000	.411	2.430
time efficiency	.169	1.902	.059	.264	3.781
environmental benefits	-.042	-.614	.540	.449	2.227
integrity	-.002	-.030	.976	.386	2.593
ability	.039	.468	.640	.299	3.347
benevolence	.035	.416	.678	.287	3.481
attitude	.325	3.378	.001	.224	4.459

Table 10 Multiple regression – intention as dependent variable

Table 10 exhibits the result of the multiple regression analysis of intention as dependent variable. Controlling the influence from benefit, risk and trust variables, it supported *Hypothesis 4* that attitude toward using digital post services has a positive influence on intention to use digital post service. Moreover, although the direct influence from risks, benefits and trust beliefs on intention were not hypothesized in this paper, it is observed from Table 10 that time risk has a significant negative influence on intention and experience has a significant positive influence on intention. Thus, time risk and experience both have significant direct influence on intention. As for the other variables, since multiple regression only report unique relationship between independent variables and dependent variable as significant, it is possible that the other risk, benefit and trust measures indirectly influence intention through attitude.

The Table 11 below summarizes the results of hypothesis tests. *H1b*, *H1e* and *H1f* are confirmed, indicating functionality, time efficiency and environment benefits have positive influence on attitude toward using digital post service. *H2b* and *H2f* are confirmed, showing time risk and psychological risk have negative influence on attitude toward using digital post service. *H3c* is confirmed, meaning integrity has a positive influence on attitude toward using digital post service. *H4* is most strongly confirmed among all the hypotheses, with the standardized coefficients beta of 0.325. Thus, attitude toward using digital post services is verified to have a positive influence on intention to use digital post service.

Hypothesis	Result	Standardized Coefficients Beta
H1a. Ease of use has a positive influence on attitude toward using digital post service.	Rejected	
H1b. Functionality has a positive influence on attitude toward using digital post service.	Confirmed	0.151
H1c. Accessibility has a positive influence on attitude toward using digital post service.	Rejected	
H1d. Experience has a positive influence on attitude toward using digital post service.	Rejected	
H1e. Time efficiency has a positive influence on attitude toward using digital post service.	Confirmed	0.333
H1f. Environment benefit has a positive influence on attitude toward using digital post service.	Confirmed	0.256
H2a. Functional risk has a negative influence on attitude toward using digital post service.	Rejected	
H2b. Time risk has a negative influence on attitude toward using digital post service.	Confirmed	0.146
H2c. Financial risk has a negative influence on attitude toward using digital post service.	Rejected	
H2d. Privacy risk has a negative influence on attitude toward using digital post service.	Rejected	
H2e. Security risk has a negative influence on attitude toward using digital post service.	Rejected	
H2f. Psychological risk has a negative influence on attitude toward using digital post service.	Confirmed	0.110
H2g. Social risk has a negative influence on attitude toward using digital post service.	Rejected	
H3a. Ability of the service provider has a positive influence on attitude toward using digital post service.	Rejected	
H3b. Benevolence of the service provider has a positive influence on attitude toward using digital post service.	Rejected	
H3c. Integrity of the service provider has a positive influence on attitude toward using digital post service.	Confirmed	0.155
H4. Attitude toward using digital post services has a positive influence on intention to use digital post service.	Confirmed	0.325

Table 11 Summary of hypothesis test results

Chapter 6 Implications and future research

The results from the survey confirmed five hypotheses and the validation of the relationships in the conceptual model are shown below in Figure 4.

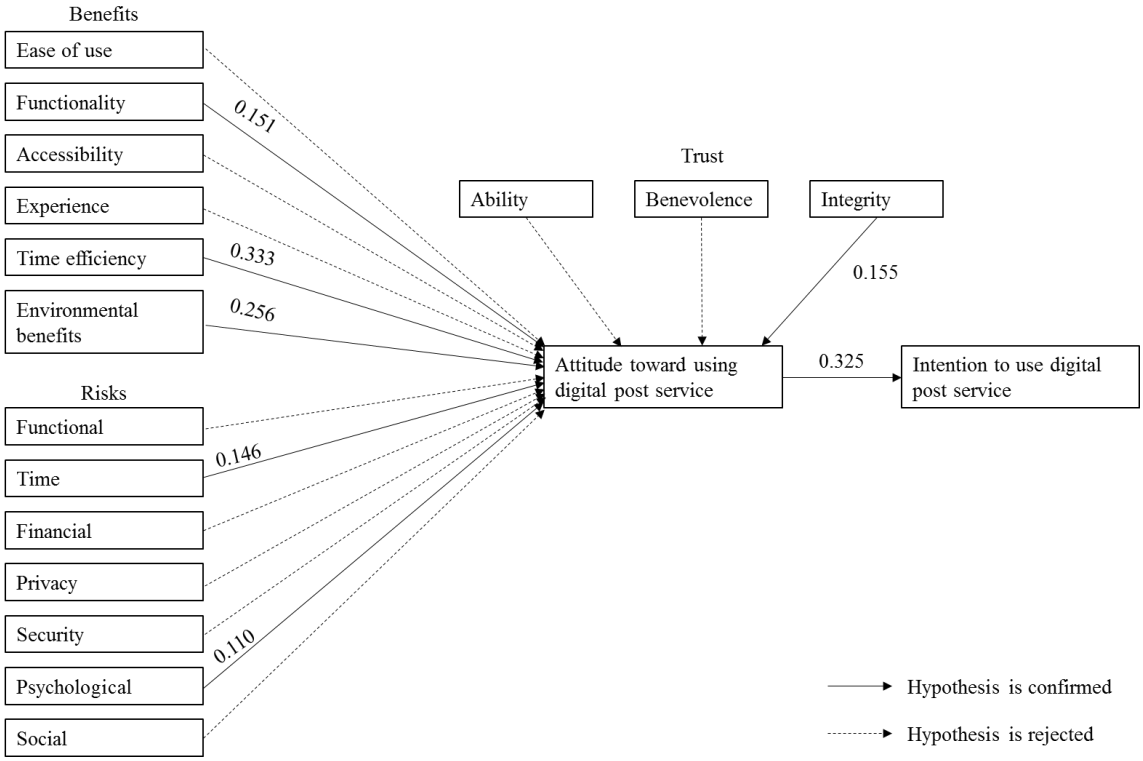

Figure 4 Results of the test of conceptual model

As shown in Figure 4, three out of six benefits of digital post service are found to have direct positive influence on consumers' attitude toward using digital post service. They are functionality, time efficiency and environmental benefits, and time efficiency has the strongest influence. Time risk and psychological risk of digital post service are observed to have direct negative influence on consumers' attitude toward using digital post service. Integrity of digital post service provider is verified to have positive influence on consumers' attitude toward digital post service while the other two trust beliefs ability and benevolence are not. Lastly, controlling for the influences of all risk, benefit and trust variables, consumers' attitude toward using digital post service has a positive influence on their intention to use digital post service. Acknowledging the

findings of the survey results, theoretical and managerial implications and suggestions for future research are discussed in the following sections.

6.1 Theoretical implications

The conceptual model proposed in this paper is an extension of TAM, incorporating benefits and risks from customer perceived value perspective as well as the trust beliefs of service provider. This paper applied the fresh perspective of customer perceived value to SST adoption and the seemingly contradictory results of the influence from time risk and time efficiency on attitude toward using digital post service just confirm the feasibility of the customer perceived value perspective on TAM. Customer perceived value theory states customers would assess the gain and loss when making purchase decision and such assessment would influence customer satisfaction. The theory proves to be applicable also in digital post service context because the tradeoff of time is shown to influence consumers' attitude toward using digital post service. Both time risk, measured by the items e.g. "I think my use of Digipost is time-consuming", and time efficiency, measured by the items e.g. "I save time by using Digipost", have significant influence on attitude toward using digital post service and the two variables represent the risk and benefit of using digital post service. This shows consumers indeed make tradeoff when making SST adoption decisions and the customer perceived value perspective is applicable to the TAM. In terms of trust, it has been included in TAM before but was mostly measured by single dimension. The three trust beliefs of service provider used in this paper show different significance level of the influence in TAM and this indicates that some trusting characteristics of service provider may be more important in attracting consumers to adopt its SST. Therefore, it is suitable to apply trust beliefs to TAM instead of single measurement in order to investigate which characteristics influence SST adoption most.

This paper, together with many other SST adoption-related articles, acknowledges the important influence from attitude toward using SST on intention to use SST. The result

of the second multiple regression in this paper (intention as dependent variable) also reveals that other variables including benefit and risk measures may have direct influence on intention to use digital post service as well. For example, experience is found to have direct positive influence on intention to use digital post service. Therefore, scholars may consider the direct influence on intention from the factors other than attitude.

Moreover, the benefits and risks are derived from similar SST categories with digital post service based on SST classifications. However, as the results turn out, one of the two antecedents in the original TAM ease of use does not have a significant positive influence on attitude toward using digital post service. Furthermore, half of the benefit, risk and trust measures were found to have no significant influence on attitude toward using digital post service. On the other hand, the environmental benefit measure, which was specifically developed with Posten Norge AS for this study, was proven to have significant positive influence on attitude toward using digital post service. Therefore, it is possible that similar SST categories in the SST classification still have different factors influencing attitude toward SST adoption and the TAM may not be applicable to all SSTs. Another possible speculation of the reason why many antecedents proposed in this paper were proven insignificant is that the classification of digital post service is problematic for survey respondents. The classification was based on its features and functions including pay bills, i.e. direct transaction, and thus it shares the commonality with other SSTs such as online shopping, online banking, and mobile banking, and so on; therefore, many benefits and risks identified in this paper were drawn from this SST categories. However, survey participants are not yet users of digital post service and thus they are not familiar with the features and functions provided by the service – they may consider digital post service as a pure post service similar to email instead of an integrative service involving payment. As a result, what respondents know of digital post service is different from author' understandings, and thus respondents do not agree with the benefits and risks of digital post service identified by the author. Therefore, it is recommended that scholars investigating the adoption of different kinds of SSTs

carefully evaluate, select and probably develop suitable antecedents of SST adoption.

6.2 Managerial implications

As mentioned above, managers in digital post service field also need to be aware that the findings from similar SST categories may not be directly applicable to the adoption of digital post service. Managers may need to test the influences from certain factors on the adoption of digital post service before rushing to improve or minimize the factor.

As far as the survey results in this paper can tell, managers aiming to boost digital post service could put advertising focus on the useful and broad range of functions their SSTs provide, the environmental benefits from using the SSTs, and the integrity and reliability of the service provider themselves. For example, on the cover of all the current paper post, an obvious line stating "think about the environment, turn to digital" may invoke consumers' awareness of both the digital post service and its environment benefits. In this way, environmental benefits is promoted and thus consumers' attitude toward using digital post service is becoming positive. Moreover, psychological risk could be diminished by educating new users the ways to use the SST and thus relieve them from the anxiety of using the SST. For example, an interactive user interface could be designed for digital post service, and from time to time, it pops up dialog box saying "try click here" and then explains/demonstrates different available functions of the SST. Moreover, similar to Siri in iPhone, a human-like butler could be placed in the SST and it could help users utilize all the functions. As experience proves to directly influence consumers' intention to use digital post service, managers could emphasize the fun experience of using the SST and even set up experience area in the stores to both offer the fun and instruct new users. In this way, new users may be attracted by the fun experience and free from psychological risk. Moreover, the experience area could also help consumers understand the available functions of digital post service and assure consumers of the integrity of service provider. In addition, managers also need to keep updated about the antecedents other than attitude of SST adoption and thus do not

necessarily need to struggle to improve customer favorability.

This paper provides the fresh perspective of customer perceived value and the perspective is testified to be applicable to SST adoption. Therefore, managers could make marketing strategy to leverage their strengths so that customers are convinced that the gain from using the SST outweighs the loss. For example, as the survey results in this paper shows, the time efficiency of benefit and time risk both have significant influence on consumers' attitude toward using digital post service. In this case, managers need to persuade consumers to believe that digital post service helps them save time and improves their efficiency. For example, a new advertising launched online or on TV may feature the time-saving characteristic of digital post service. A possible direct illustration of the kind could be a user of digital post service finishes sending a digital post when he or she finishes eating a bar of chocolate, or a comparison that a user of digital post service could send a digital post and do grocery shopping while the non-user could only send a post during the same period of time. Besides, as the invoice payment function is only available on Digipost website, managers could consider bringing the function to mobile users as well and promoting the function. Since this function is also convenient for the customers of online/mobile banking, partner banks may be willing to promote together. For example, partner banks could highlight a line stating “pay bills with one click” on their promotion brochure and under the line, a comic tells their customers how to use the function step by step. Comic on the brochure not only catches eyes, but brings fun to readers – hopefully digital post service could be associated with such feeling from the beginning. Since the function saves users time of paying invoice via online banking, consumers may come to realize the time efficiency benefit of digital post service outweighs time risk and finally adopt digital post service.

6.3 Suggestions for future research

Many researchers have investigated the influences of benefits, risks and trust in service

provider on SST adoption; however, this paper furthers the understanding in digital post service context. This paper also shows that the influencing factors of different kinds of SSTs needs to be specially selected and developed. Therefore, the researchers investigating SST adoption in digital post service field could use the validated factors in this paper for reference. Moreover, instead of mirroring the factors from other SSTs, they may need to consider the characteristics of digital post service when exploring other factors influencing SST adoption. In addition, researchers also need to make sure the respondents see the SST the same way as they understand it. For example, a question about how respondents think about or describe the SST would be helpful for calibration.

The conclusions drawn in this paper, on the other hand, face the threats to conclusion validity, internal validity and external validity. Conclusion validity is "the degree to which conclusions we reach about relationships in our data are reasonable" (Trochim, 2006, Conclusion Validity para. 2). In spite of the high reliability of measures in the survey, it is still possible that some relationships are missed due to random heterogeneity of respondents or low statistical power. Since the survey had a diverse group of respondents, they varied widely on measures and such individual differences shadowed potential relationships among variables. Thus, researchers may need to increase their statistical power in order to distinguish the true strength of the relationships. For example, an increase of significance level would increase the risk of making a Type I Error, but it would also higher the statistical power. Researchers may compromise the rigor of the test when identifying the determinants of SST adoption and then lower significance level to test the validity of the determinants.

Internal validity is "the approximate truth about inferences regarding cause-effect or causal relationships" (Trochim, 2006, Internal Validity para. 1). Since the hypotheses and conclusions in this paper drew inferences about causal relationships among benefits, risks, trust beliefs and SST adoption, the internal validity of such relationships needs to be examined. According to Trochim (2006), the three criteria of establishing causal relationship are: temporal precedence, covariation of the case and effect, and no

plausible alternative explanations. First, temporal precedence means the cause happened before the effect. As the survey gathered the information about both the cause and the effect at the same time, it is difficult to know whether respondents think about the cause first and thus lead to the outcome of the effect. It is possible that the respondents have somehow developed their attitude toward using digital post service already but they have never thought about the benefits or risks. Or due to the self-fulfilling prophecy effect, the results of the cause were even derived from respondents' attitude toward using digital post service. That is, as the respondent dislikes digital post service, he or she would undervalue its benefits and exaggerate its risks to justify that it is right to dislike digital post service. Therefore, a question about whether respondents acknowledge the antecedents may help make sure of the temporal precedence. Second, the covariation of the cause and effect has not been investigated because the survey was only conducted once. Therefore, a study of the covariation in the future may be useful. For example, a two-group research experiment could be designed to testify the covariation of the benefits of the SST and the attitude toward using digital post service. First, the benefit perceptions and attitude of both groups will be measured. Then during the time of research, research group would get information of the benefits of using digital post service while the control group does not. Last, the benefit perceptions and the attitude of both groups will be measured again. In this experiment, if deducting the natural effect in control group, the attitude of research group increases with the more positive rating of benefit perceptions, then the covariation of benefits and attitude is detected and verified. Third, other unknown plausible alternative explanations are possible for the survey in this paper. Therefore, a qualitative survey may be helpful to determine the existence of alternative explanations. In summary, a more thorough research of the factors influencing SST adoption may be: first, explore possible antecedents specifically for the SST of interest via qualitative research, e.g. interview; then screen the possible antecedents via quantitative research and finally design experiments to identify the real influential factors. In this way, qualitative research could help verify the temporal precedence and rule out plausible alternative explanations while the experiment could test the covariation. Then the internal validity

of the research would be confirmed.

In terms of external validity, it refers to "the approximate truth of conclusions that involve generalizations" (Trochim, 2006, External Validity para. 1). The three major threats to external validity are people, places and times. The survey in this paper is confronted with all the three threats. As the recruitment of respondents was through email only, the participants are, to some extent, regular users of email and they may be biased in that digital post service may seem to be another form of email rather than a new SST to them. Therefore, researchers may need to conduct the survey not only by sending out emails but making calls or street interviews. The survey was conducted only in Norway and it is possible that the influence of Norwegians' high level of technology acceptance or special concerns for the environment would inhibit the generalization of the survey results to other countries. Therefore, researchers may need to extend the survey sample to consumers across the globe to avoid the influence of nationalities. Lastly, digital post service is currently at an infant stage and has not been widely known. Later, with the introduction and promotion of digital post service, consumers' perception of such service may change and thus the results from the survey may not be applicable to the digital post service in the mature stage in the future. Therefore, it is recommended that researchers consider the development stage of SSTs when exploring the influencing factors of SST adoption.

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Appendix

Appendix A Survey measures

Variable	Items	Reference(s)
Time risk	TimR1: I think my use of Digipost is time-consuming TimR2: I think I waste much time when I use Digipost TimR3: I feel that using Digipost is inefficient use of my time	Crespo *et al.* (2009)
Functional risk	FunR1: I am sometimes concerned if Digipost work as it is supposed to FunR2: I think there is a significant chance that Digipost will not work as well as it is supposed to FunR3: I am unsure if the technological solutions in Digipost work as it is supposed to	Crespo *et al.* (2009), Stone and Grønhaug (1993)
Psychological risk	Psy1: I may feel uneasy when I use Digipost Psy2: Using Digipost may give me a feeling of anxiety Psy3: I feel a little nervous when using Digipost	Crespo *et al.* (2009)
Privacy risk	Pri1: I think there is a significant chance that my personal information can be lost when I use Digipost Pri2: I am worried that my use of Digipost increases the chances of receiving mail that I have not requested Pri3: I am afraid that my use of Digipost increases the chances that my personal information can be used for other purposes	Crespo *et al.* (2009)
Financial risk	Fin1: I think I can lose money by using Digipost Fin2: I think I can lose control over bank accounts and credit cards by using	Crespo *et al.* (2009)

	Digipost Fin3: I am worried about financial losses due to system failures resulting in that I do not receive certain mail	
Social risk	Soc1: People who mean a lot to me think it is a bad idea to use Digipost Soc2: My acquaintances think it is unwise to use Digipost Soc3: My use of Digipost gives a negative impression on my friends	Crespo *et al.* (2009)
Security risk	Sec1: I do not think that the digital service Digipost is secure Sec2: I do not think that Digipost is well protected from hacking Sec3: I sometimes wonder if it is safe to use Digipost	Aldas-Manzano *et al.* (2011)
Accessibility	Acc1: Digipost provides access to my mail wherever I am Acc2: Digipost provides access to my mail whenever I need it Acc3: Digipost makes everyday life easier	Forsythe *et al.* (2006)
Functionality	Fun1: Digipost has the functionality that I need Fun2: There are many functions available at Digipost Fun3: Digipost gives me sufficient information about the functions and opportunities offered	Forsythe *et al.* (2006)
Ease of use	Eou1: Digipost is easy to learn for me Eou2: It is easy for me to get Digipost to work the way I want Eou3: Using Digipost is easy and understandable	Nysveen *et al.* (2005)
Experiences	Exp1: Digipost gives me new experiences Exp2: It feels exciting to receive mail through Digipost Exp3: It is fun to use Digipost	Forsythe *et al.* (2006)
Time	Tim1: I save time by using Digipost	Nysveen *et al.* (2005)

efficiency	Tim2: Digipost is quicker compared to how I previously handled my mail Tim3: By using Digipost I have time left for other things	
Environment	Env1: Digipost contributes to saving the environment Env2: Digipost contributes to saving cost for the society Env3: Digipost contributes to more effective work processes	N/A
Integrity	Integrity1: I think Posten is honest Integrity2: To me, Posten is reliable Integrity3: Posten keeps their promises	Hwang and Lee (2012), Xie and Peng (2009)
Ability	Ability1: Posten has high competence Ability2: Posten has a high degree of expertise Ability3: Posten has a high degree of knowledge and abilities	Hwang and Lee (2012), Schlosser *et al.* (2006) and Xie and Peng (2009)
Benevolence	Benev1: Posten seems to be concerned with what is best for me as a customer Benev2: I think Posten considers my welfare besides making profit Benev3: I am sure that if I have a problem, Posten will respond constructively and care about me	Hwang and Lee (2012), Schlosser *et al.* (2006) and Xie and Peng (2009)
Attitude	I thing using Digipost is: Att1: Bad (1) _ _ _ _ _ _ _ Good (7) Att2: Unreasonable (1) _ _ _ _ _ _ _ Reasonable (7) Att3: Unfavorable (1) _ _ _ _ _ _ _ Favorable (7) Att4: Negative (1) _ _ _ _ _ _ _ Positive (7)	Nysveen *et al.* (2005)
Intention	Int1: I will use Digipost the next month Int2: I will frequently use Digipost in the future	Nysveen *et al.* (2005)

Appendix B Factor analysis results of original risk measures

	1	2	3	4	5	6	7
I think my use of Digipost is time-consuming		.770					
I think I waste much time when I use Digipost		.952					
I feel that using Digipost is inefficient use of my time		.904					
I am sometimes concerned if Digipost work as it is supposed to					.842		
I think there is a significant chance that Digipost will not work as well as it is supposed to					.928		
I am unsure if the technological solutions in Digipost work as it is supposed to					.853		
I may feel uneasy when I use Digipost	.647						
Using Digipost may give me a feeling of anxiety	1.028						
I feel a little nervous when using Digipost	.916						
I think there is a significant chance that my personal information can be lost when I use Digipost						.599	
I am worried that my use of Digipost increases the chances of receiving mail that I have not requested						.478	
I am afraid that my use of Digipost increases the chances that my personal information can be used for other purposes						.824	
I think I can lose money by using Digipost							.689
I think I can lose control over bank accounts and credit cards by using Digipost							.620
I am worried about financial losses due to system failures resulting in that I do not receive certain mail							.705
People who mean a lot to me think it is a bad idea to use Digipost				.782			
My acquaintances think it is unwise to use Digipost				.965			
My use of Digipost gives a negative impression on my friends				.840			
I do not think that the digital service Digipost is secure			.915				
I do not think that Digipost is well protected from hacking			.904				
I sometimes wonder if it is safe to use Digipost			.698				
Eigenvalues	11.096	2.263	1.602	1.237	.876	.770	.573
Variance explained	52.839	10.777	7.627	5.892	4.170	3.664	2.729

Appendix C Factor analysis results of original benefit measures

	1	2	3	4	5	6
Digipost provides access to my mail wherever I am		.886				
Digipost provides access to my mail whenever I need it		.983				
Digipost makes everyday life easier				.494		
Digipost has the functionality that I need						.843
There are many functions available at Digipost						.721
Digipost gives me sufficient information about the functions and opportunities offered						.597
Digipost is easy to learn for me					.901	
It is easy for me to get Digipost to work the way I want					.729	
Using Digipost is easy and understandable					.864	
Digipost gives me new experiences	.603					
It feels exciting to receive mail through Digipost	.963					
It is fun to use Digipost	.945					
I save time by using Digipost				.924		
Digipost is quicker compared to how I previously handled my mail				.827		
By using Digipost I have time left for other things				.548		
Digipost contributes to saving the environment			.795			
Digipost contributes to saving cost for the society			1.021			
Digipost contributes to more effective work processes			.717			
Eigenvalues	8.990	2.402	1.339	1.210	.828	.681
Variance explained	49.947	13.344	7.441	6.720	4.602	3.783

Appendix D SPSS outputs of correlation matrices

Correlation matrix of risk measures

	TimR1	TimR2	TimR3	FunR1	FunR2	FunR3	Psy1	Psy2	Psy3	Pri1	Pri3	Fin1	Fin2	Fin3	Soc1	Soc2	Soc3	Sec1	Sec2	Sec3
TimR1	1.000	.853	.782	.506	.516	.455	.476	.352	.351	.381	.383	.492	.535	.508	.390	.442	.346	.399	.320	.371
TimR2	.853	1.000	.874	.501	.508	.443	.509	.394	.379	.375	.359	.467	.494	.499	.399	.461	.346	.399	.331	.365
TimR3	.782	.874	1.000	.425	.428	.394	.426	.299	.276	.318	.296	.430	.465	.420	.349	.415	.325	.386	.291	.319
FunR1	.506	.501	.425	1.000	.840	.805	.657	.524	.480	.583	.559	.374	.497	.556	.375	.396	.383	.602	.555	.560
FunR2	.516	.508	.428	.840	1.000	.893	.692	.585	.563	.666	.642	.415	.566	.549	.399	.426	.376	.665	.635	.647
FunR3	.455	.443	.394	.805	.893	1.000	.662	.574	.551	.659	.633	.402	.538	.517	.357	.413	.412	.674	.664	.661
Psy1	.476	.509	.426	.657	.692	.662	1.000	.851	.785	.608	.598	.421	.553	.553	.431	.475	.425	.583	.565	.577
Psy2	.352	.394	.299	.524	.585	.574	.851	1.000	.925	.534	.538	.367	.550	.463	.381	.398	.380	.490	.491	.513
Psy3	.351	.379	.276	.480	.563	.551	.785	.925	1.000	.541	.509	.402	.522	.444	.396	.416	.415	.500	.494	.483
Pri1	.381	.375	.318	.583	.666	.659	.608	.534	.541	1.000	.821	.366	.530	.442	.299	.342	.317	.716	.715	.712
Pri3	.383	.359	.296	.559	.642	.633	.598	.538	.509	.821	1.000	.390	.545	.524	.295	.351	.332	.703	.726	.750
Fin1	.492	.467	.430	.374	.415	.402	.421	.367	.402	.366	.390	1.000	.663	.676	.596	.575	.594	.391	.329	.384
Fin2	.535	.494	.465	.497	.566	.538	.553	.550	.522	.530	.545	.663	1.000	.726	.545	.563	.513	.487	.467	.513
Fin3	.508	.499	.420	.556	.549	.517	.553	.463	.444	.442	.524	.676	.726	1.000	.570	.557	.516	.484	.439	.514
Soc1	.390	.399	.349	.375	.399	.357	.431	.381	.396	.299	.295	.596	.545	.570	1.000	.826	.775	.417	.357	.388
Soc2	.442	.461	.415	.396	.426	.413	.475	.398	.416	.342	.351	.575	.563	.557	.826	1.000	.823	.429	.434	.445
Soc3	.346	.346	.325	.383	.376	.412	.425	.380	.415	.317	.332	.594	.513	.516	.775	.823	1.000	.438	.400	.397
Sec1	.399	.399	.386	.602	.665	.674	.583	.490	.500	.716	.703	.391	.487	.484	.417	.429	.438	1.000	.881	.826
Sec2	.320	.331	.291	.555	.635	.664	.565	.491	.494	.715	.726	.329	.467	.439	.357	.434	.400	.881	1.000	.843
Sec3	.371	.365	.319	.560	.647	.661	.577	.513	.483	.712	.750	.384	.513	.514	.388	.445	.397	.826	.843	1.000

Correlation matrix of benefit measures

	Acc1	Acc2	Fun1	Fun2	Fun3	Eou1	Eou2	Eou3	Exp1	Exp2	Exp3	Tim1	Tim2	Tim3	Env1	Env2	Env3
Acc1	1.000	.906	.450	.544	.519	.347	.394	.350	.332	.283	.301	.354	.330	.289	.382	.312	.389
Acc2	.906	1.000	.438	.538	.512	.353	.351	.365	.301	.297	.297	.336	.330	.273	.389	.313	.382
Fun1	.450	.438	1.000	.714	.691	.366	.512	.427	.488	.494	.550	.641	.575	.603	.428	.400	.533
Fun2	.544	.538	.714	1.000	.665	.325	.418	.411	.413	.409	.455	.480	.485	.465	.442	.399	.506
Fun3	.519	.512	.691	.665	1.000	.454	.523	.566	.330	.355	.354	.480	.449	.446	.462	.411	.480
Eou1	.347	.353	.366	.325	.454	1.000	.691	.759	.105	.106	.116	.219	.225	.151	.218	.217	.200
Eou2	.394	.351	.512	.418	.523	.691	1.000	.708	.268	.273	.296	.382	.411	.345	.282	.300	.359
Eou3	.350	.365	.427	.411	.566	.759	.708	1.000	.237	.229	.239	.327	.320	.257	.270	.300	.340
Exp1	.332	.301	.488	.413	.330	.105	.268	.237	1.000	.776	.782	.670	.604	.676	.455	.425	.556
Exp2	.283	.297	.494	.409	.355	.106	.273	.229	.776	1.000	.935	.588	.599	.694	.429	.460	.574
Exp3	.301	.297	.550	.455	.354	.116	.296	.239	.782	.935	1.000	.630	.614	.736	.391	.423	.557
Tim1	.354	.336	.641	.480	.480	.219	.382	.327	.670	.588	.630	1.000	.860	.785	.521	.482	.611
Tim2	.330	.330	.575	.485	.449	.225	.411	.320	.604	.599	.614	.860	1.000	.791	.491	.438	.562
Tim3	.289	.273	.603	.465	.446	.151	.345	.257	.676	.694	.736	.785	.791	1.000	.436	.454	.579
Env1	.382	.389	.428	.442	.462	.218	.282	.270	.455	.429	.391	.521	.491	.436	1.000	.799	.725
Env2	.312	.313	.400	.399	.411	.217	.300	.300	.425	.460	.423	.482	.438	.454	.799	1.000	.816
Env3	.389	.382	.533	.506	.480	.200	.359	.340	.556	.574	.557	.611	.562	.579	.725	.816	1.000

Correlation matrix of trust measures

	Integrity1	Integrity2	Integrity3	Ability1	Ability2	Ability3	Benev1	Benev2	Benev3
Integrity1	1.000	.746	.745	.574	.557	.547	.545	.522	.542
Integrity2	.746	1.000	.903	.633	.667	.666	.598	.570	.571
Integrity3	.745	.903	1.000	.666	.691	.677	.631	.616	.621
Ability1	.574	.633	.666	1.000	.946	.937	.759	.702	.714
Ability2	.557	.667	.691	.946	1.000	.952	.757	.700	.701
Ability3	.547	.666	.677	.937	.952	1.000	.750	.687	.710
Benev1	.545	.598	.631	.759	.757	.750	1.000	.855	.803
Benev2	.522	.570	.616	.702	.700	.687	.855	1.000	.800
Benev3	.542	.571	.621	.714	.701	.710	.803	.800	1.000

Appendix E SPSS outputs of factor analyses

Factor analysis of purified risk measures

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	10.742	53.711	53.711	8.312	41.562	41.562	6.215
2	2.261	11.306	65.016	1.012	5.058	46.620	6.528
3	1.594	7.970	72.986	3.512	17.561	64.181	5.475
4	1.217	6.085	79.071	1.409	7.044	71.225	5.798
5	.777	3.886	82.957	1.354	6.769	77.994	7.951
6	.767	3.837	86.794	.620	3.099	81.093	7.318
7	.392	1.958	88.752	.443	2.217	83.310	6.997
8	.346	1.728	90.480				
9	.300	1.498	91.978				
10	.232	1.158	93.136				
11	.220	1.099	94.235				
12	.202	1.008	95.243				
13	.174	.872	96.115				
14	.158	.791	96.906				
15	.150	.749	97.655				
16	.144	.720	98.375				
17	.100	.501	98.876				
18	.095	.477	99.354				
19	.078	.390	99.744				
20	.051	.256	100.000				

Extraction Method: Maximum Likelihood.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Pattern Matrix[a]

	Factor						
	1	2	3	4	5	6	7
I think my use of Digipost is time-consuming			.779				
I think I waste much time when I use Digipost			.959				
I feel that using Digipost is inefficient use of my time			.907				
I am sometimes concerned if Digipost work as it is supposed to					-.852		
I think there is a significant chance that Digipost will not work as well as it is supposed to					-.927		
I am unsure if the technological solutions in Digipost work as it is supposed to					-.857		
I may feel uneasy when I use Digipost		-.642					
Using Digipost may give me a feeling of anxiety		-1.017					
I feel a little nervous when using Digipost		-.909					
I think there is a significant chance that my personal information can be lost when I use Digipost	.502						
I am afraid that my use of Digipost increases the chances that my personal information can be used for other purposes	.966						
I think I can lose money by using Digipost							.747
I think I can lose control over bank accounts and credit cards by using Digipost							.707
I am worried about financial losses due to system failures resulting in that I do not receive certain mail							.757
People who mean a lot to me think it is a bad idea to use Digipost				.788			
My acquaintances think it is unwise to use Digipost				.942			
My use of Digipost gives a negative impression on my friends				.855			
I do not think that the digital service Digipost is secure						-.901	
I do not think that Digipost is well protected from hacking						-.929	
I sometimes wonder if it is safe to use Digipost						-.715	

Extraction Method: Maximum Likelihood.

Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 7 iterations.

Factor analysis of purified benefit measures

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	8.378	49.280	49.280	7.866	46.273	46.273	5.271
2	2.400	14.120	63.400	1.985	11.676	57.949	3.913
3	1.339	7.878	71.278	1.114	6.551	64.500	5.115
4	1.199	7.052	78.330	1.370	8.058	72.558	3.907
5	.805	4.735	83.064	.861	5.067	77.626	5.764
6	.651	3.827	86.892	.507	2.985	80.611	5.950
7	.342	2.011	88.902				
8	.315	1.852	90.755				
9	.287	1.689	92.444				
10	.275	1.617	94.061				
11	.255	1.500	95.561				
12	.201	1.182	96.743				
13	.169	.992	97.735				
14	.136	.802	98.537				
15	.112	.659	99.196				
16	.084	.497	99.693				
17	.052	.307	100.000				

Extraction Method: Maximum Likelihood.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Pattern Matrix[a]

	Factor					
	1	2	3	4	5	6
Digipost provides access to my mail wherever I am		.898				
Digipost provies access to my mail whenever I need it		.965				
Digipost has the functionality that I need						.834
There are many functions available at Digipost						.750
Digipost gives me sufficient information about the functions and opportunities offered						.640
Digipost is easy to learn for me				.901		
It is easy for me to get Digipost to work the way I want				.726		
Using Digipost is easy and understandable				.858		
Digipost gives me new experiences	.602					
It feels exciting to receive mail through Digipost	.953					
It is fun to use Digipost	.952					
I save time by using Digipost					-.866	
Digipost is quicker compared to how I previously handled my mail					-.879	
By using Digipost I have time left for other things					-.578	
Digipost contributes to saving the environment			.789			
Digipost contributes to saving cost for the society			1.016			
Digipost contributes to more effective work processes			.711			

Extraction Method: Maximum Likelihood.

Rotation Method: Oblimin with Kaiser Normalization.[a]

a. Rotation converged in 6 iterations.

Factor analysis of trust measures

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	6.590	73.226	73.226	6.321	70.231	70.231	5.715
2	.946	10.507	83.733	.819	9.095	79.326	5.111
3	.609	6.762	90.495	.600	6.668	85.994	5.471
4	.301	3.344	93.839				
5	.216	2.404	96.242				
6	.140	1.553	97.795				
7	.097	1.078	98.873				
8	.056	.627	99.500				
9	.045	.500	100.000				

Extraction Method: Maximum Likelihood.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Pattern Matrix[a]

	Factor		
	1	2	3
I think Posten is honest		.745	
To me, Posten is reliable		.993	
Posten keeps their promises		.914	
Posten has high competence	.941		
Posten has a high degree of expertise	.969		
Posten has a high degree of knowledge and abilities	.965		
Posten seems to be concerned with what is best for me as a customer			.845
I think Posten considers my welfare besides making profit			.985
I am sure that if I have a problem, Posten will respond constructively and care about me			.779

Extraction Method: Maximum Likelihood.

Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Appendix F SPSS outputs of multiple regressions

Multiple regression – attitude as dependent variable

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.881[a]	.776	.757	.79716

a. Predictors: (Constant), benevolence, social risk, accessibility, privacy risk, ease of use, experience, time risk, environmental benefits, integrity, psychological risk, functionality, functional risk, financial risk, time efficiency, ability, security risk

b. Dependent Variable: attitude

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	432.960	16	27.060	42.583	.000[b]
	Residual	125.186	197	.635		
	Total	558.146	213			

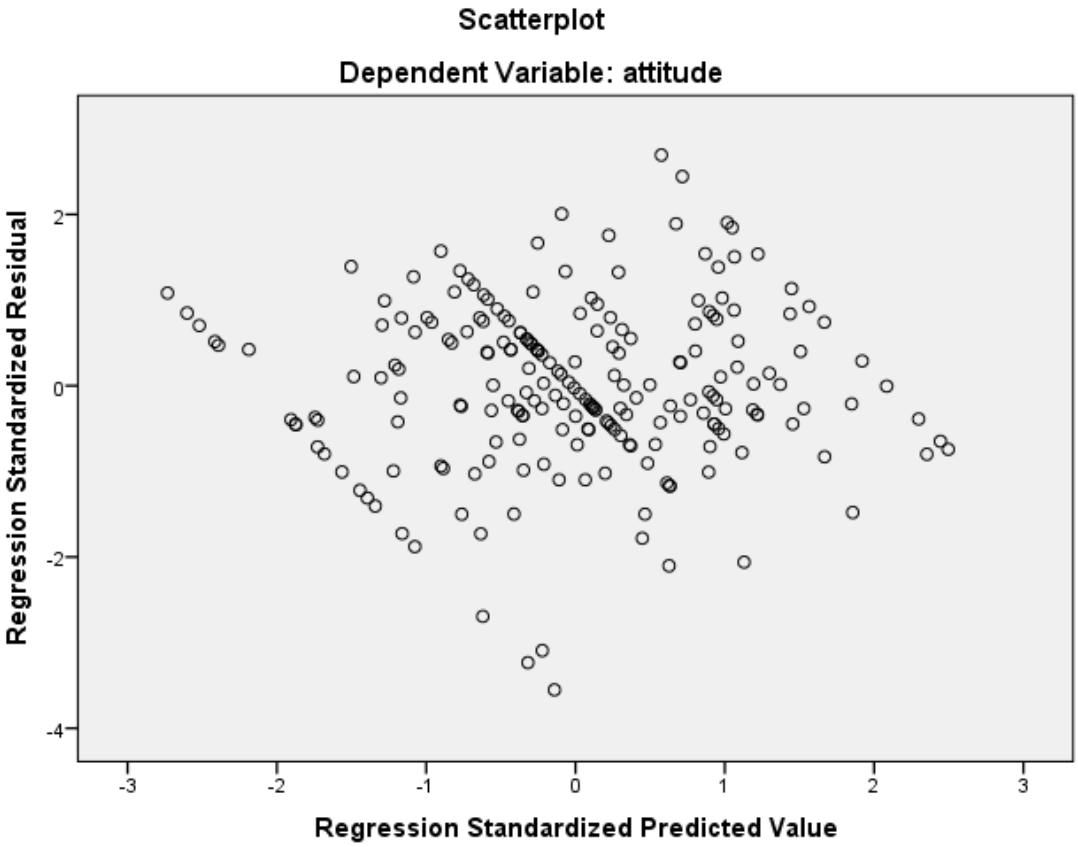
a. Dependent Variable: attitude

b. Predictors: (Constant), benevolence, social risk, accessibility, privacy risk, ease of use, experience, time risk, environmental benefits, integrity, psychological risk, functionality, functional risk, financial risk, time efficiency, ability, security risk

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95,0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	2.180	.459		4.750	.000	1.275	3.085					
	time risk	-.137	.045	-.146	-3.065	.002	-.225	-.049	-.639	-.213	-.103	.502	1.994
	psychological risk	-.102	.046	-.110	-2.202	.029	-.194	-.011	-.496	-.155	-.074	.457	2.189
	privacy risk	-.074	.057	-.081	-1.296	.196	-.185	.038	-.515	-.092	-.044	.288	3.468
	social risk	-.095	.055	-.086	-1.744	.083	-.203	.012	-.415	-.123	-.059	.466	2.148
	security risk	.026	.058	.028	.446	.656	-.088	.139	-.490	.032	.015	.284	3.516
	financial risk	-.003	.061	-.003	-.048	.962	-.123	.117	-.544	-.003	-.002	.355	2.820
	functional risk	-.026	.053	-.028	-.483	.630	-.131	.079	-.542	-.034	-.016	.348	2.873
	accessibility	-.045	.043	-.046	-1.049	.295	-.130	.040	.437	-.075	-.035	.584	1.714
	functionality	.174	.066	.151	2.646	.009	.044	.304	.701	.185	.089	.352	2.842
	ease of use	.040	.046	.038	.875	.383	-.050	.130	.495	.062	.030	.596	1.677
	experience	.013	.052	.013	.247	.805	-.090	.115	.557	.018	.008	.412	2.429
	time efficiency	.337	.062	.333	5.439	.000	.215	.459	.717	.361	.184	.304	3.287
	environmental benefits	.233	.043	.256	5.450	.000	.148	.317	.700	.362	.184	.517	1.935
	integrity	.182	.062	.155	2.919	.004	.059	.306	.337	.204	.099	.402	2.486
	ability	-.100	.063	-.097	-1.582	.115	-.224	.025	.342	-.112	-.053	.303	3.305
	benevolence	-.002	.064	-.002	-.026	.979	-.127	.124	.421	-.002	-.001	.287	3.481

a. Dependent Variable: attitude



Multiple regression – attitude as dependent variable

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.770[a]	.593	.558	1.10455

a. Predictors: (Constant), attitude, integrity, social risk, accessibility, privacy risk, ease of use, experience, time risk, psychological risk, ability, environmental benefits, functional risk, financial risk, functionality, benevolence, security risk, time efficiency

b. Dependent Variable: intention

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	348.280	17	20.487	16.792	.000[b]
	Residual	239.128	196	1.220		
	Total	587.408	213			

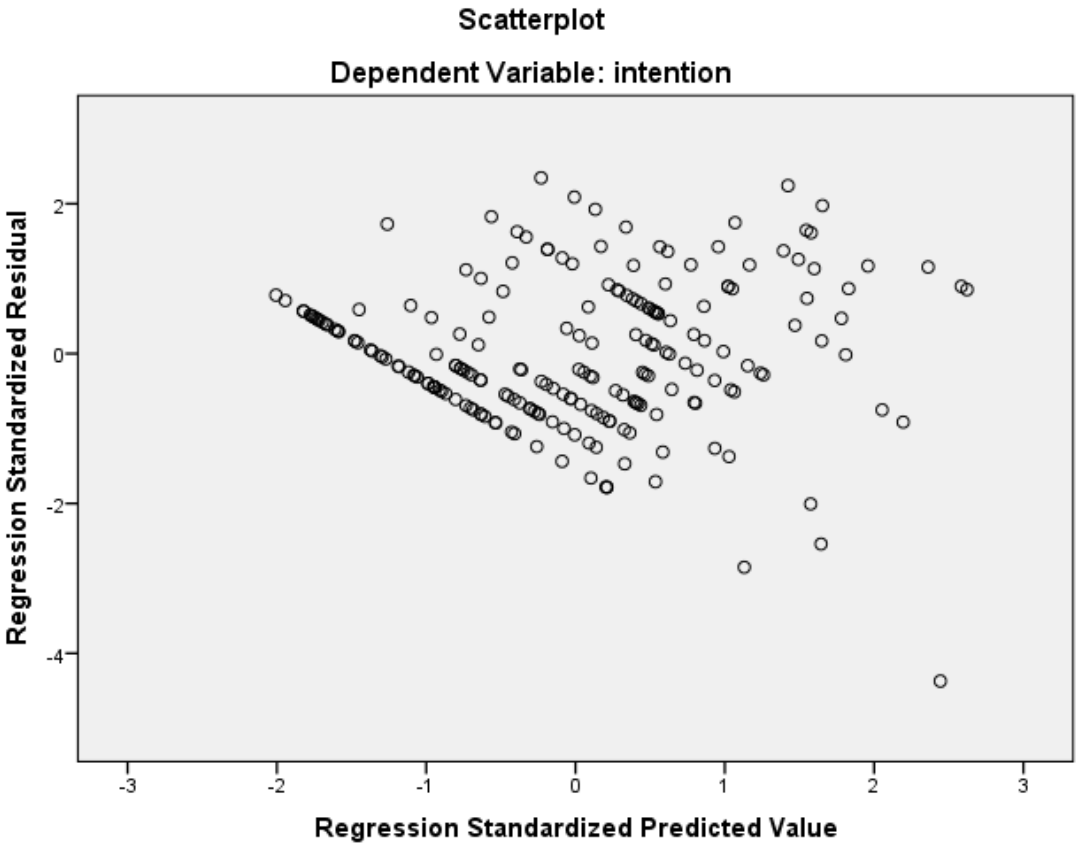
a. Dependent Variable: intention

b. Predictors: (Constant), attitude, integrity, social risk, accessibility, privacy risk, ease of use, experience, time risk, psychological risk, ability, environmental benefits, functional risk, financial risk, functionality, benevolence, security risk, time efficiency

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B		Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1 (Constant)	.293	.671		.437	.663	-1.030	1.617					
time risk	-.178	.063	-.185	-2.811	.005	-.302	-.053	-.542	-.197	-.128	.479	2.089
psychological risk	.019	.065	.020	.291	.771	-.109	.147	-.268	.021	.013	.446	2.243
privacy risk	.026	.079	.028	.333	.740	-.129	.182	-.296	.024	.015	.286	3.498
social risk	-.079	.076	-.069	-1.028	.305	-.229	.072	-.249	-.073	-.047	.458	2.181
security risk	.065	.080	.069	.810	.419	-.093	.222	-.281	.058	.037	.284	3.520
financial risk	.068	.084	.062	.812	.418	-.098	.234	-.346	.058	.037	.355	2.821
functional risk	-.029	.074	-.030	-.389	.698	-.174	.117	-.360	-.028	-.018	.348	2.877
accessibility	-.058	.060	-.058	-.965	.336	-.176	.060	.319	-.069	-.044	.580	1.723
functionality	.081	.093	.068	.874	.383	-.102	.264	.563	.062	.040	.340	2.943
ease of use	.008	.064	.008	.131	.896	-.117	.134	.355	.009	.006	.594	1.684
experience	.255	.072	.252	3.546	.000	.113	.397	.618	.246	.162	.411	2.430
time efficiency	.175	.092	.169	1.902	.059	-.006	.356	.672	.135	.087	.264	3.781
environmental benefits	-.039	.063	-.042	-.614	.540	-.164	.086	.519	-.044	-.028	.449	2.227
integrity	-.003	.088	-.002	-.030	.976	-.177	.172	.246	-.002	-.001	.386	2.593
ability	.041	.088	.039	.468	.640	-.132	.215	.339	.033	.021	.299	3.347
benevolence	.037	.088	.035	.416	.678	-.137	.211	.414	.030	.019	.287	3.481
attitude	.333	.099	.325	3.378	.001	.139	.528	.682	.235	.154	.224	4.459

a. Dependent Variable: intention


Scatterplot
Dependent Variable: intention
Regression Standardized Residual
Regression Standardized Predicted Value
2
0
-2
-4
-3
-2
-1
0
1
2
3