



Journal of Internet Banking and Commerce

An open access Internet journal (<http://www.arraydev.com/commerce/jibc/>)

*Journal of Internet Banking and Commerce, December 2014, vol. 19, no.3
(<http://www.arraydev.com/commerce/jibc/>)*

Innovation Acceptance Research: A Review of Theories, Contexts, and Approaches

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Abstract

This paper reviews the existing literature and studies on the impact of Information Systems (IS) on the adoption of Internet Banking (IB). We reviewed the adoption theories utilized in IB studies within different contexts and approaches. This explanatory study was conducted to develop an understanding of the theoretical-based research of IB. The findings indicate that there is a large body of literature regarding IB adoption. Most IB research investigated the adoption of IB using the psychological approach, where some used the social approach or a combined approach of both. Our research recommends new approaches to investigate the adoption of IB and develop new theories. Specifically, and among others, the User's Informational-Based Readiness is a new approach this study recommends for future research of innovation adoption.

Keywords: Internet Banking; Adoption Theories; factors affecting IB adoption; Diffusion of Innovation

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INTRODUCTION

This section discusses the adoption theories related to the diffusion of innovation as well as several technology adoption models. Taylor and Todd (1995) found that understanding the determinants of Information Technology (IT) usage ensures the effective deployment of IT resources in an organization. It is noticeable that adoptions of a particular technology, such as Internet Banking (IB), are approached from several levels.

Some researchers have approached the adoption of technology from a macroeconomic prospective or from a community context at the country level (Chan & Ming-te, 2004; Anandarajan et al., 2000; Sathye, 1999; Polatoglu & Ekin, 2001; Suganthi et al., 2001; Gurau, 2002; Gerrard & Cunningham, 2003; Brown et al., 2004; Al-Sabbagh & Molla, 2004).

Other academic researchers have examined this issue at an organizational level (Daniel, 1999; Jayawardhena & Foley, 2000; Liao & Jr, 2000; Gopalakrishnan et al., 2003; Pikkarainen et al., 2004).

Still other researchers have explored this issue by investigating the determinants of adoption and usage from the individual user level (Mathieson, 1991; Tan & Teo 2000; Black et al., 2001; Chau & Lai, 2003; Wang et al., 2003).

METHOD

Strauss and Corbin (1990) discovered that research literature may serve different purposes, such as discovering gaps in understanding, to derive theoretical and conceptual frameworks. The following study benefited from the qualitative and

exploratory methods of research to guide research, interpret findings, and explain essential variables and suggest relationships between them.

According to Strauss and Corbin (1990) the emphasis of the qualitative and exploratory methods of research is the discovery of relevant categories, the relationships between them, and relating them in new ways. Cronk and Fitzgerald (2002) described that qualitative researchers seek to explain phenomena in light of theoretical frameworks and develop mind maps, such as new classification models for the body of knowledge, to show how concepts can be grouped or clustered together.

LITERATURE REVIEW

Technology Adoption Models

Prior to analyzing technology adoption models and evaluating their significance in determining the success of adoption, it is useful to define some important terms. In this context, "adoption" refers to when members of a social system (i.e., individuals, organizations, or countries) select a technology for use. "Innovation" refers to the nuance of the new technology being adopted. "Diffusion" refers to the stage in which the technology spreads to general use and application.

The research of Hu et al. (1999) exploring user adoption of new technology has received attention from information systems (IS) researchers and practitioners. Additionally, the work of Venkatesh et al. (2003) is often described as one of the most mature research areas in modern IS literature. This research has resulted in several theoretical models with roots in IS that routinely explain over 40 percent of the variance in individual intentions to use technology (e.g., Davis et al., 1989; Taylor & Todd, 1995; Venkatesh & Davis, 2000). Although there are several models of technology adoption, Taylor and Todd (1995) differentiated the research of the determinants of IT adoption and usage into two approaches.

The first approach employs intention-based models such as the Theory of Reasoned Action (TRA) (Ajzen and Fishbein, 1980), the Theory of Planned Behavior (TPB) (Ajzen, 1985), the Technology Acceptance Model (TAM) (Davis, 1986), and the Triandis model of choice behavior (Triandis, 1997). Together these are known as the 4T theories. This approach uses behavioral intention to predict IT adoption and usage and focuses on identifying the determinants of intention, such as attitude, subjective norms, perceived behavior control, factor influences, and facilitation conditions. The technology adoption models proposed by the 4T theories are examples of this behavioral intention-based research.

The second approach examines the adoption and usage of IT from a diffusion of innovation perspective (Rogers, 1995). This perspective will be elaborated further in the following section.

It is important to note that the adoption and usage of IT at the organizational and individual levels have received a great deal of attention in recent IS literature. Rogers (1995) also discussed the diffusion of innovation at these two levels.

This study examines both approaches because IB is considered an innovation, as it has its own characteristics and needs user intention for actual adoption. Additionally, this study discusses adoption factors. Adoption factors in this study are restricted to the scope of the research framework, which are innovation characteristics (Rogers, 1995; Moore & Benbasat, 1991), individual differences (Agarwal & Prasad, 1999), and external factors (Davis, 1989). These three adoption factors are considered to be rich sources of several determinants of IB adoption and use.

Social Psychology Adoption Theories

Models from social psychology, such as the TRA, TPB, TAM, and Triandis (4T) theories, are predominantly used to investigate adoption studies. The TRA, TPB, and TAM theories were reviewed as the fundamental background for this study. Brief descriptions of these theoretical models are presented in the following sections. The fourth theory, Triandis (1977), is seldom used for IS and is not yet used for IB adoption studies.

Theory of Reasoned Action (TRA)

Ajzen and Fishbein developed the TRA in 1967 and used it to study human behavior in 1980. The TRA is a model of the psychological processes that mediate the relations between attitudes and behavior. The TRA is composed of attitudinal, social influences, and intention variables to predict behavior. According to Ajzen and Fishbein (1980), the structure of the TRA is divided into three main areas as depicted in Figure 1.

The first area is intention, which defined as the likelihood of doing something. The premise is that a person's intention is the main predictor and influencer of attitude. The second area is attitude, which defined as an individual's positive or negative feeling associated with performing a specific behavior. The third area is subjective norms, which is determined by an individual's normative beliefs about whether others think he or she should perform that particular behavior.

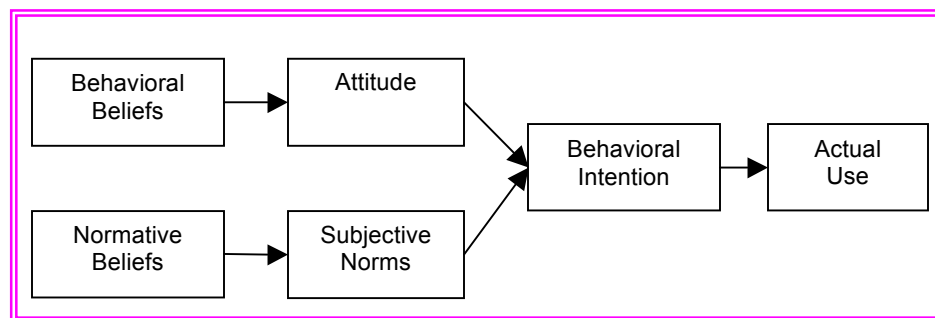


Figure 1: Theory of Reasoned Action (Ajzen and Fishbein, 1980)

Figure 1 depicts how the TRA is “designed to explain human’s behavior” (Ajzen & Fishbein, 1980) and consists of two factors that affect behavioral intentions: attitude toward behavior and subjective norms. The TRA has been applied in its original and extended form to predict online grocery buying intentions (e.g. Hansen et al., 2004), aspect of nursing (e.g. Ellison, 2003), the adoption of IT applications (e.g. Anandarajan et al., 2000; Wu, I., 2003), and, more recently, to investigate the factors that influence intentions to purchase services online (e.g. Njite & Parsa, 2005).

Furthermore, the TRA was used as a basis to develop the TPB as well as a basis for

modifying the TAM model with subjective norms as suggested by Venkatesh and Davis (2000) and Venkatesh and Morris (2000).

IB research rarely employs the TRA. Karjaluoto et al. (2002) is the only paper we found that uses the TRA to explore how different factors influence attitudes towards IB and the use of IB in Finland. In this study, attitudes were influenced through a learning process that was affected by reference group influences, past experience, and personality. Table 1 presents an overview of the adoption studies that use the TRA model.

Table 1: Overview of Key Studies of IB Adoption using the TRA model

Model reference		Others determinants	TRA IB adoption formation variables					
Year	AB		NB	SN	ATT	BI	Actual usage	
Karjaluoto, & Mattila, & Pentto TRA integrated with TAM	2002	Prior experience of computers Prior experience of technology Personal banking experience Reference group	xx	xx	xx	√	Xx	√
SN=Subjective Norm, ATT=Attitude, BI=Behavioral Intention, AB=Attitudinal Belief, NB=Normative Belief √ = Included in study's model √√= Included in study's model and has significant influence √x = Included in study's model but it has no significant influence xx = Not included								

It is important to note that the TRA presence in the IB context still unknown. The study by Karjaluoto et al. (2002) grounded the TRA, but the main focus was on measuring the attitudinal determinants toward IB.

Theory of Planned Behavior (TPB)

The TPB was developed as an extension of the TRA to justify conditions where individuals do not have complete control over their behavior (Ajzen, 1991). This theory posits that behavior is determined by intention to perform the behavior (Benham & Raymond, 1996). The components of behavioral attitudes and subjective norms are the same in the TPB as in the TRA. In addition, the TPB includes behavioral control as a perceived construct. Therefore, in the TPB three constructs determine a user's intention: attitude, subjective norms, and perceived behavioral control. The TPB has been used to study the adoption of different IS, such as spreadsheets (Mathieson, 1991), computer resource centers (Taylor & Todd, 1995), electronic brokerages (Battacherjee, 2000), and negotiation support systems (Lim, 2002).

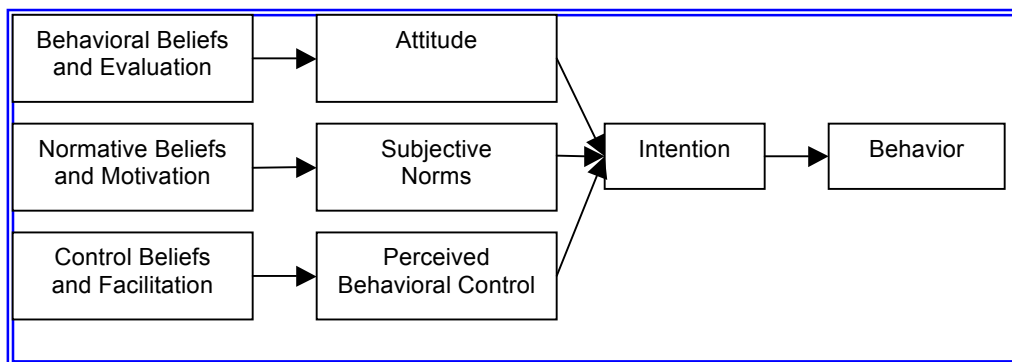


Figure 2: Theory of Planned Behavior

Although studies of the individual adoption of IB using the TPB are rare, two researchers used the TPB to study individual intentions toward adopting IB. Liao et al. (1999) provided an example from Hong Kong and Shih and Kwoting (2004) from Taiwan. Based on these two studies, Liao et al. (1999) demonstrated that the TPB was only partially applicable in predicting the adoption intention of IB. Liao et al. (1999) proved that behavioral intention is significantly a function of attitude and perceived behavioral control, while subjective norms were not significant determinants in both studies. Similarly, Brown et al. (2004), in a comparative study of IB adoption in Singapore and South Africa, demonstrated that subjective norms showed no influence on the adoption of IB as hypothesized in their model. Shih and Kwoting (2004), comparing the TRA to two versions of the TPB model, demonstrated that the intention to adopt IB can be explained by attitude in both models, and that only relative advantage and complexity are related to attitude. Table 2 summarizes these studies and provides further details.

Table 2: Overview of Key Studies in IB Adoption using the TPB

Model	Year	Others determinants	IB Adoption Formation Variables				
			PBC	SN	ATT	INT	AB
Liao, S et al	1999	Attitude toward IB dependent upon behavioral beliefs of: 1) relative advantage, 2) ease of use, 3) compatibility, 4) results demonstrability, 5) perceived risk IB normative beliefs dependent upon: normative beliefs of image, visibility, critical mass	√√	√x	√√	√	√
Shih & Kwoting Taiwan decomposed theory of TPB	2004	Attitude influenced by: Relative advantages, complexity Perceived behavioral control influenced by: Facilitating	√	√x	√√	√	√
PBC=Perceived Behavioral Control, SN= Subjective Norms, ATT=Attitude, INT=Intention, AB=Actual Behavior √ = Included in Study's Model , √√= Included in Study's Model and has significant influence √x = Included but it has no significant influence xx = not included							

The Decomposed TPB model

In a study of consumer adoption intentions, Taylor and Todd (1995b) suggested a new format of the TPB theory. This is helpful in understanding the relationships between the belief structures and antecedents of intention, as several researchers have examined approaches to decomposing beliefs into multidimensional constructs.

The decomposed TPB model is inspired by Taylor and Todd (1995a; 1995b). This model decomposes three sets of belief structures into a multi-dimensional belief construct. These belief structures, according to Taylor and Todd (1995b), are referred to as attitudinal beliefs, normative beliefs, and control beliefs, which are related to the attitude, subjective norms, and perceived behavioral control aspects of the TRA respectively. The decomposed TPB has many advantages, such as representing the TRA's core constructs clearly. Also, the decomposed TPB broadens the attitudinal beliefs, rather than only having the two factors as proposed in the TAM.

Technology Acceptance Model (TAM)

One of the most widely used and referenced theories in the context of technology adoption is the TAM (Davis, 1989; Legris et al., 2003; Gefen et al., 2003). The TAM was inspired by Davis et al. (1989) and was first used to explain computer usage behavior.

Ajzen and Fishbein (1980) developed the TAM theory on the platform of the previous and well-known theory of Reasoned Action (TRA). Briefly, the TAM posits that two specific variables, Perceived Ease Of Use (PEOU) and Perceived Usefulness (PU), determine one's behavioral intention to use a technology, attitudes toward adopting IT, and actual usage. Behavioral intention is a measure of the strength of one's intention to perform a specified behavior. The TAM model has received extensive empirical support through validations, applications, and replications (e.g., Mathieson, 1991; Plouffe et al., 2001; Legris et al., 2003).

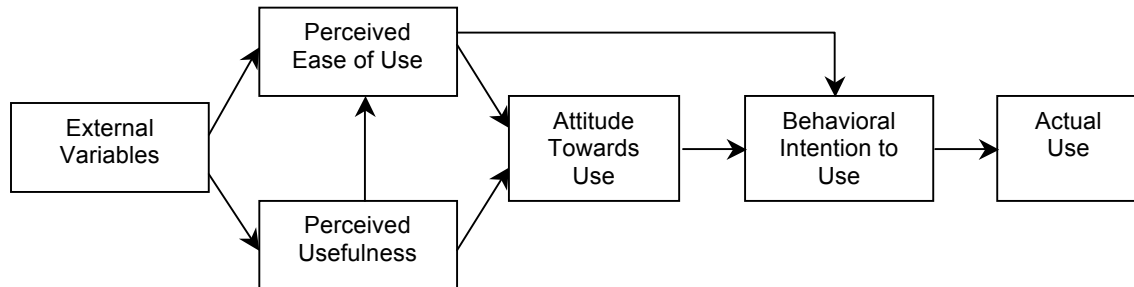


Figure 3: Technology Acceptance Model by Davis 1989

In Figure 1, the sequence of the adoption process path according to the TAM can be noted as the actual use (actual behavior), which is determined by PU and PEOU. PU is defined as the “prospective user’s subjective probability that using a specific application system will increase this or her job performance within an organizational context” (Davis, 1989). Further, the TAM assumes that PU is influenced by the PEOU, because, all other things being equal, the easier a technology is to use, the more useful it can be. PEOU refers to “the degree to which the prospective user expects the target system to be free of effort” (Davis et al., 1989).

The TAM suggests that the effect of external variables on intention is mediated by key beliefs (i.e., PU and PEOU). These external variables might include system design characteristics, training, documentation, and other types of support, as well as decision making characteristics that might influence usage (Davis et al., 1989). In practical examinations, external variables might also include gender, past experience, transitional support, and subjective norms (Legris et al., 2003).

In their comprehensive study of the TAM, Legris et al. (2003) found that among 38 studies, 16 showed a significant positive correlation between PU and behavioral intention, while 10 revealed that PEOU was a significant predictor of behavioral intention. These studies also concluded that overall the TAM is a useful theoretical model to understand and explain use behavior in IS implementation. However, they also suggested that, because of its parsimonious nature, the TAM should be integrated into a broader model that includes variables related to both human and social change processes and aspects of the innovation model. An example of a suitable model is the Perceived Characteristics of Innovating (PCI) model (Moore & Benbasat, 1991).

The TAM model has been extended and modified multiple times. The first TAM extension, known as the TAM2, includes two concepts of social influence processes and

cognitive instrumental processes as determinants of perceived usefulness (Venkatesh & Davis, 2000).

The second TAM extension incorporates perceived resources (R), which refers to the extent that an individual believes he or she has the personal and organizational resources needed to use an IS, such as skills, hardware, software, money, documentation, data, human assistance, and time (Mathieson et al., 2001).

The third TAM extension proposed by Pikkarainen et al. (2004) includes four constructs: perceived enjoyment, amount of information on online banking, security and privacy, and quality of internet connection.

These extensions of the original TAM also provide evidence that studies based on the TAM theory have found that PU and PEOU are not sufficient to predict technology acceptance. The TAM has been used to investigate diverse IS adoption in many studies. For instance, the TAM was used to study the intention to adopt negotiation support systems (Lim, 2002), e-Commerce (e.g. Gefen & Straub, 2000), and e-services (e.g. Featherman & Pavlou 2003), to predict consumer intentions to use on-line shopping (e.g. Vijayarathy, 2004; Shih, 2004), consumer acceptance of online banking (e.g. Pikkarainen et al., 2004) and recently, to study behavioral intention to use mobile banking (e.g. Luarn & Lin, 2005).

Internet Banking Adoption research using the TAM Theory

The TAM is most widely used by researchers of IB adoption. A literature review of IB research revealed that the TAM model paved the way for academic research to investigate IB adoption. Table 2 shows that Sathye (1999) pioneered the study of IB adoption. The TAM theory received greater attention than the TRA theory by IB researchers. Mathieson et al. (2001) indicated that the TRA is a general theory of human behavior while the TAM is specific to IS usage. Previous studies aimed to investigate the influence of different external factors on the TAM's two main variables, PU and PEOU, are presented in the above table.

Existing research used the TAM to investigate user adoption using three paths. In the first path, researchers, such as Chau and Lai (2003) and Vincent and Honglei (2004), designed their model to target user attitudinal behavior toward IB adoption. In the second path, researchers, such as Wang et al. (2003), Chan. and Ming-te (2004), and Vincent and Honglei (2004), investigated factors influencing user intentions to use IB. In the third path, researchers such as Sathye (1999) and Pikkarainen et al. (2004) investigated factors influencing the actual use of IB. Table 3 presents several models of IB adoption that employed the TAM theory.

Table 3: Overview of Key Studies in IB Adoption Using TAM

Reference	Year	Others determinants	IB adoption formation variables				
			PEOU	PU	ATT	INT	AB
Sathye, M.	1999	Security of transactions Reasonable price Resistance to change Availability of infrastructure	√	√	xx	xx	√
Wang, Y. et al.	2003	Perceived credibility Computer self-efficacy(DV) Perceived trust , Perceived risk	√	√	xx	√	xx

Chau, P.Y.K. and Lai V.S. K.	2003	Personalization (PER) Alliance services (ALS) Task familiarity (TAF) Accessibility (ACC)	√	√	√	xx	xx
Pikkarainen, T. et al,	2004	Perceived enjoyment Online banking Information Security and privacy Quality of Internet Connection	√	√	xx	xx	√
Chan, S. and Ming-te, L.	2004	Subjective norms Image Result demonstrability Perceived risk	√	√	xx	√	xx
Vincent, S. L. and Honglei, L.	2004	Gender Age IT Competency	√	√	√	√	xx
PEOU=Perceived ease of use, PU= Perceived usefulness, ATT=Attitude, INT=Intention, AB=Actual Behavior √ = Included in study's model √x= Included in study's model but it has no significant influence xx = Not included in study's model							

Mechanism of the Social Psychology Adoption Theories

This section attempts to describe how the theorized models in the TRA, TAM, TPB, and Triandis (4T) theories work when investigating IS adoption. The social psychological behavior of adopters was used to study the adoption of IB in regard to the 4T theories. In this manner, modeling the psychology adoption theories can provide insight as to how adopters behave toward accepting the technology under study. In addition, the key variable widely used in these models is the psychological factor regarded as the behavioral intention of users or potential users. Although these models show the development process in their theories, all of them are concerned with issues related to the users.

Diffusion of Innovation (DOI) Theory

The term “Diffusion of Innovation” by Rogers (1983) describes the process by which an innovation is communicated through certain channels over time among members of a social system. Research aims to highlight the basic characteristics of an innovation and its context that correlate with its diffusion. Furthermore, research shows that understanding this process improves the capacity to improve it.

However, while the dominant, traditional theories of the adoption of innovations stem from microeconomics, the diffusion of innovation (DOI) theory has been widely applied to many health issues such as, AIDS research (e.g. Maguire, 2002), pediatric primary care (e.g. Barth & Sherlock, 2003), applied nursing research (e.g. Lee & T-T, 2004), and the anti-smoking and anti-drug campaigns (e.g. McDonald, 2004; Pampel, 2001; Thomas, 2004).

Rural sociologists study the diffusion of agricultural technologies in social systems and have used the DOI theory for studies of the diffusion of palm oil (Chaudhuri, 1994) and the diffusion of innovation in the flour milling industry (Hayward, 1972). Additionally, the DOI theory was successfully applied to the diffusion of the information technology product Java software in Internet, Intranet, and hypertext environments (e.g. Burns, 1997; Zhang & Saboe, 2004).

Based on Rogers’ definition of the diffusion of innovation, there are four main elements in the diffusion of innovation process: (1) the innovation’s characteristics, (2) the

channels used to communicate the benefits of the innovation, (3) the time elapsed since the introduction of the innovation, and (4) the social system in which the innovation is to diffuse.

Rogers (1995) further explained these four main elements of the diffusion of innovation as follows:

(1) **Innovation:** an idea, practice, or object that is perceived by an individual or other unit of adoption (Rogers, 1995, p. 11).

(2) **Communication channels:** the means by which messages get from one individual to another.

(3) **Time:** the period elapsed since the innovation commenced has three time factors: (a) the innovation decision process, (b) the relative time with which an innovation is adopted by an individual or group, and (c) the innovation's rate of adoption.

(4) **Social system:** the set of interrelated units that are engaged in joint problem solving to accomplish a common goal.

Rogers' Mechanism of Diffusion

The two categories of the diffusion of innovation studies are the diffusion processes and the determinants. Frambach et al. (1998) described the two types of diffusion models. The first type is models that aim to gain understanding of the diffusion process as a whole. These models are analytical representations of the diffusion process at the aggregate level. The second type is models that aim to gain insight in the determinants of the individual adoption or non-adoption decision.

These models have a disaggregate perspective and are generally referred to as adoption models. Rogers' definition of the diffusion concept implies that diffusion occurs in a voluntary environment in which making decisions is not an authoritative or collective process. Each member of the social system makes his or her own decision to adopt an innovation, known as an innovation-decision. The most remarkable feature of the diffusion theory is that the innovation-decision depends seriously on the innovation-decisions of the other members of the social system.

A five stage of process occurs to diffuse an innovation among the members of a social system. The first stage is when members are exposed to the innovation's existence by knowledge-awareness. This knowledge is when "a person becomes aware of an innovation and has some idea of how it functions." The second stage when members form a behavioral attitude that leads them to the persuasion level. The persuasion level is when a person forms a favorable or unfavorable attitude toward the innovation Rogers (1995). The third stage is when members make decisions in which "a person engages in activities that lead to a choice to adopt or reject the innovation." The fourth stage is when the innovation is implemented in which "a person puts an innovation into use." The fifth and final stage is when the innovation is confirmed in which a "member evaluates the results of an innovation-decision already made" Rogers (1995). According to Rogers and Shoemaker (1971), these five stages do not necessarily have to occur in sequence and some can be omitted.

In the diffusion theory, several variables influence the adoption and diffusion of innovations. According to Frambach (1998), diffusion models are useful to investigate the role of both the adopter and supply variables on the shape of the diffusion process.

Original models exclusively focused on adopter variables to explain individual adoption behavior (Rogers, 1983 and 1995). However, preliminary research of the influence of supplier variables on the individual innovation adoption decision support the view that supply variables can play an important role in the individual adoption context (Frambach, 1998).

Internet Banking Studies in Rogers' Context

The adoption of IB is a complex issue since adopting a particular technology depends on many factors. Therefore, IB as a technological innovation in banking must be thoroughly studied through the perspective of diffusion. Based on the DOI theory, there are four key elements in the IB diffusion process: Internet banking, channels of communications, time, and people in the social system. Academic research about IB is expanding. Therefore, this paper attempts to explore the adoption of IB in the context of the DOI theory.

There are few previous research studies that have employed the five formal variables of Rogers' DOI theory. Therefore, in this section we consider the current studies of IB adoption that use Rogers' DOI theory. Table 4 explains this view briefly. We note that many studies avoid using the observability variable in their models, i.e., Tan and Teo (2000), Suganthi et al. (2001), Gerrard and Cunningham (2003), and Brown et al. (2004).

In some way Black et al. (2001), who investigated the adoption of Internet financial services, demonstrated that using the Internet for financial services is not visible to other members of the society. However, DOI studies have not significantly addressed innovations that have advantages and disadvantages that are not easily seen by others in the social system. Research has also found that the five studies of IB based on the DOI theory give much concern to the two variables of relative advantages and complexity. Moreover, many studies based on the country's level have also concentrated on these two variables, e.g., Polatoglu and Ekin (2001) from Turkey, Suganthi et al. (2001) from Malaysia, and Al-Sabbagh and Molla (2004) from Oman. Additionally, studies that employ the TPB theory show that relative advantages and complexity are determinant factors with significant influence on an IB user's attitude (see Table 4).

Table 4: Overview of Key Studies in IB Adoption Using Theory of DOI

Reference	Year	Other Determinants	IB Adoption Formation Variables				
			RA	OBS	TR	COX	COT
Rogers	1995		√	√	√	√	√
Tan, M, and Teo, T.S.H. IB	2000	Internet experience Banking needs Risk Subjective norms Perceived behavioral control variables: self-efficacy, government support, technology support	√	xx	√	√	√
Suganthi et al., (Malaysia) IB	2001	These authors did not indicate any theory of adoption they adopt for the study	√	xx	xx	√	xx
Black, N. J. et al. IB	2001		√	√	√	√	√
Polatoglu V.N and Ekin S.	2001	Perceived risk Type of group	√	√	√	√	√

IB		Type of decision Marketing effort					
Gerrard, P. & Cunningham, J.B.	2003	risk: 1 confidentiality 2 accessibility	√	xx	xx	√	√
Brown, I. et al south Africa IB	2004	Banking needs Risk Internet experience Subjective norms Perceived behavioral control Self-efficacy Technology support Government support	√	xx	√	√	√
Al-Sabbagh, I.	2004	Inhibitors Drivers of Internet banking adoption Demographic profile	√	xx	√	√	√
Chang, Y.	2004	Demographics: Sex, Age, Nationality, Education, Marital status, Type of job, Personal income, Household income, Type of housing, Area of residence Aware of interest rate information Banking Behavior: Frequent visitors to bank branches, Frequent visitors to bank website	xx	xx	xx	Xx	xx
RA=Relative Advantage, OBS =Observability, TR =Trial ability, COX=Complexity, COT =Compatibility √ = included in Study's Model √x = Included but it has no significant influence xx = not included							

It is important to note that most studies do not entirely adopt the model variables, but omit some and add others. Chang (2004) investigated technology diffusion as a social phenomenon, and believed that the nature of the social system determines the rate of adoption. Chang emphasized the influences of socio-economic variables on the adoption of IB and used the logistic distribution and duration model to detect the dynamics of the IB adoption process. The duration model (Rogers, 1995) identifies the determinants of early adopters versus delayed adopters by their sequential adoption time. Table 5 displays a summary of previous IB innovation acceptance research.

Table 5: Trend in Innovation Adoption Research: Internet Banking

Reference		Innovation Adoption Research			Note
Author	Year	Theories	Contexts	Approach	
Brown et al.	2004	TPB DOI	south Africa	Psychology	Comparative study
Al-Sabbagh	2004	DOI TAM	Oman	Psychology	Drivers and inhibitors
Chang, Y.	2004	DOI	Korea	Demographic	Social norm effects
Pikkarainen et al.	2004	Extension of TAM	Finland	Psychology	n/a
Chan and Ming-te	2004	TAM2 Social Cognitive Theory	Hong Kong	Psychology Sociology	Acceptance and user resistance
Shih and Kwoting	2004	DTPB	Taiwan	Psychology	n/a
Gerrard and Cunningham	2003	DOI	Singapore	Psychology qualitative	IB characteristics
Wang et al.	2003	extended TAM	Taiwan	Psychology snapshot research approach	Primary aim is to extend the TAM

Chau and Lai	2003	TAM	Hong Kong	Psychology	Identify IB characteristics and determinants
Karjaluoto et al.	2002	TRA in TAM	Finland	Psychology Sociology	Factors affecting attitude and behavior
Suganthi et al,	2001	n/a	Malaysia	Psychology Descriptive	Demographic differences
Polatoglu and Ekin	2001	DOI	Turkey	Psychology	Customer satisfaction
Black et al.	2001	DOI	England	Psychology qualitative approach	Innovation attributes
Tan and Teo	2000	TPB DOI	Singapore	Psychology Sociology	Factors affecting
Liao et al.	1999	TPB DOI	Hong Kong	Psychology Sociology	Adoption process
Sathye	1999	n/a	Australia	Sociology Descriptive	IB obstacles IT Sociology Awareness

DISCUSSION

The research literature regarding the acceptance of new technologies and innovations is significant, and has identified a number of adoption and diffusion variables across multiple contexts. For example, the Technology Acceptance Model (TAM) offers a parsimonious theory to explain individual acceptance of an innovation (Davis, 1989). Similarly, research at the organizational and inter-organizational levels has explained the adoption behaviors associated with different innovation characteristics.

However, as many senior scholars and industry observers have expressed, there are many opportunities to develop adoption and diffusion of innovation theories. Accordingly, Lucas et al. (2007) stated that previous research has emphasized individual adoption and acceptance of innovations. Thus, broader research of the relevant technological, institutional, and historical contexts is necessary to develop theories for technology innovations. Fichman (2004) also called for research beyond the dominant paradigm of the relationships between the independent variables of innovator profiles and the dependent variables of innovation quantity.

There are promising opportunities to develop theories regarding user informational readiness, contagion effects, management fashion, innovation mindfulness, technology ecosystems and innovation life cycles, innovation configurations, technology destinies, the evolution of standards organizations, and quality-led innovation. Moreover, there are many methods that can address research questions and offer new approaches to theory development.

For example, survival analysis from public health and spatial econometrics from geographical Information systems offer innovative ways develop new theoretical perspectives on the adoption and diffusion process of technological innovations. Additionally, data mining and other advanced statistical methods that blend techniques from computer science can recognize patterns and organizational changes.

CONCLUSION

Over the last 15 years, a large body of literature on IB adoption has been developed based on the four existing research frameworks, the Theory of Reasoned Action (TRA), the Theory of Planned Behavior (TPB), the Technology Acceptance Model (TAM), and the Diffusion of Innovations (DOI) theory. However, the aforementioned frameworks were established with studies of fairly simple IS tools in an e-commerce environment. Therefore, the empirical applicability of these frameworks was extended to incorporate different issues (i.e., contexts, users, organization, and innovation). In this way, many IS researchers attempted to expand or modify these theoretical models to improve their accuracy.

Although social psychological models have been extensively used as the theoretical foundation to study technology or IS adoption, the study of IB has received little attention. The existing studies to predict consumer adoption of IB produced different models as well as different determinants to explain adoption.

It is important to note that the existing theories of social psychology that were used to explore adoption (TRA, TPB, TAM, Triandis, and DOI) have some similarities and differences.

Firstly, the theory of TPB and TAM were both developed from the TRA theory. Secondly, all models that employ any of the theories assume a consequence path of actions initiated by an attitude toward innovation, followed by intention formation, and completed with actual behavior. Thirdly, the consequence relationship occurs mainly among four constructs, assuming that cognitive, normative, or affective beliefs form attitudes, which, in turn, influence behavioral intention and the actual adoption of IB. Fourthly, the two TAM constructs (PU and PEOU) are similar to the two constructs in Rogers' theory of Relative Advantage (RA) and Complexity (COX), which are all predictors of a user's attitude construct. Furthermore, the perceived usefulness (PU) in the TAM is similar to the perceived consequences in the Triandis model. Fifthly, the constructs of PU, relative advantage, and perceived consequences are cognitive components of individual attitude.

In various models, these constructs further justify the rationale in the TRA that the beliefs about the consequences of behaviors are keys to the formulation of attitude towards the behavior. Similarly, the TRA and TPB have been used to predict intentions and behaviors by measuring attitudes and norms, but the "TPB differs from the theory of reasoned action in its addition of perceived behavioural control" (Ajzen, 1991).

Ajzen (1991) reported that perceived behavioral control in the TPB refers to an individual's perception that the behavior is under his or her control and he or she has access to resources and opportunities to facilitate the likelihood of behavioral achievement. In this connection, Ajzen (1991) views that the TPB's behavioral control construct has a similar function as the Triandis' construct, which is in the form of facilitating factors. The differences between the Triandis and TPB models is the construct that facilitating factors only affect the actual behavior, while the perceived behavioral controls in the TPB impacts both intentions and actions. The constructs such as compatibility, trialability, and observability, which came from social psychological models including Rogers' DOI theory, are not in the 4T theories for technology adoption.

The multifaceted and complex processes of diffusion and adoption of IB requires an integration of theories from diverse perspectives, such as the 4T and DOI theories.

This paper attempts to fill this gap by integrating constructs from Rogers' DOI theory with other adoption theories, such as the TRA, TPB, TAM, and Triandis, into a research model fit for the study of IB.

LIMITATION

Future research could employ quantitative methods to obtain insights of user perceptions and associated outcomes to better understand the applicability of the proposed model.

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