TTF and TAM in Online Shopping: An Integrated Model

Developmental (Discussion) Paper

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ABSTRACT:

Online shopping has generated widespread research aimed at understanding what motivates consumers to shop online, from either a consumer- or a technology-orientated perspective (Jarvenpaa and Todd, 1996). The consumer-orientated perspective focuses on consumers' prominent views about online shopping. In comparison, the technology-centred perspective

looks at how the technical specifications of a virtual shop influences a person's perceptions and consequently their use of that technology (Chen et al. 2002).

Although some previous studies have focused on the factors that encourage customers to opt for a certain channel to buy a product, there is a comparative lack of rich research focusing on why customers use channel in a sustained manner. Some researchers have observed factors such as ease of use, advantage, and risk, which may influence a consumer's decision to use a channel to purchase a product. It is evident that a customer's attraction to a channel does not guarantee their persistent use of this channel. Research has shown that if any innovation occurs and a new feasible channel is introduced, customer loyalty to the company may cease immediately (Bhattacherjee 2001a; Limayem and Cheung 2008).

The present study adds to the body of knowledge in the technology acceptance field by developing a comprehensive model for online shopping acceptance. The model is based on the Technology Acceptance Model (TAM) and the Task-Technology Fit (TTF) model. The framework for the study uses the TAM as the main element of consideration. It further relates to TTF dimensions, namely: 1) information quality, 2) services visibility, 3) system reliability, and 4) compatibility, as well as other exogenous factors (trust and risk) which are observed in contrast within the online shopping context.

1. Introduction

Within the topic of e-commerce, this thesis aims to investigate online shopping. Online shopping has generated widespread research aimed at understanding what motivates consumers to shop online, from either a consumer- or a technology-orientated perspective (Jarvenpaa and Todd, 1996). The consumer-orientated perspective focuses on consumers'

prominent views of online shopping. As online shopping gains popularity, researchers have begun to study the attitudes of e-consumers (Dennis, 2004; Harris and Dennis 2008; Jarvenpaa and Todd 1996). This area of research revolves around consumers' psychological patterns (Hoffman and Novak 1996; Lynch and Beck 2001; Novak et al. 2000; Wolfinbarger and Gilly 2002), demographics (Brown et al. 2003; Korgaonkar and Wolin 1999), perceptions of risk factors and advantages associated with online shopping (Bhatnagar and Ghose 2004; Huang et al. 2004; Kolsaker et al. 2004), and eagerness to shop (Childers et al. 2001; Johnson et al. 2007; Wolfinbarger and Gilly 2002), as well as the orientation of shopping (Jayawardhena et al. 2007; Swaminathan et al. 1999). In comparison, the technology-centred perspective looks at how the technical specifications of a virtual shop influence a person's perceptions and consequently, his or her use of that technology (Chen et al. 2002). Online stores have been thoroughly studied with the help of modernisation and advancements in technology (Zhou et al. 2007). Previous studies have focused on the design and physical appearance of stores (Zhang and Von Dran 2002), their user-friendly nature (Devaraj et al. 2002; Stern and Stafford 2006), their cost and payment procedures (Liao and Cheung 2002), intention to be used (Chen and Hitt 2002), and finally, the information (Palmer 2002; McKinney et al. 2002).

Although some previous studies have focused on the factors that encourage customers to opt for a certain channel to buy a product, there is a comparative lack of rich research focusing on why customers consistently use a certain channel. Some researchers have observed factors such as ease of use, benefits received, and risk, which may influence a consumer's decision to use a channel to buy a product. It is evident that a customer's attraction to a channel does not guarantee their persistent use of the same channel. Research has shown that if any innovation occurs and a new feasible channel is introduced, customers may be immediately lost by the former company (Bhattacherjee 2001a; Limayem and Cheung 2008).

1.1 Study Background: E-Commerce Development

Several studies have presented a number of issues (Yoon 2002) ranging from risk factor and trust in a business (Jarvenpaa et al. 2000; Lee and Turban 2001) to the Technology Acceptance Model (TAM) (Childers et al. 2001; Dabholkar and Bagozzi 2002; Monsuwe, Dellaert, and Ruyter 2004). Nevertheless, research concerning online shopping has still not

reached the level of detail established for store and outlet shopping. In recent years, researchers have begun to study contrasts in behaviour and the differences in shopping preferences (Li et al. 1999; Mathwick et al. 2001; Wolfinbarger and Gilly 2002; Ganesh et al. 2010). Some consumers perceive online shopping to be more efficient, less time-consuming, and more operational than shopping in traditional stores (Wolfinbarger and Gilly 2001; Kim and Shim 2002; Monsuwe et al. 2004).

Previous studies have agreed on the importance of customer adoption and use of online shopping as the key factor in a retailer's achievement of benefits from launching this service (Giovanis 2011; Kim et al. 2012). Understanding what influences customers' adoption and use of online shopping can help retailers to develop appropriate websites and strategies in order to encourage their customers to adopt and fully utilise online shopping.

As a result, a comprehensive study is needed to identify what affects customers' adoption and use of online shopping. As noted, previous research has addressed the adoption but has not investigated its use. In addition to this, this study considers the importance of trust and risk by including them in a combined Technology Acceptance Model/Task–Technology Fit (TAM/TTF) theoretical model, as explained in Section 1.3 below. Trust has proven to be a significant element for influencing consumers to shop online, as consumers perceive risks in the impersonal nature of online shopping. Researchers have found that demographic variables have a significant effect on whether consumers will choose to use online shopping and whether they trust it as a means of purchasing (Chang et al. 2005)

1.1.1 Theoretical Background

This study will develop and test a theoretical extension of the TAM (Davis 1989; 1992; 1993) by the TTF model (Dishaw and Strong 1999) to look at what affects the adoption and use of online shopping within the transaction sector in a developed country (i.e., the United States).

The TAM is viewed as a robust model that can be used to predict technology acceptance. The TTF model is an extension of the TAM model as it considers how technology tasks affect a person's use of the technology. Combining the two models allows different aspects of users' adoption and use of online shopping to be focused on. Trust and perceived risk are considered to be essential constructs when uncertainty exists, thus, these beliefs are also

integrated in the proposed online shopping acceptance model. In addition, it is considered that the present study is the first to elaborate the TAM to include the TTF model extended with trust and risk, to predict behavioural intention (i.e., adoption and use) towards online shopping.

Dishaw and Strong (1999) have shown that using a combined TAM/TTF model for technology adoption in the workplace is very effective. The results of their research revealed that the TTF model was more efficient than the TAM for estimating use in work tasks. Nevertheless, Dishaw and Strong's (1999) results showed that combining the TAM and the TTF model into one model will explain the variance in use much better than the independent models can. Dishaw and Strong (1999) found that task and technology had an effect on task–technology fit, whilst task–technology fit directly influenced the perceived ease of use and behavioural intention measured by the TAM.

1.1.2 Consumer Trust and Risk

The word *trust* has various meanings. It can be described as the readiness of a party to be defenceless to the activities of a different party, anticipating that the other party will carry out a specific work significant to the trustee (Hassanein and Head 2007; Mayer et al. 1995). Due to safety problems, consumers have concerns regarding utilising the Internet to procure goods and services. Consumers' trust of online vendors and Internet technology is a significant aspect that reduces trust with regards to safety (Ha and Stoel 2009). Trust can be measured through consumers' beliefs about the credibility and reliability of new technology (Ha and Stoel 2009; McKnight and Chervany 2001). Obviously, this measure depicts faith in Internet technologies and online vendors, as well as in consumers' beliefs about the safety of online shopping. Moreover, this trust is more essential while shopping online as compared to buying from brick-and-mortar stores (Grewal et al. 2004; Ha and Stoel 2009). According to previous researchers' conclusions, trust is a forerunner for consumers' attitudes and intentions regarding shopping online (Chen and Tan 200) as well as their behavioural intentions (Ha and Stoel 2009; Pavlou 2003; Suh and Han 2002; Gefen and Straub 2003).

The second construct that will be incorporated into the conceptual framework is risk. Due to the distant and impersonal nature of the online shopping environment, risk is a significant element of e-commerce (Pavlou 2003). Therefore, the elements of risk and trust play a central

role in customer behaviour studies in the context of e-commerce (Gefen et al. 2003). Thus, there is a relationship between trust and risk, as trust plays an important role in reducing the risk of falling victim to opportunistic behaviour (Ganesan 1994; Fukuyama 1995). In the e-commerce literature, (Jarvenpaa et al., 1999) have suggested that a customer's trust in an Internet store leads to low perceived risk of buying from the store.

1.1.3 The Contribution of the Study to Existing Research

The study will add to the body of knowledge in the field of technology acceptance by developing a comprehensive model for online shopping acceptance. The model is based on the TAM and the TTF model. The rationale behind elaborating the TAM to include the TTF model is that both models focus on different aspects of users' adoption and use of new technologies. The TAM model suggests that an individual's acceptance of a new technology is largely determined by their beliefs and attitudes towards using that technology. However, the TTF model focuses on the ability of technology to support a task and match the individual's task requirements with the available functionality (Wu et al., 2007). As such, the TTF model supports a rational approach when deciding to accept new technologies, by suggesting that individuals choose to use a new technology that provides benefits for them (Goodhue, 1995). Furthermore, since trust and risk are considered to be essential constructs when uncertainty exists, these beliefs are also integrated into the proposed combined online shopping model. The conceptual framework adopted in the present study will incorporate the role of individual factors as moderators, in the context of online shopping.

1.1. 4 Conceptual Model for Online shopping Acceptance

Theoretical research has shown that both the TAM and TTF models are efficient in describing the factors that affect consumers' acceptance of new technologies. The TAM and TTF models underpin the modern-day online shopping model. The TTF model targets the capability of IT to match a task and syncs the available IT functionality with the demands of the customers' task (Wu et al., 2007). According to the TTF model, an individual acknowledges recent technologies for wholly logical reasons. It recommends that customers prefer a new technology because it is more beneficial to them (for example, it improves their job efficiency), but the model does not consider their attitudes towards using that technology. The TAM suggests that an individual's acceptance of a new technology is largely determined

by their beliefs and attitudes towards using that technology. These two models focus on different features of a customer's approval of new technologies, and this differentiation is the underlying principle behind modifying the TAM to include the TTF model (Goodhue, 1995). According to Dishaw and Strong (1999), the acceptance of IT is better described by the combination of these two approaches rather than independent attitudes or a fit model. Regarding online shopping, it supposes that a customer's preference to acknowledge online shopping is more than likely affected when both approaches are integrated to produce a rational model that establishes expected effects from executing online shopping services, expressing confidence, and examining mind-sets towards online shopping. Thus, a better description of online shopping acceptance can be provided when the TAM and the TTF model are combined together rather than used independently. Furthermore, because some ambiguity exists due to the fact that trust and supposed threat are essential components of the model, the proposed online shopping acceptance approach also integrates these beliefs. Therefore, the eight essential elements postulated in the conceptual model for using online shopping are: perceived usefulness, perceived ease of use, perceived trust, perceived risk, information quality, service visibility, system reliability, and compatibility.

1.1.5 Perceived Ease of Use and Perceived Usefulness

Online shopping involves two main beliefs, namely: perceived usefulness, which is the belief that technology improves work performance, and perceived ease of use, which is the belief that technology does not require much effort to use (Davis, 1989). Both of these beliefs affect how customers regard a new technology, according to the TAM. Because of these beliefs, customers regard online shopping as something very useful and advantageous. Possible benefits are that customers can use the services of the store without worrying about opening times or their current location. Customers will thus resort to online shopping more often because they do not need to expel much effort to use these services. Davis (1989) suggested that both the variables of perceived ease of use and perceived usefulness together, could affect any person’s intentions in their initial learning and behaviour stages. Thus, previous research studies that used the TAM in various different cases, have provided many contradicting scenarios between these two variables and also between them and behavioural intentions. However as time goes on, it has been found that only perceived usefulness directly influences intentions, whereas perceived ease of use has an indirect influence. Because of

such conflicts, the present study will focus on all such relationships whilst keeping the original TAM in view.

The following hypotheses have been formulated:

H1: Perceived usefulness of online shopping will have a positive impact on a customer's intention to make use of online shopping.

H2: Perceived ease of use of online shopping will have a positive impact on customer's intention to make use of online shopping.

H3: Perceived ease of use of online shopping will have a positive impact on perceived usefulness of online shopping.

1.1.6 Trust and Perceived Risk

Trust is a crucial factor for customers when shopping online and trust has been associated and supported by the TAM beliefs (Chircu et al., 2000; Pavlou, 2003; Gefen et al., 2003b). Trust is an important part of e-commerce due to the uncertainty and risk involved in online transactions (Hoffman et al., 1999). It is believed that trust should increase customers' perceived ease of use when using the website. When trust is established, customers will not feel the need to monitor and control every situation; thus, trust makes transactions easy and manageable (Chircu et al., 2000). When parties in an organisation trust each other, they are able to conduct transactions effectively and with less hassle (Ring & Van de Ven, 1994); in the same way, when customers have a high level of trust when online shopping, they will not feel compelled to deeply investigate a certain company's actions or history and thus will be able to purchase products easily. In contrast, when consumers do not trust the concept of online shopping, they will spend more time and effort to investigating finer details of the company's shopping activities and services. Customer trust plays an important role in online shopping; it influences the risk factor involved when using online shopping services. In addition to this, customer trust and perceived risk have a direct effect on a customer's intention to use shop online.

The following hypotheses can be derived:

H4: Trust in online shopping will have a positive impact on the perceived ease of use of online shopping.

H5: If a customer's trust regarding online shopping is high, then the perceived risk of using that channel will be lessened.

H6: If a customer's level of perceived risk of online shopping is high, then the intention to use online shopping will be reduced.

H7: Trust of online shopping will have a positive impact on a customer's intention to use online shopping.

1.1.7 Task-Technology Fit

The TTF has an important effect on user adoption. Many researchers have conducted research on the effect of TTF on the usage of different objects. TTF affected Knowledge Management System (KMS) usage (Lin & Huang, 2008) and users' utilisation of information technology (Dishaw & Strong, 1999). Many researchers have concluded that there is a positive relationship between users' adoption of new technology and task technology. If task technology is better, users will adopt the new technology more often. Dishaw and Strong (1999) studied the TAM and the TTF model with regards to the adoption of technology in the workplace. They demonstrated that the TTF model works better than the TAM if one wants to predict the work-related task use. However, they also made it clear that when the TAM and the TTF models are used in combination, they are better able to explain the variance in utilisation apart from increasing efficiency than they can when they are used separately. Dishaw and Strong (1999) also examined the effects of task and technology on task-technology fit. Their belief was that it would have an effect on the perceived usefulness of an object was negated. However, what they discovered instead was that task and technology had a significant impact on the perceived ease of use. An empirical study was conducted by Wu et al. (2007) to investigate what factors determine the end-user (EUC) acceptance. This study supported the influence of task-technology fit on perceived ease of use and determined a direct relationship (Wu et al., 2007). In the case of Online shopping, however, TTF not only had an effect on perceived ease of use but also on perceived usefulness and behavioural intentions (Klopping & McKinney, 2004). Chang (2008) investigated intelligent agents'

employment in an online auction process. His study supported Klopping's and McKinney's finding that TTF also affected the perceived usefulness.

A number of researchers (e.g., Goodhue 1995; 1998; Goodhue & Thompson, 1995) have identified dimensions of task-technology fit, which will be highlighted in the next chapter. However, Goodhue and Thompson (1995) described eight dimensions of task-technology fit. These dimensions are: 1) quality of the data; 2) data location; 3) authorisation to access data; 4) compatibility of data; 5) training and ease of use; 6) timeliness of production, 7) reliability of the system; and 8) relationship of IS and users. Following this work, Goodhue (1998) presented twelve dimensions, which are: 1) level of detail, 2) accuracy, 3) compatibility, 4) locatability, 5) accessibility, 6) meaning, 7) assistance, 8) ease of use, 9) reliability of the system, 10) currency, 11) presentation, and 12) confusion. Both of studies outline some TTF dimensions, which are similar, or the same. In the first study, Goodhue and Thompson (1995) identified only eight dimensions of task-technology fit, while the second study included twelve dimensions. Goodhue and Thompson (1995) combined four of the dimensions, which were later pointed out separately in Goodhue's (1998) twelve points. When it comes to determining which factors are important and are more significant than the others, the primary five factors or five constructs of task-technology fit are based on the dimensions identified in the two research studies. These fourth dimensions are considered to be well suited and matched when it comes to Online shopping. The factors or constructs are: 1) quality of the information, 2) services visibility, 3) reliability of the system, and 4) Compatibility.

- *Information quality*: Information quality makes a clear and concise interaction with the Online shopping website. In this way, it can be stated that information quality contributes towards the value for the user. Three factors contribute to information quality: 1) correct degree of detail, which means that the information being stored is preserved at the correct level of detail; 2) precision, which refers to the exactness and authenticity of the information presented online; and lastly 3) currency, which ensures that the latest information is present on online shopping websites so that the customer's needs can be fulfilled adequately.

- *Service visibi*lity: The degree to which the online shopping services are observable in a distinct and clear form for the customers.

- *System reliability*: System reliability is a characteristic that ensures that the system is free of problems will not crash and is easily accessible to customers whenever they need it. It is basically the dependability on an online shopping system.
- *Compatibility*: Compatibility is more suitable in activities related to e-commerce where customers deal with websites containing information from a variety of sources, for example Amazon or eBay. It is the feature that ensures that data obtained from different sources are consistently organised or compared.

Taking a practical approach, the actual use or behavioural intention to use is directly affected by TTF which, according to various researchers working in different domains, encompasses few of the dimensions being employed in the present research study, (Dishaw & Strong, 1999; Benslimane et al., 2003; Klopping & McKinney, 2004).

This discussion leads to the following hypotheses:

- H 9: Services visibility on the online shopping website will positively influence intention to use online shopping services.
- H10: System reliability will positively influence intention to use online shopping services.
- H 11: Information quality in the online shopping website will have a positive effect on the perceived ease of use of online shopping services.
- H12: Service visibility on the online shopping website will have a positive effect on perceived ease of use of Online shopping services.
- H13: System reliability will positively influence perceived ease of use of online shopping services.

- H 14: Compatibility will positively influence perceived ease of use of online shopping services

1.1. 7. Selecting Research Sample

A population is a collection of people in a group who make up a society; it is an organisation or a community who hold similar characteristics, qualities, features or events that researchers want to investigate (Scheaffer et al., 1979; Mark, 1996). Therefore, a population is a complete element through which a researcher can elect the samples (Bryman and Bell, 2007). However, the initial step when sampling is to describe the population of where the sample is being sourced. In addition, for this study, the target population is people who are frequent Internet users in the United States; people who carry out money transactions online for the sake of shopping, irrespective of their gender.

In this research, sampling was conducted, and Internet users aged 18 and above were targeted. The sample had prior experience of online shopping on the Internet either globally or in their local area. A natural sample was preferred of the student's to have a suitability of the choice-based sampling approach of the research. Cao and Mokhtarian (2005) suggested that the attentiveness and caution are required when examining a large number of a population in order to avoid homogenous results and outcomes. In addition, having young people as the participants, means that it will be possible to depict what online shopping patterns will be like in the near future.

1.1.8. Outline of the Proposed Method for Testing the Propositions

In the present study, an online questionnaire was formulated for online shopping users in order to facilitate participation. After examining several online websites, the researcher chose one (http://www.surveygizmo.com) which was both simple and effective and permitted the researcher to export data into CSV format. Furthermore, the chosen website permitted the researcher to import the data into an SPSS spreadsheet. This feature exhibits the superiority and distinctiveness of a web survey over a traditional survey. Moreover, utilising online questionnaires improves accuracy of answers and stops errors occurring, which can happen when traditional manual process of data transfer is implemented.

To distribute the survey and recruit and financially compensate subjects, the researcher will utilise MTurk, which is an online Web-based platform.. MTurk is very cost-effective, not only regarding the costs associated with subjects but also in the time required for implementing the study (Berinsky et al. 2012). Buhrmester et al. (2011) have noted that the participants recruited via MTurk are somewhat more demographically different when compared to standard Internet users because the participants are influenced through task volume and reimbursement ratio; however, it is still a time effective way of recruiting and compensating participants; the quality of the data does is not affected due to realistic reimbursement, and the obtained data are as dependable as those achieved by traditional processes.

1.1.9 Theoretical, Methodological, and Practical Value of the Present Research

1.2 Theoretical Value

With regards to theory, the study will add to existing knowledge in four key areas:

•Expanding the current literature review by determining the factors that affect the acceptance of online shopping by online customers.

•Developing an extended, comprehensive TAM/TTF model to add to the literature on consumer behaviour by incorporating the TAM/TTF model and perceived trust and risk and then relating them to a different situation – online shopping.

•Adding to the literature of online trust by depicting the role of consumer trust within online shopping and showing how this can be improved.

•Adding to technology acceptance theories by depicting the role of the task–technology fit theories with regards to the recognition of online shopping.

1.2.1 Practical Value

Highlighting the elements that affect online shopping and comprehending the links between them will not only contribute to the body of theoretical knowledge, but it could also help retailers to react to their consumers' perceptions and fulfil their needs. This can be done by developing more appropriate websites and devising the correct strategies to motivate consumers to use online shopping to its full potential.

1.2.2. Methodological Value

In addition, the present study elaborates on the combined TAM/TTF model by adding elements of trust and risk and moderating by individual differences to predict behavioural intentions in the context of online shopping.

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