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CONSUMER ADOPTION OF THE ONLINE DESKTOP

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A research report submitted to the Gordon Institute of Business Science, University of Pretoria, in partial fulfilment of the requirements for the degree of Master of Business Administration.

8 SEPTEMBER 2006

ABSTRACT

This research investigates whether The Unified Theory of Acceptance and Technology (UTAUT) can be successfully applied to the adoption of an early stage technology. Specifically, the study examines the models suitably toward explaining consumer acceptance of the online desktop or webOS. A secondary objective was to assess the likelihood that consumers will adopt the online desktop. The study found that the UTAUT model accounted for 57 percent of the variance in consumer intention to use an online desktop. The performance expectations of consumers accounted for a significant proportion of this variance. In regards to the secondary objective, the study concluded that the online desktop was of moderate use to consumers. An online desktop was found to be useful to consumers in that it provides them with enhanced mobility and flexibility.

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DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University.

Jamie Angus Band
8 September 2006

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CHAPTER 1. INTRODUCTION

When a new technology appears that promises to change the landscape of computing, it is often accompanied with significant hype and over investment. In the midst of the excitement, it is rare for those in the information technology (IT) industry to consider the actual merits of the technology in the eyes of the customer. The history of computing is littered with examples of failed ideas and sunk costs that could perhaps have been avoided. In many instances, these failures can be attributed to a lack of user acceptance (Davis, Bagozzi, and Warshaw, 1989). With this in mind, IS researchers have developed several theoretical frameworks that attempt to predict the adoption of a technology. One such framework is the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Gordon and Davis, 2003). In this research report, the UTAUT model is applied to the adoption of the online desktop or WebOS. The intent is to verify the integrity of the model by applying it to a new research context.

1.1. Introduction to the UTAUT Model

Venkatesh et al. (2003) presented the UTAUT model in the 2003 September Issue of the MIS Quarterly. Their model integrated eight prominent models of technology acceptance and was empirically validated with six longitudinal field studies of six different departments of six large firms in six different industries. It was found to explain 70 percent of the variance (adjusted R^2) in usage intention. This was a considerable improvement over any of the eight

constituent models, which typically explain around 40 percent of the variance in technology acceptance.

In its short history, the UTAUT model has been applied to evaluate the adoption of a broad range of technologies. It has been validated in studies on wireless sensor networks (Lubrin, Lawrence, Navarro, and Zmijewska, 2006), wireless LAN's (Anderson and Schwager, 2005), mobile devices (Carlsson C., Carolsson J., Hyvönen, Puhakainen and Walden, 2006), voice over internet protocol (Zhang, Chan and Fang, 2004) and instant messaging (Chan, Jin J., Jin Y., 2004).

Although, the model was principally designed for use within an organizational context, it has also shown strong predictive ability in studies that target the consumer. For instance, Wang, Lin and Pin (2006) demonstrated that the model is a strong predicator of consumer intention to use mobile services. In this research report, the UTAUT model used to examine consumer adoption of the online desktop.

1.2. Introduction to the Online Desktop

In July 2006, Ray Ozzie, th\e Chief Architect at Microsoft, declared "the software industry was experiencing a fundamental and transformational shift to services" (Nuttall, 2006). This viewpoint echoed Google's sentiment, which was revealed earlier in the year when it announced the availability of online word processor and spreadsheet applications targeted toward the consumer market

(Hills, 2006). Many experts in the computing industry believe that the dawn of a new era has arrived. They refer to the new software-as-a-service (SaaS) delivery model, where consumers and businesses access their software and information primarily over the Internet.

In the SaaS delivery model, service providers maintain, operate and support the use of software on behalf of their customer base. Rather than purchase software from a retail outlet and manually install it on personal computer (PC), the software is hosted at a central location on the Internet and accessed remotely. In consumer markets, online software services are typically sold on a subscription, per use or advertising supported basis.

SaaS applications have been popular for over decade. For instance, in 1997, Hotmail, an online email service, was sold to Microsoft for $400 million after it signed up 8.5 million subscribers in just two years. In 2006, News Corp purchased Intermix Media, owners of the MySpace social networking site, for a reported $580 million. By August 2006, the service boasted more than 100 million subscribers. This was soon followed by Google's investment in YouTube, the video sharing service, for a staggering $1.6 billion (Charmy B., 2005).

Despite these success stories, there are few examples of traditional desktop applications being substituted for SaaS equivalents. The services that have achieved success in the marketplace have tended to be those that are inherently designed to facilitate collaboration and exchange. They reside in

categories such as social networking, bookmark-sharing, video-sharing, online dating, online auctions and so forth. The more traditional applications, such as Microsoft Office, continue to reside on the desktop and remain in widespread use today. For instance, in 2006, the Gartner Group reported that Microsoft Office was installed on over 450 million computers worldwide (Markoff, 2006).

In a bid to capitalize on the industry-wide trend toward SaaS, several start-ups have begun offering online office applications targeted toward the consumer. The list of competitive services include: Google Docs and Spreadsheets, ajaxWrite, RallyPoint, ThinkFree, Writeboard and Zoho Writer. These services have the potential to challenge Microsoft's dominance of the market as they offer benefits inherent in the SaaS delivery model. Furthermore, since they are intrinsically Internet-based, they are better equipped to implement features that facilitate collaboration among users.

Critics of the SAAS delivery model, note the striking similarities that it bears to the failed network computing (NC) and application server provider (ASP) initiatives so vigorously pursued in the 1990's. Despite significant investments, ASP's failed to attract a large client base (Susarla, Barua, Winston, 2003) primarily because they failed to understand and fulfil customer requirements (Desai and Currie, 2003).

From the point of view of the business user or consumer, it is arguable whether the concept of SAAS, in comparison to the ASP model, is merely an exercise in re-branding since the distinguishing characteristic is relatively minor and

technical in nature. Namely, SAAS applications are implemented primarily using native web technologies, whereas ASP applications are principally client-server based. The use of web technologies may solve some of the scalability and deployment issues that plagued the ASP model however the core concept of software sold as a service remains the same.

The network computer, first proposed by Larry Ellison (CEO of Oracle) in late 1995, also bears close resemblance to SAAS. Oracle designed a “thin-client” computer that relied exclusively on the network for the storage and retrieval of applications and data. Much like the SAAS model, Ellison envisioned information technology (IT) companies rendering their software as a service over the Internet. Despite bold projections, the network computer never achieved mass adoption in the way that Ellison had originally envisioned it. Hof (1998) attributed the lacklustre demand for network PC’s due to immature software, poor standardization and declining PC prices.

The network computing, ASP and SAAS models are similar on a conceptual level. Firstly, Customers access their software and data directly over the network rather than from local storage. Secondly, service providers are responsible for the centralized hosting, ongoing maintenance and management of customer software and data. Thirdly, customers are typically charged on a subscription basis for services rendered, rather than a once of license fee for the purchase of the software.

In the event that users begin to substitute their traditional desktop applications

with online equivalents, it may no longer be necessary for the PC to possess local storage. Users would instead access their applications and data from servers hosted on the Internet. In anticipation of this trend, start-up services such as a CosmoPOD, EyeOS and YouOS have begun offering the equivalent of a PC desktop in an online environment. Similar to a PC desktop, an online desktop helps users to organize and access online applications. It also promotes a common look, feel and usage pattern across a multitude of online applications. As opposed to a PC desktop, an online desktop is hosted online and is decoupled from the device used to access the Internet.

1.3. Introduction to the Research Aims

Venkatesh et al. (2003, p. 467) states that UTAUT model is “the definitive model that synthesizes what is known and provides a foundation to guide future research”. Given the significance of Venkatesh et al. (2003) study, it is important for researchers to verify its claims in different contexts, such that the UTAUT can assume its rightful place in the IS literature. Thus, the primary objective of this study is to validate the predictive ability of the UTAUT model as it is applied to consumer adoption of the online desktop. The secondary goal is to assess whether consumers are likely to adopt the online desktop. To perform an meaningful analysis, the factors that influence the acceptance or rejection of the technology will be examined.

This research is unique in that it is the first study to explore consumer adoption of the online desktop. It is different from most other UTAUT studies in that it

examines the use of online desktop services in a real environment. In most adoption studies concerning early-stage technologies, study participants are asked to test a technology in laboratory settings. In this study, the participants are existing users of a commercially available online desktop service.

1.4. Outline of the Study

The research consists of a survey of existing online desktop service users. It begins by examining the current literature on technology adoption, and the UTAUT model in particular. Following the literature review, the methodology is discussed wherein the hypotheses, population, sample, survey instrument, data collection procedures and method of analysis are presented. Having established a formal methodology, the research results are discussed and the findings interpreted with respect to the research objectives.

CHAPTER 2. LITERATURE REVIEW

The subject of technology adoption is an actively researched area in literature. Most studies that explore the acceptance of a technology take one of three approaches: the domestication approach, the diffusion approach and the adoption approach (Vigayan, Perumal, and Shanmugam, B. 2005). The domestication approach explores the social interactions that mediate consumption and adoption of a technology. The diffusion approach, proposed by Rogers (1995), analyses the spread of technology as it occurs in stages. The adoption approach uses empirical models derived from social cognitive theory (SCT) to explain the acceptance of technology. In this study, the adoption approach is pursued as it has the advantage that an empirical analysis of the factors that contribute to the adoption of a technology can be performed.

The UTAUT model incorporates constructs derived from eight technology acceptance models (see Table 1). The constituent models, with the exception of IDT, are heavily rooted in Social Cognitive Theory (see Figure 1). In order to critically assess the UTAUT model and to establish its legitimacy, it is necessary to review its derivation, especially with respect to the origins of the constructs that it defines as determinants of technology acceptance.

Model	Authors
Social Cognitive Theory (SCT)	Bandura (1977)
Theory of Reasoned Action (TRA)	Sheppard, Hartwick and Warsaw (1988)
Theory of Planned Behaviour (TPB)	Sheppard,Hartwick and Warsaw (1988)
Technology Acceptance Model (TAM)	Davis, Bagozzi, and Warshaw (1989)
Combined TAM and TPB model (C-TAM-TPB)	Taylor and Todd (1995a)
Motivation Model (MM)	Davis, Bagozzi, and Warshaw (1992)
Model of PC Utilization (MPCU)	Thompson, Higgins and Howell (1991)
Innovation Diffusion Theory (IDT)	Moore G.C. and Benbasat (1991)

Table 1 Eight Technology Acceptance Models

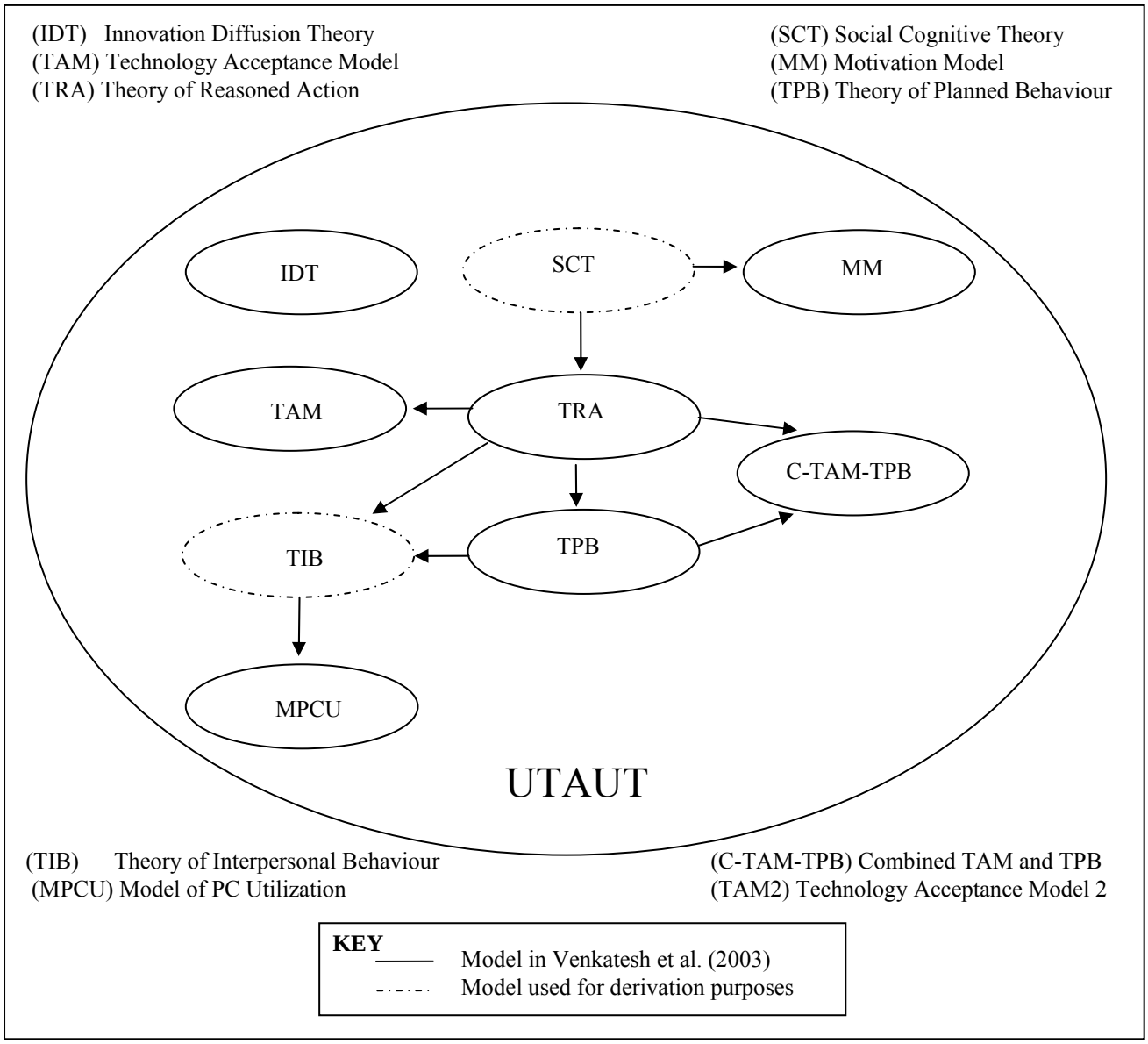


Figure 1 Theoretical Background of the UTAUT Model

2.1. Social Cognitive Theory

Social Cognitive Theory (SCT), first proposed by Bandura (1977), provides a framework for understanding, predicting, and changing human behaviour. The theory stems from Social Learning Theory (SLT), which has a rich historical background dating back to the late 1800's. The theory identifies human behaviour as an interaction of personal factors, behaviour, and the environment (Bandura, 1977). It states that a person's intention to perform a particular behaviour is determined by their self-efficacy and outcome expectancy (Bandura, 1998).

Self-efficacy is the confidence people have in their ability to perform a particular behaviour. It is influenced by factors such as verbal persuasion, accomplishments, vicarious experiences and physiological signals (Bandura, 1997). It affects an individual's choice of behaviours, their persistence in overcoming obstacles, and their ability to perform the behaviour (Compeau and Higgins, 1995).

Outcome expectancy is a judgement that a behaviour will result in one or more consequences (Bandura, 1986). The outcome may be physical (e.g. bodily harm), social (e.g. praise from others) or self-evaluative (e.g. pride) (Bandura, 1986). According to SCT, people who are more efficacious tend to perceive outcomes in a more positive light. Thus, outcome expectancy is directly influenced by self-efficiency (Bandura, 1986).

Both Venkatesh (2000) and Agarwal et al. (2000) have demonstrated the importance of self-efficiency as a determinant of behavioural intention in technology acceptance studies. Compeau and Higgins (1995) introduced the concept of self-efficiency to the MIS literature by empirically verifying the relationship between computer self-efficacy (CSE) and computer use. In doing so, they developed a 10 item, single factor measure of CSE, which has been used in a number of later studies (Compeau et al., 1999; Agarwal et al., 2000 and Venkatesh, 2000).

Compeau and Higgins (1995) used SCT in a study that examined computer use among students. In doing so identified five determinants of technology acceptance:

- *Outcome Expectations (Performance).* The judgement that a given behaviour will result in one or more job-related outcomes.
- *Outcome Expectations (Personal):* The judgement that a given behaviour will result in one or more personal consequences.
- *Self-Efficacy*. The judgment of one's ability to use a technology to accomplish a particular job or task.
- *Affect*. An individual's liking of a particular behavior, such as use of technology.
- *Anxiety*. The evoking of anxious or emotional reactions when using technology.

2.2. Theory of Reasoned Action

The Theory of Reasoned Action (TRA) suggests that individuals' consider the consequences of their actions before they perform a given behaviour. According to the theory, a person's intention to perform a particular behaviour (BI) is influenced by the person's attitude toward performing the behaviour and subjective norm (Ajzen and Madden, 1986). An individual's attitude towards the behaviour is defined as "an individual's positive or negative feelings about performing the target behaviour" (Fishbein and Ajzen 1975); while subjective norm is defined as "the person's perception that most people who are important to him think he should or should not perform the behaviour in question" (Fishbein and Ajzen 1975). It assumes that the person always has choice to perform the behaviour, so the individual's intention to perform the behaviour is an immediate determinant of action.

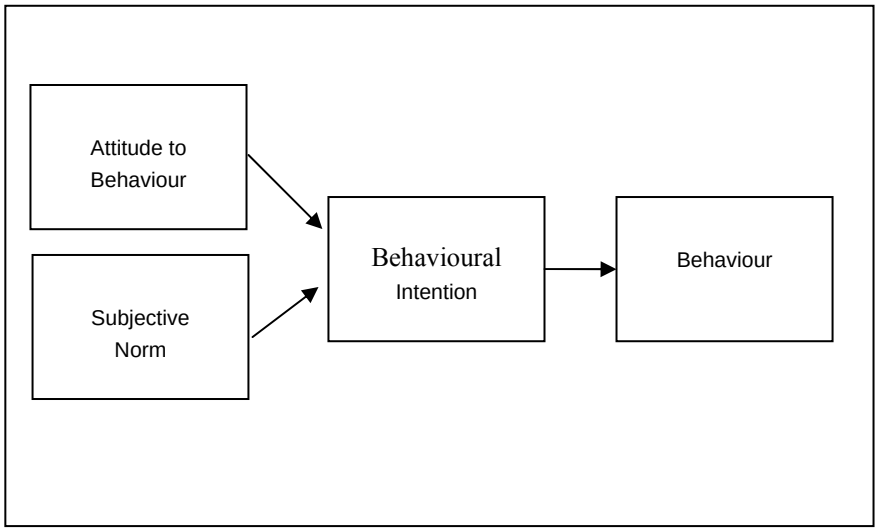


Figure 2 Theory of Reasoned Action (TRA)

The TRA asserts that all factors that influence behaviour, for example, system design variables, user characteristics, task characteristics and political

influences, do so only by indirectly influencing attitude toward behaviour, subjective norm or their relative weights (Davis et al., 1989).

The TRA has been used to conduct empirical studies in a wide range of research areas. For instance, it been applied to predict and explain consumer behaviour (Mcneil, 1974), family planning behaviour (Whelpton, Campbell and Patterson, 1966) and technology acceptance (Davis, Bagozzi, and Warshaw, 1989).

2.3. Theory of Planned Behaviour

The TRA was later revised and reformulated into the Theory of Planned Behaviour (TPB). The TPB was introduced to cater for circumstances when a person's behaviour is not voluntary. It supplements the TRA model by including perceived behavioural control (PBC) as a predicator of intention and behaviour. PBC refers to beliefs about the presence of factors that may facilitate or impede performance of a given behaviour. In other words, it is the perception of constraints and/or opportunities associated with performing a specific behaviour, for example: time, money and expertise.

According to TPB, one's behaviour is guided by the beliefs about the consequences of behaviour (behavioural beliefs), beliefs about the expectations of others (normative beliefs) and beliefs about the presence of factors that facilitate or impede performance of the behaviour (control beliefs). The relative weights of these three factors influence the outcome of a person's

decision making (Ajzen, 1988). Generally, a person's intention to perform a specific behaviour will be stronger if their attitude toward the behaviour is positive, their beliefs about the expectations of others are positive, and there are limited perceived constraints associated with performing the behaviour.

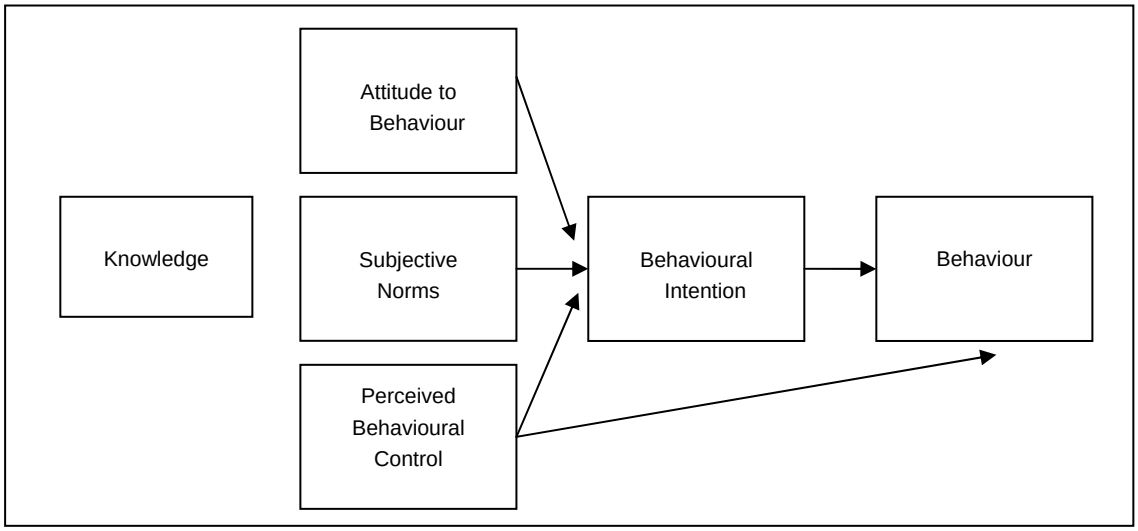


Figure 3 Theory of Planned Behaviour (TPB)

2.4. Technology Acceptance Model

Davis et al. (1989) introduced a model to explain user acceptance behaviour, known as the Technology Acceptance Model (TAM). The model is derived from SCT, and in particular, the TRA.

According to the TAM, the adoption of a new information technology is determined by a user's intention to use the system. The intention to use a system is motivated by the person's attitudes toward the system, which are in turn, are influenced by the user's beliefs about the system. The model incorporates five determinants of technology acceptance:

- *Perceived Usefulness (PU).* The extent to which a person believes that using a system would enhance his or her job performance.
- *Perceived Ease of Use (PEOU).* The extent to which a person believes that using a system would be free of mental effort.
- *External Variables.* All variables that influence PEOU or PU (e.g. onsite training, previous experience, and opinions of others).
- *Attitude Toward Using (A).* The attitude toward using a system if formed by beliefs about its usefulness and ease-of-use.
- *Behavioural Intention to Use (BI).* The intention of a user to use the system.

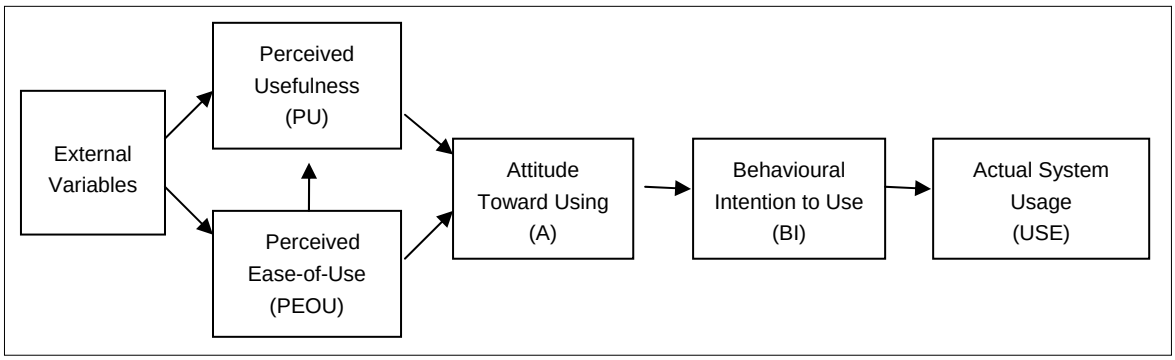


Figure 4 Technology Acceptance Model (Davis et al., 1989)

As illustrated in Figure 4, PEOU and PU are the primary beliefs that have the greatest bearing on intention and actual usage (Davis et al., 1989). These two cognitive variables have been shown to explain a large percentage of the variation in intention to use a technology: 35% in Venkatesh (2000), 45% to 57% in Davis et al. (1989), 49% in Venkatesh and Davis (2000), and 52% in Taylor and Todd (1995).

The TAM is probably the most widely used technology acceptance model in

the literature. As of January 2000, no less than 424 articles had cited the two original TAM studies in the MIS Quarterly and Management Science journals (Venkatesh et. al, 2000). The TAM website http://www.guuspijpers.com/TAM lists a further 30 journal articles published in the year 2003 alone.

The TAM has been tested empirically in numerous studies (Davis et al., 1989; Mathieson, 1991; Dillon and Morris, 1996; Taylor and Todd, 1995). The model has also been applied to wide-variety of technologies, including off-the-shelf software (Igbaria et al., 1997), hardware systems (e.g. mainframes, minicomputers) (Tam and Hui, 2001) and web-based systems (Moon and Kim, 2001).

2.5. Combined TAM and TPB

To provide a more accurate explanation of the determinants of technology acceptance, Taylor and Todd (1995b) introduced a combined TAM and TPB model (C-TAM-TPB). The hybrid model incorporated elements of the TPB with the TAM. Specifically, it augmented the TAM with perceived behavioural control and subjective norm constructs as determinants of behavioural intention.

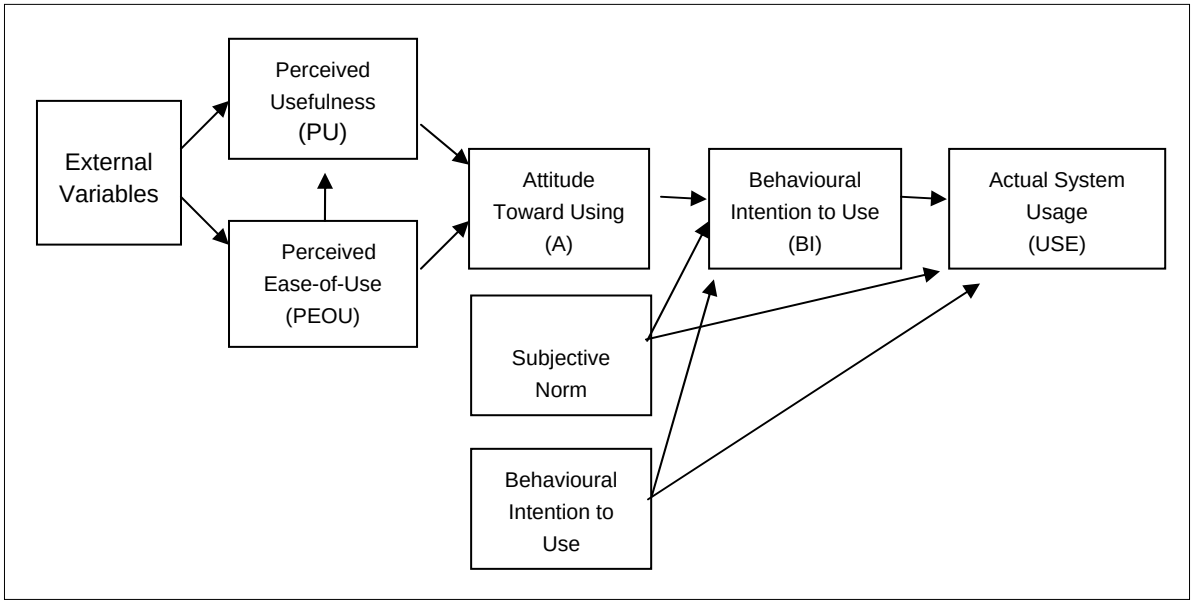


Figure 5 C-TAM-TPB Model (Taylor & Todd, 1995b)

2.6. Theory of Interpersonal Behaviour

Triandis's (1971, 1980) Theory of Interpersonal Behaviour (TIB) attempts to address deficiencies in TRA and TPB. It incorporates constructs such as habit, social factors and facilitating conditions. According to Triandis (1980), one's behavioural intentions are influenced by what one would like to do (affect), what one thinks ought to be done (social factors), and by the expected consequences of behaviour (perceived consequences). Actual behaviour is determined by what one has usually done (habits), by one's behavioural intentions and the facilitating conditions.

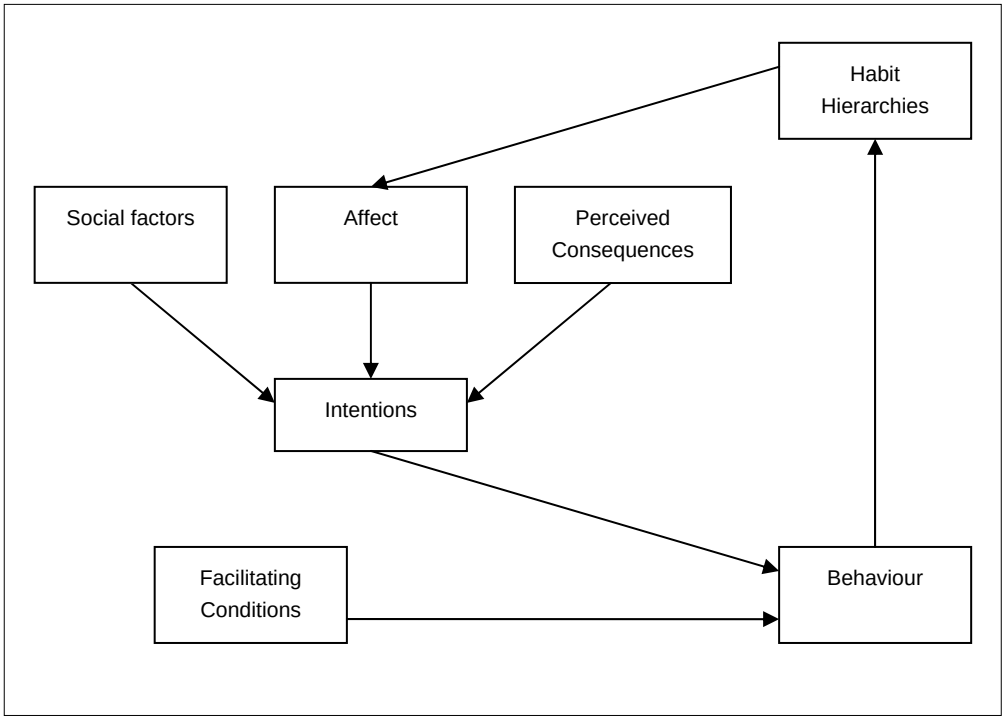


Figure 6 Factors Influencing Behaviour (Thompson et al., 1991)

Similar to the perceived behavioural control construct in TPB, facilitating conditions refer to the necessary resources and support to perform a particular behaviour. They are the objective factors that make performing the behaviour easy or difficult. In the TIB, facilitating conditions influence actual behaviour, while perceived behavioural control in TPB affects both behavioural intention and usage.

2.7. Model of PC Utilization (TMCU)

Thompson et al. (1991) proposed yet another theory of technology adoption, known as the Model of PC Utilization (MPCU). They adapted TIB to the context of personal computer use by knowledge workers. In doing so, they augmented TIB with following constructs:

- Complexity: “The degree to which an innovation is perceived as relatively difficult to understand and use” (Rogers and Shoemaker, 1971, p. 154). It is expected to have a negative correlation with adoption and use.
- Job-Fit: “The extent to which using a PC can enhance the performance of his or her job” (Thompson et al., 1991, p. 129). It is expected to have a positive correlation with adoption and use.

The TIB included habit as a determinant of behaviour. However, due to measurement difficulties, it was excluded from the MPCU as a construct. Thus, the model examined the influence of facilitating conditions, affect, social factors, complexity, job fit and long-term consequences on PC utilization.

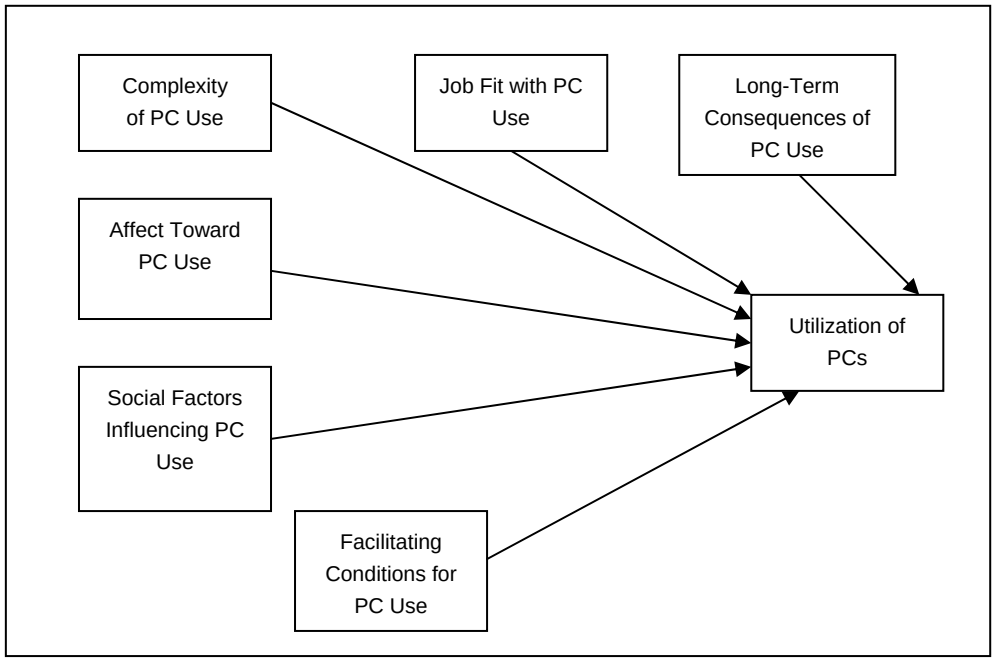


Figure 7 Factors Influencing the Utilization of Personal Computers (Thompson et al., 1991)

The findings indicated that social factors, complexity, job fit and long-term

consequences have a significant influence on PC use. In contradiction with the TIB, there was no evidence that affect (attitude) and facilitating conditions have an impact on PC utilization.

2.8. Motivational Model

Davis et al. (1992) used to motivational theory to develop the Motivation Model (MM) to predict technology acceptance and usage. (Vallerand, 1997) identified two dimensions to motivation:

- *Intrinsic Motivation*: "The perception that users will want to perform an activity 'because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself, such as improved job performance, pay, or promotions" (Davis et al. 1992, p. 1112)
- *Extrinsic Motivation*: "The perception that users will want to perform an activity 'for no apparent reinforcement other than the process of performing the activity per se'" (Davis et al. 1992, p. 1112)

Davis et al. (1992) found that intrinsic and extrinsic motivation were important factors in behavioural intention to use a technology. This finding was confirmed in later studies by Hoffman and Novak (1995) and Venkatesh (2000).

2.9. Innovation Diffusion Theory

Innovation Diffusion Theory (IDT) (Rogers, 1962) is another well established technology adoption theory. The theory has been applied to a numerous IT

studies (Agarwall and Prasad, 1997; Moore and Benbasat, 1991).

IDT is based upon theories of technology diffusion, whose origins can be traced back to the French sociologist Gabriel Tarde (1903). Tarde (1903) plotted the original innovation curve, which illustrates that the rate of technology adoption tends to follow an S-shape. Years later, Ryan and Gross (1943), while studying the diffusion of hybrid seed among a group of Iowa farmers, discovered that diffusion was “a social process through which subjective evaluations of an innovation spread from earlier to later adopters rather one of rational economic decision making.” (Valente, 1995). Their study represented a novel perspective as it highlighted the impact that social factors have on technology adoption. Furthermore, the study concluded that the rate of adoption of hybrid seeds among farmers also followed an S-curve shape.

Decades later, in his book Innovation Diffusions, (Rogers, 1962) formalized innovation diffusion research into his Innovation Diffusion Theory (IDT) by synthesizing over 3800 diffusion theory publications. IDT explains a broad range of issues related to technology adoption. It explains the innovation decision process, the determinants of rate of adoption, and the various categories of adopters. More importantly it attempts to forecast and explain the likelihood and rate of technology adoption.

Rogers (1995) identifies five attributes that influence the rate of technology adoption. He argues that rate of technology adoption can be predicted by measuring people’s perceptions of these attributes. These five key attributes

are:

- *Relative Advantage*: The degree to which an innovation is perceived as being better than its precursor.
- *Ease of Use*: the degree to which an innovation is perceived to be difficult to use.
- *Image*: The degree to which use of an innovation is perceived to enhance one's image or status in one's social system.
- *Visibility*: The degree to which one can see others using the system in the organization.
- *Compatibility*: The degree to which an innovation is perceived as being consistent with the existing values, needs, and past experiences of potential adopters.
- *Results Demonstrability*: The tangibility of the results of using the innovation, including their observability and communicability.
- *Voluntariness of Use*: The degree to which use of the innovation is perceived as being voluntary or of free will.

Rogers (1995) found that these variables typically explain between 49 to 87 percent of the variance in the rate of technology adoption. In contrast, by analysing seventy-five diffusion articles, Tonartzky and Klein (1982) revealed that the rate of innovation adoption could only be consistently explained by relative advantage, compatibility and complexity.

Some researchers have pointed out the similarities between TAM and IDT. For

example, the relative advantage construct in IDT is often regarded as equivalent to TAM's PU construct. Furthermore, the complexity construct in IDT is similar to the PEOU concept in TAM (Moore and Benbasaat, 1991).

In 1991, Moore and Benbasat (1991) combined IDT and the TRA to develop an instrument to measure technology acceptance. Consistent with Davis (1989), they renamed IDT's complexity construct to ease-of-use. They also introduced an image construct which was defined as "the degree to which use of an innovation is perceived to enhance one's image or status in one's social system" (Moore and Benbasat 1991, p. 195). Furthermore, the IDT observability construct was separated into two distinct parts, namely: results demonstrability and visibility. Results demonstrability "concentrated on tangibility of using the innovation, including their observability and communicability" (Moore and Benbasat 1991, p. 203). Visibility, on the other hand, focused on the physical presence of the innovation in the organisational setting. Thus, constructs used in Moore and Benbasat's instrument were relative advantage, compatibility, image, ease of use, results demonstrability, visibility, and trialability.

2.10. **The UTAUT Model**

The UTAUT model was published in the September 2003 edition of MIS Quarterly (Venkatesh et al. 2003). The model incorporates four core determinants that influence behavioural intention (BI) to use a technology. There determinants are:

- *Performance Expectancy (PE)*: "The degree to which an individual believes that using the system will help him or her to attain gains in job performance".
- *Effort Expectancy (EE)*: "The degree of ease associated with the use of the system".
- *Social Influence (SI)*: "The degree to which an individual perceives that important others believe he or she should use the new system".
- *Facilitating Conditions (FC)*: "The degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system".

Venkatesh et al. (2003) derived these factors from constructs in the eight constituent models discussed in Section 1.1 .

UTAUT Construct	Source Construct
Performance Expectancy	
Effort Expectancy	Perceived ease of use (TAM/TAM2) Complexity (MPCU) Ease of use (IDT)
Social Influence	Subjective norm (TRA, TAM2, TPB/DTPB, and C-TAM-TPB) Social factors (MPCU) Image (IDT)
Facilitating Conditions	Perceived behavioral control (TPB/DTPB, C-TAM-TPB) Facilitating conditions (MPCU) Compatibility (IDT)

Table 2 Source of UTAUT Constructs

The model, as illustrated in Figure 8, posits two direct determinants of usage behaviour: behavioural intention (BI) and facilitating conditions (FC). The variables of gender, age, experience and voluntariness of use moderate the relationships as follows: (Venkatesh et al. 2003):

- *Gender:* performance expectancy, effort expectancy, social influence
- *Age:* performance expectancy, effort expectancy, social influence, facilitating conditions
- *Experience:* effort expectancy, social influence, facilitating conditions
- *Voluntariness of Use:* social influence

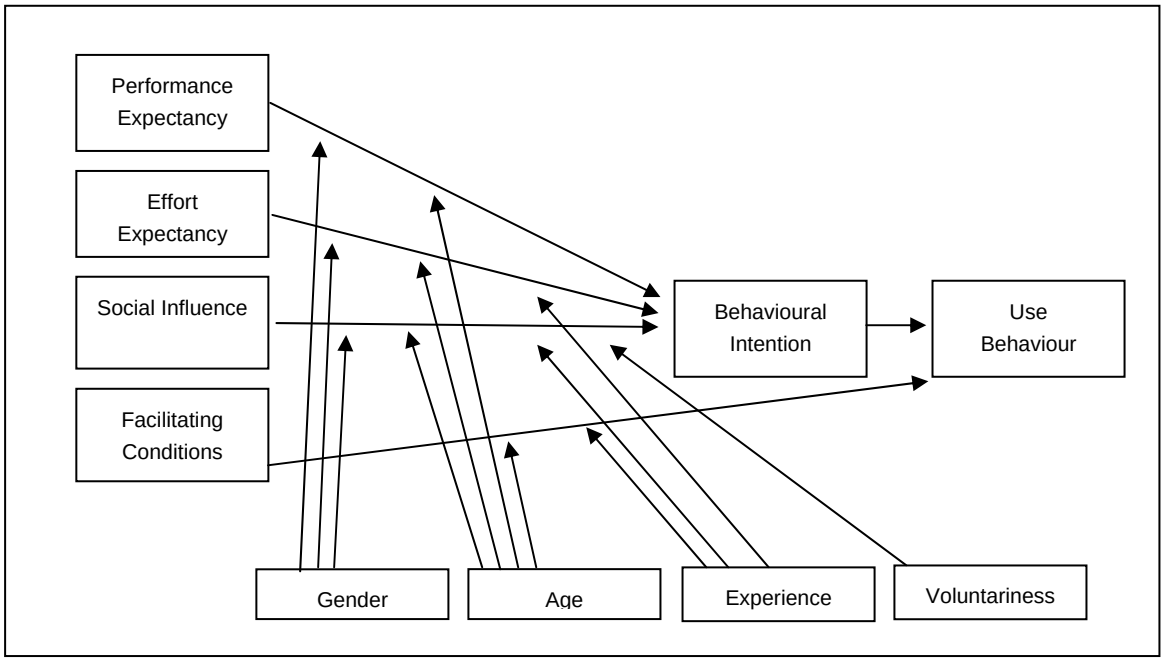


Figure 8 UTAUT Research Model (Venkatesh et al., 2003)

CHAPTER 3. RESEARCH QUESTIONS

3.1. Introduction

In this chapter, the research questions and hypotheses are stated.

3.2. Research Questions

The main objective of this study is to validate the predictive ability of the UTAUT model as applied to consumer adoption of the online desktop. The secondary objective is to establish whether consumers are likely to adopt the online desktop. Thus, the research questions can be formally stated as follows:

Question 1. Is the UTAUT model valid when applied to consumer adoption of the online desktop?

Question 2. Are consumers likely to adopt the online desktop?

3.3. UTAUT Hypotheses

To test for the validity of the research model, the hypotheses in Table 1 below are proposed.

H1	Performance expectancy will have a significant positive influence on behavioural intention to use an online desktop.
H2	Effort expectancy will have a significant positive influence on behavioural intention to use to use an online desktop.
H3	Social influence will have a significant positive influence on behavioural intention to use an online desktop.
H4	Facilitating conditions will have a significant positive influence on online desktop usage.
H5	Behavioural intention to use an online desktop will have a significant positive influence on usage.
H6	The influence of performance expectancy on behavioral intention of using VoIP will be moderated by (a) gender and (b) age, such that the effect will be stronger for men and particularly for younger men.
H7	The influence of social influence on behavioral intention to use an online desktop will be moderated by (a) age and (b) experience, such that the effect will be stronger for older persons at the early stage of experience.
H8	The effect of effort expectancy on behavioral intention to use an online desktop will be moderated by (a) gender, (b) age and (c) experience, such that the effect will be stronger for women, particularly for younger women, and particularly at early stages of experience.
H9	The influence of facilitating conditions on the usage of an online desktop will be moderated by (a) age and (b) experience, such that the effect will be stronger for older users, particularly in the early stages of experience.
H10	UTAUT will account for a significant percent of the variance (adjusted R2) in usage intention to use to an online desktop.

Table 3 Hypotheses

Although voluntariness of use is incorporated in the UTAUT as a moderator, it is not applicable for this analysis. Since the target population consists of consumers, the use of the online desktop service is entirely voluntary.

CHAPTER 4. RESEARCH METHODOLOGY

4.1. Introduction

This chapter describes the research methods as they relate to the population, sample, survey instrument, survey procedure, and data analysis.

4.2. Population and Sample

For the purposes of this study, the population is confined to users of the CosmoPOD web service. CosmoPOD is a provider of online desktops and online applications targeted toward the consumer market. The CosmoPOD user base was chosen as the population for several reasons:

- Firstly, the online desktop is a relatively new concept. The CosmoPOD user base consists of users who have had some exposure to an online desktop service.
- Secondly, as CosmoPOD uses terminal services technology to provide its services, it offers a desktop and set of applications that are equivalent in appearance, feature-set and usage to their offline counterparts. Thus, the study participants are less inclined to favour traditional offline applications due to the immaturity of applications designed for online use.
- Thirdly, CosmoPOD's consumer base is in alignment with the target population of this study. The CosmoPOD service is targeted toward business travellers, office workers, contractors and students alike. The

service is marketed directly to these consumers on the Internet. No specific focus is applied to individuals of a specific gender, race group or location.

The sample was chosen from the population using the simple random survey sampling technique. As the sample was selected by chance, the likelihood of choosing individuals with characteristics similar to the population as a whole is significant. As part of the random sampling process, each member of the population was assigned a unique number. Individuals from the population were selected using random numbers generated by the Random.org service (http://www.random.org). In this way, each member of the population had an equal and known chance of being selected. In addition, each combination of the members of the population had an equal chance of composing the sample (Welman and Kruger, 2001).

According to Burns and Bush (1998), the size of a sample has a direct influence over the accuracy of research findings. Garrity (2000) suggests that sample sizes smaller than 30 are generally regarded as not statistically significant. For partial least squares (PLS) multivariate regression analysis, the statistical method of the analysis chosen in this study, Barclay et al. (1995) suggest a minimum sample size of ten times the number of predicators to give sufficient power to detect the relationships between the variables in the study. Goodhue, Lewis and Thompson (2006) later showed that the “10 times rule of thumb” rule was only applicable for large (0.80) effect sizes. Since, the effect size is unknown, the recommendation from Barclay et al. (1995) will be used.

Category	Value
Population size (N)	18000
Level of confidence required	95%
Margin of error required	+-5%
Minimum sample size required (n)	190*
* Calculated using the "ten times rules of thumb" (Goodhue D., Lewis W. and Thompson R.,2006) (n = 19 indicators x 10 = 190)	

Table 4 Population Parameters

4.3. Survey Instrument

The survey instrument consisted of the self-administered online questionnaire presented in Appendix A. The questionnaire was adapted from the Venkatesh et al. (2003) study. In accordance with the UTAUT model, it contains items that are designed to measure the four determinants and (independent variables) and behavioural intention to use an online desktop (dependent variable). The items were formulated based on previously conducted tests of the UTAUT model.

In line with the Venkatesh et al. (2003) study most of the items in the questionnaire were measured with seven point Likert scales. Responses to these items ranged from "Strongly Disagree" to "Strongly Agree". The age moderator was coded as a continuous variable, while gender and experience moderators were represented as binary dummy variables. The usage indicator was specified in terms of the number of hours spent per month using an online desktop service. In the interests of clarity, all survey items that served as

indicators in the UTAUT model were assigned an abbreviated indicator name (see Appendix A).

4.4. Survey Procedure

Randomly selected members of the population were sent an email message containing a brief description of the study and a link to a website hosting the actual questionnaire. The survey participants submitted their responses to Survey Monkey web site (http://www.surveymonkey.com) using a web browser. They also received strict assurances that their identity would remain confidential. Once the target number of responses had been received, the data was retrieved from the Survey Monkey website in Comma Separated Value (CSV) file format. The data was then imported into the SmartPLS (Hansmann and Ringle 2004) software package for analysis. SmartPLS is a software application designed for (graphical) path modelling and analysis, developed by the Institute of Operations Management and Organizations at the University of Hamburg (Germany).

4.5. Data Analysis and Interpretation

This study uses partial least squares (PLS) regression to analyse the survey results. PLS was developed in the late seventies by Herman O.A. Wold (Wold 1975). It is a covariance-based structural equation modelling (SEM) technique, widely used to model the relationships between multiple independent and dependent variables in technology acceptance studies (Compeau and Higgins, 1995; Venkatesh et al. 2003). Unlike traditional regression techniques, PLS is

capable of not only of assessing the causation among a set of dependent and independent variables (structural model) but also the validity and reliability of latent variables (measurement model). It is particularly useful for analysing models and theory building due to its minimal demands on measurement scales, sample size and residual distributions (Chin, 1998; Wold, 1985).

The research model used in this study was constructed and analysed using the SmartPLS (Hansmann and Ringle, 2004) path modelling software package (see Figure 9 below). The software allows one to graphically depict a PLS model and perform comprehensive statistical analysis.

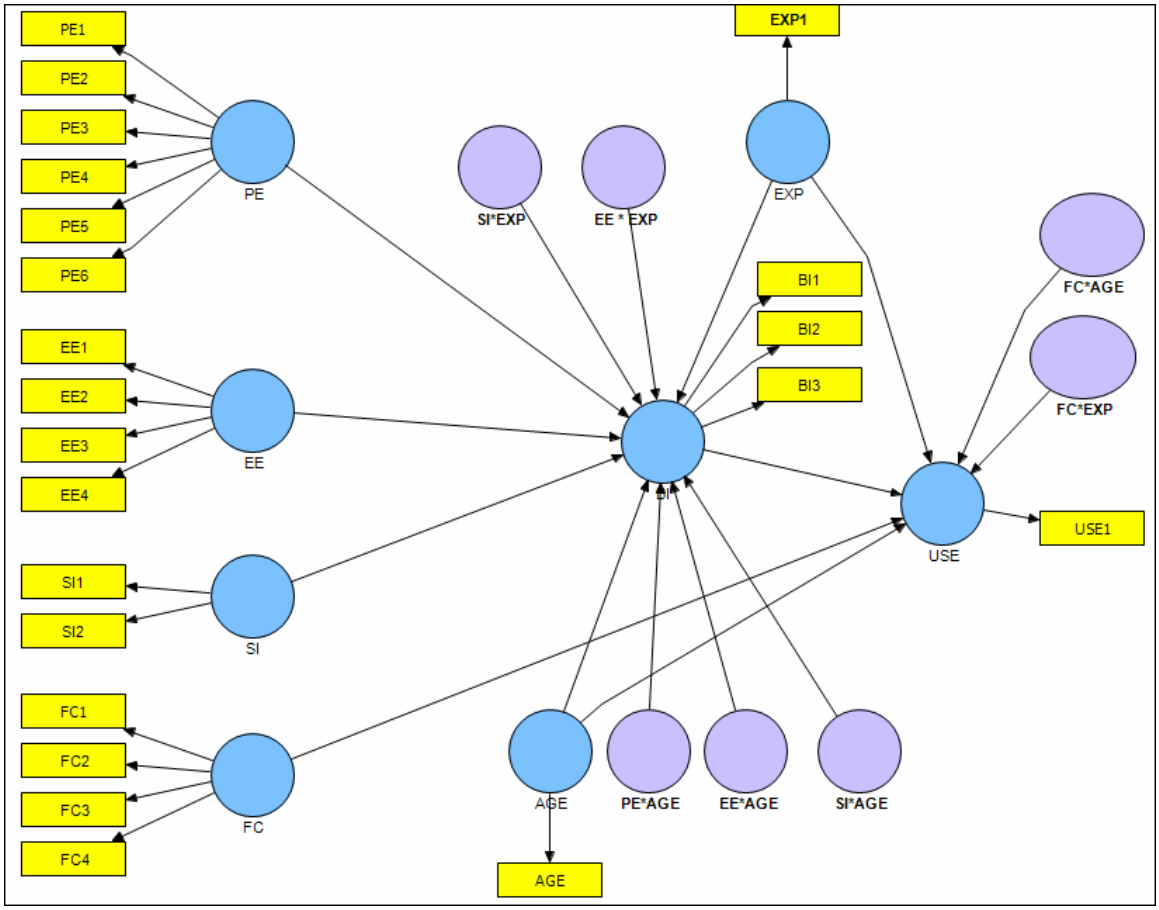


Figure 9 The UTAUT Model As Depicted in SmartPLS

The statistical output of the PLS regression was analysed according to Hulland's (1999) recommendations. Following the procedure, a research model analysed using PLS regression should be conducted in two stages: (1) evaluation of the measurement model (2) evaluation of the structural model. In the first stage, each of the measures in the model needs to be tested for validity and reliability. In the second stage, the structural model is assessed by estimating the paths between the constructs in the UTAUT model, determining their significance and evaluating the predictive strength of the model.

4.5.1. The Measurement Model

An evaluation of the measurement model is performed in order to determine whether the questionnaire responses actually measure their corresponding latent variables. Hulland (1999) recommends considering (1) the reliability of individual survey items (2) the convergent validities of measures associated with individual constructs (3) the discriminant validity between constructs.

Reliability refers to the accuracy and precision of a measurement procedure (Thorndike, Cunningham, Thorndike and Hagen, 1991). The reliability of survey items is determined by examining their loadings (or simple correlations) with respect to their latent constructs. Factor loadings provide information about the extent to which the survey items are able to measure their corresponding latent variables. Items with high loadings share a large amount of the variance with their associated constructs. (Fornel and Larcker, 1981) suggest that an item can be considered reliable if it has a factor of loading of greater than 0.70.

Where multiple measures are taken for a single construct, they should be tested for convergent validity. Meaning, the survey items should be at least moderately correlated among themselves. Hulland (1999) suggests that convergent validity should be measured using Fornell and Larcker's (1981) measure of internal consistency rather than Chronbach's alpha. Fornell and Larcker's (1981) Composite Reliability (CR) measure is deemed superior as it uses "the item loadings obtained within the nomological network" (Hulland, 1999, p. 199). They recommend that CR must exceed 0.70.

As a further criterion for convergent validity, Barclay, Thompson and Higgins (1995) recommend the use of Average Variance Extracted (AVE). It refers to the average variance shared between a construct and its measures. It is suggested that all constructs should have an AVE of greater than 0.50 to warrant their inclusion in the model.

Hulland (1999, p. 199) defines discriminant validity as "the extent to which measures of a given construct differ from the measures of other constructs in the same model". Thus, all constructs should be more correlated with their own measures than with other constructs. To test for discriminant validity, Fornell and Larcker (1981) recommend that the square root of a construct's AVE should be greater than the correlations of the other constructs in the model (Hulland, 1999). Furthermore, Chin (1998) suggests analysing the cross-loadings to ensure that all measures show higher loadings with respect to their construct than with any other construct.

Convergent Validity Tests	Discriminant Validity Tests
√ Indicator loadings > 0.70 √ Composite Reliability (CR) > 0.70 √ Average Variance Extracted (AVE) > 0.50	√ AVE > square of inter-construct correlations √ No substantial cross-loadings

Figure 10 PLS Measurement Model Validity Tests

4.5.2. The Structural Model

In PLS analysis, the structural model is assessed by examining the path coefficients (standardized regression coefficients). According to Pedhazur (1997), the cut-off lower limit for a regression coefficient should be set at 0.05; however, values above 0.10 are preferable. To determine the significance of the path coefficients, t-statistics are generated. In PLS regression analysis, it is common practice to use the Bootstrap re-sampling technique (Efron, Gong, 1983) The means of the coefficients in the bootstrap sample are compared with original sample means using a one-tailed T-test. The critical T-statistic for a one tailed test at significant level of 5% and 198 degrees of freedom (the number of bootstrap runs) is 1.64. Any hypothesis will be rejected if its associated T-statistic is less than 1.64. Lastly, the squared multiple correlations (R^2) for the dependent latent variables are calculated to evaluate the predictive strength of the model.

4.6. Limitations of the Study

The limitations of the study are as follows:

- The sample consists of CosmoPOD users only. Thus, the responses to the items in the survey instrument may reflect opinions of the users toward the CosmoPOD service specifically. In other words, the study may not be generaliseable to all online desktop systems.
- The sample is not representative of the consumer population as a whole since it comprises of early adopters and individuals with previous exposure to an online desktop service.
- The online desktop is an early stage technology. Therefore, the true merits of the technology may be not yet be apparent.

CHAPTER 5. RESEARCH RESULTS

5.1. Introduction

This chapter presents the results of the study. It reveals the biographical profile of survey respondents and provides aggregate information about the survey responses. Thereafter, the results of the UTAUT regression analysis are supplied, in terms of both measurement and structural models.

5.2. Sample Size

Of the 19,684 emails that were sent to the population, 1561 were undeliverable due to invalid email addresses. Within a 48 hour period, a total of 209 responses were collected. Of these, 11 responses had to be discarded due to invalid data entries. Thus, the sample comprised of a total of 198 individuals.

5.3. Biographical Information

A significant proportion (97%) of the sample comprised of male respondents, while only 3% consisted of females (see Figure 11). Considering the skewness of this distribution, it was decided not to examine moderating influence of age on any of the determinants of behavioural intention and use.

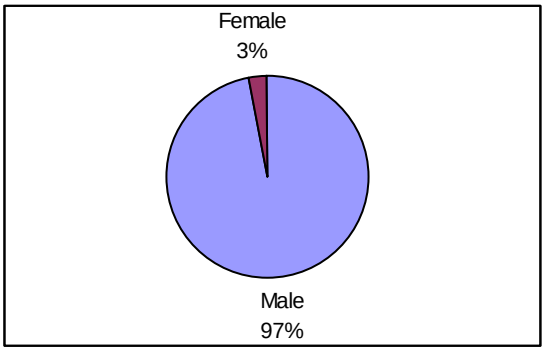


Figure 11 Gender Representation

As Figure 12 shows, most of the participants (42%) were between the age of 20 and 29. The average age was 32 years, while the standard deviation of the age distribution was 14.

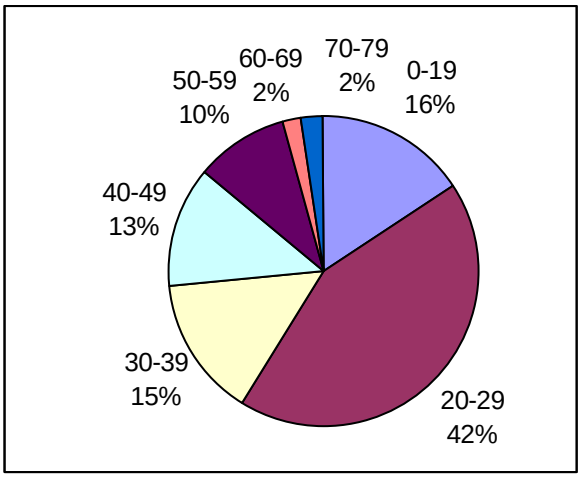


Figure 12 Age Representation

The majority of individuals (37%) were students, while not surprisingly, a significant number (30%) worked in technical, scientific and engineering fields (see Figure 13 below).

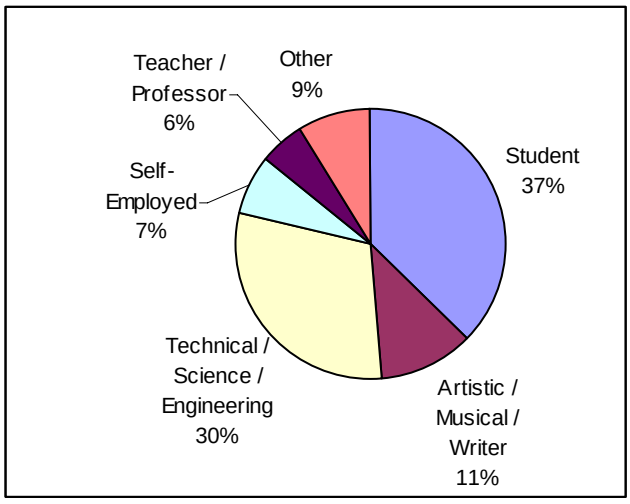


Figure 13 Occupation Representation

Consistent with the age and occupation distributions, most individuals had a high school (23%) level of education, or had attended some university or college (23%).

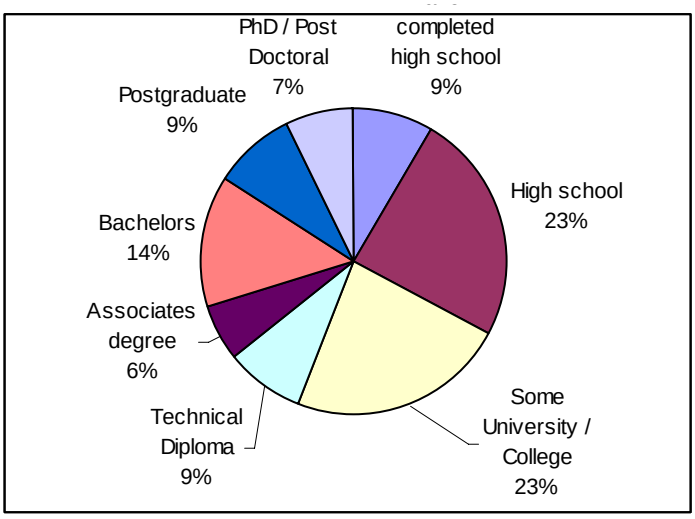


Figure 14 Education Representation

There was a fairly even split between those individuals that regarded themselves as experienced at using an online desktop and those that did not. Much of the user base consisted of users that had experimented briefly with the CosmoPOD online desktop service, but had decided not to use it on

regular basis.

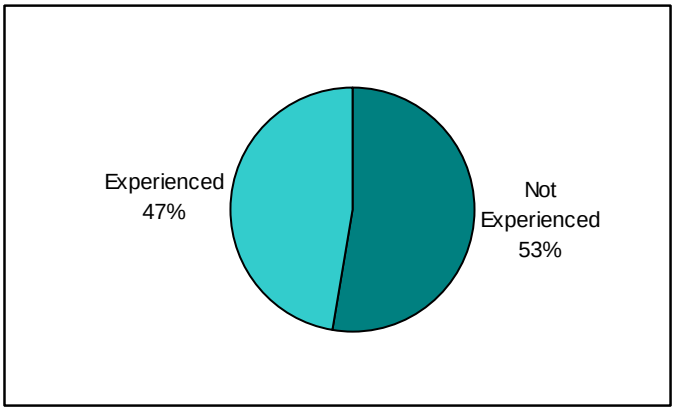


Figure 15 Prior Experience

5.4. Survey Responses

111 *Behavioural Intention*

The mean response to behavioural intention related questions was “somewhat agree”, indicating that the survey participants had a moderate inclination to use an online desktop service within a twelve month period.

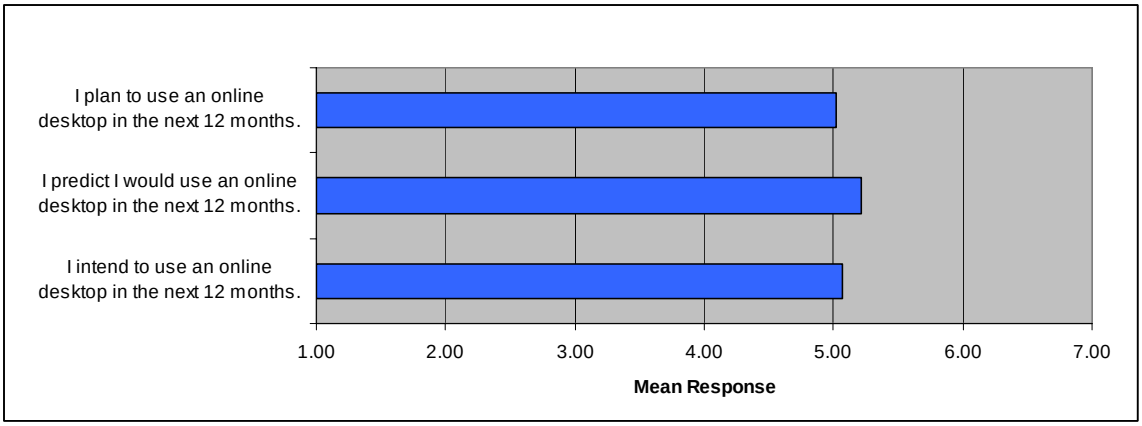


Figure 16 Mean Responses to Behavioural Intention Questions

211 *Performance Expectancy*

The survey participants generally felt that the online desktop was useful and

that it would give them enhanced mobility. However, they believed that the use of an online desktop would not significantly increase their productivity. They tended not to see it as a tool that would help them save more time or simplify lives further.

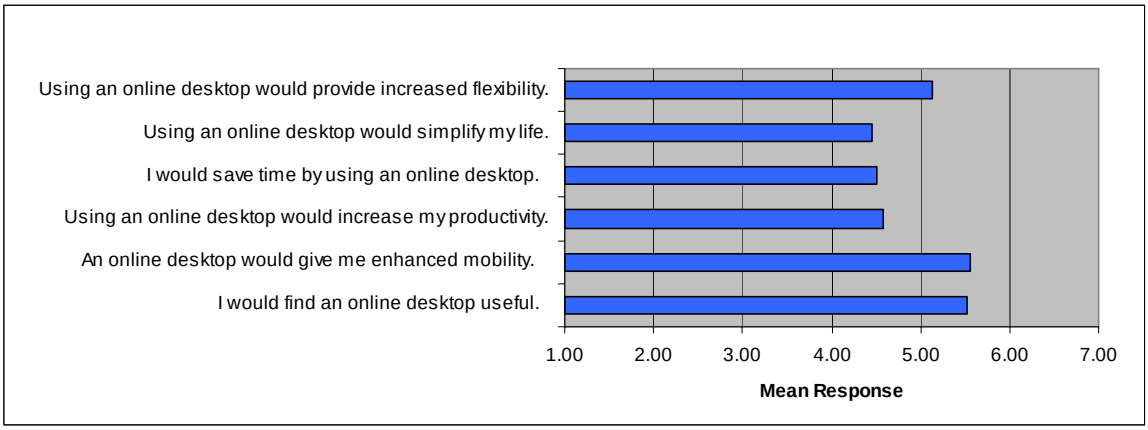


Figure 17 Mean Responses to Performance Expectancy Questions

311 *Effort Expectancy*

Most people felt that it would be easy for them to become skilful at using an online desktop, however they were slightly less optimistic about whether they would find online desktops' easy-to-use in the first place.

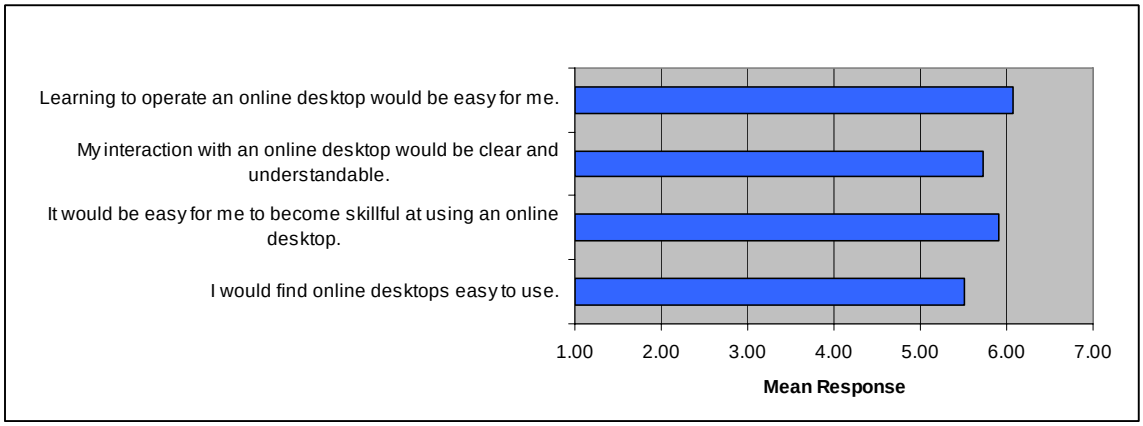
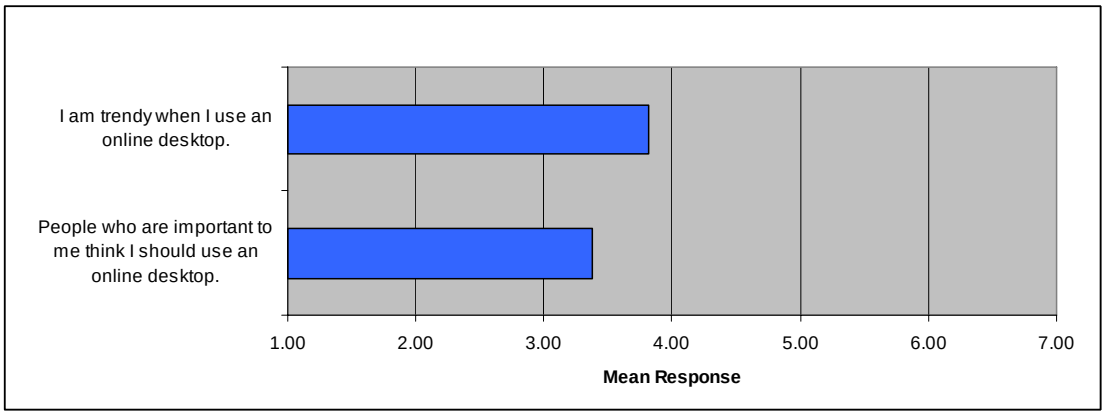


Figure 18 Mean Responses to Effort Expectancy Questions

411 *Social Influences*

As the Figure 19 below indicates, there are no significant social pressures to use an online desktop, nor is it particularly trendy to one use.



Fig

Figure 19 Mean Responses to Social Influence Questions

511 *Facilitating Conditions*

Figure 20 below refers to survey items related to facilitating conditions. Connectivity to the Internet is a prerequisite for online desktop usage. The survey participants were in moderate agreement that they had access to the Internet at any time. Interestingly, people generally felt that they had the knowledge to use an online desktop, however, were less optimistic about whether help would be available if they needed it. In addition, they generally felt that the costs associated with using an online desktop service somewhat restrained their usage.

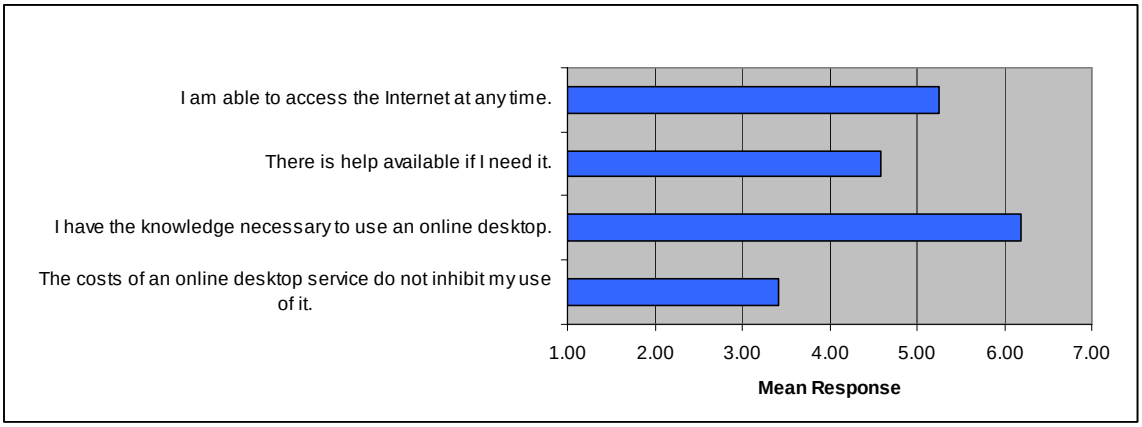


Figure 20 Mean Responses to Facilitating Conditions Questions

611 *Usage*

Figure 21 below illustrates that the vast majority of survey participants do not currently use an online desktop service. However, around 20% of the individuals surveyed to do currently utilize an online desktop service. The sample spent an average of 27 hours per month using an online desktop.

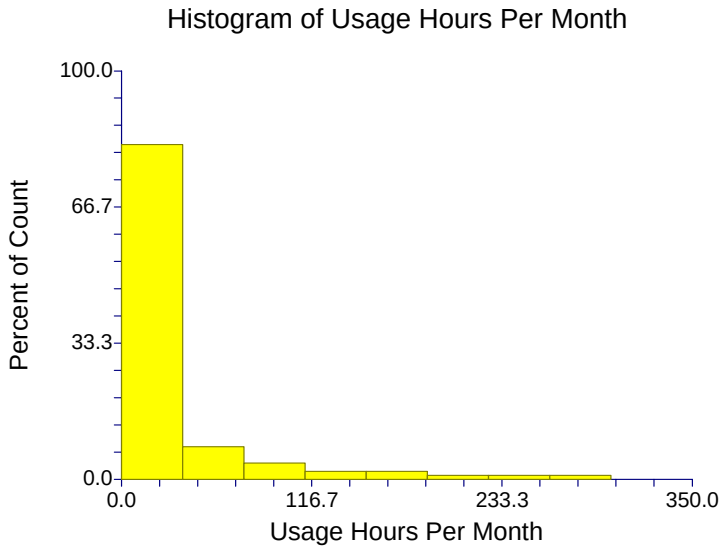


Figure 21 Reported Online Desktop Usage (Hours Per Month)

711 *Additional Factors*

The responses in Figure 22 measure consumer's anxiety towards use of an online desktop. They are included for informational purposes only.

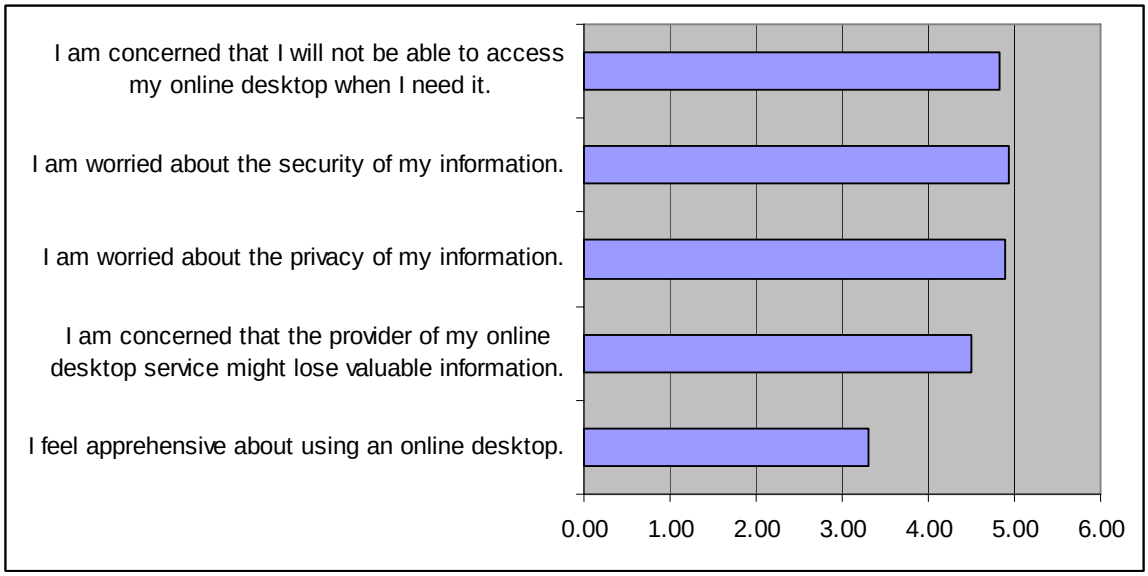


Figure 22 Mean Responses to Anxiety Questions
Figure 23 Anxiety Responses

5.5. Measurement Model

The outer loadings of the indicators with respect to their constructs are given in Appendix B. All factor loadings are above the recommended 0.70, with the exception of those listed in Table 5 below. These items do not adequately explain their associated constructs and must be considered unreliable for the purposes of the analysis.

Indicator	Construct	Loading
FC2	FC	0.06
FC3	BI-FC*EXP	0.45
FC4	BI-FC*EXP	0.55

Table 5 Outer Loadings

The reliability statistics are shown in Table 6 below. The majority of constructs

test positive for convergent validity, however facilitating conditions fails the test as it has a composite reliability of less than 0.70. Furthermore, its AVE is below the recommended 0.50, suggesting that the construct's scale items are not, at a minimum, moderately correlated with each other.

	AVE	sqrt(AVE)	Composite Reliability	Cronbachs Alpha
BI	0.95	0.98	0.98	0.98
EE	0.82	0.90	0.95	0.93
EE * EXP	0.93	0.96	0.98	0.97
EE*AGE	0.91	0.96	0.98	0.97
FC	0.32	0.56	**0.58**	0.52
FC*AGE	0.73	0.86	0.92	0.91
FC*EXP	0.63	0.79	0.87	0.82
PE	0.76	0.87	0.95	0.94
PE*AGE	0.84	0.92	0.97	0.96
SI	0.81	0.90	0.89	0.77
SI*AGE	0.82	0.91	0.90	0.80
SI*EXP	0.84	0.92	0.91	0.82
USE	1.00	1.00	1.00	1.00

Table 6 Reliability and Validity Metrics

The table in Appendix C shows that all constructs, with the exception of the age moderator on facilitating conditions, test positive for discriminant validity. The square root of each construct's AVE is greater than the correlations with other constructs in the model. The age moderator for facilitating conditions does not test positive for discriminant validity as the square root of its AVE is below the correlation coefficient associated with facilitating conditions. From the cross loadings given in Appendix D, it can be seen that the indicators FC1 and FC1*EXP1 are more closely correlated with other constructs than their own construct. In particular, FC1 appears to be highly correlated with the effort expectancy construct. Thus, these measures fail the cross correlation test for discriminant validity.

Table 7 below lists all the indicators and constructs that failed to pass the reliability and validity criteria. The model was tested using different combinations indicators for facilitating conditions, but it did not improve the reliability of the construct. To proceed with the evaluation of the structural model, it is necessary to eliminate facilitating conditions from the model.

Type	Indicator / Construct	Reason	Hypothesis Affected
Indicator	FC2	Reliability	H4,H9
Indicator	FC3	Reliability	H4,H9
Indicator	FC4	Reliability	H4,H9
Construct	FC	Convergent validity	H4,H9
Indicator	FC*AGE	Discriminant validity	H9
Construct	FC1	Discriminant validity	H4,H9
Construct	FC1*EXP1	Discriminant validity	H9

Table 7 All Indicators / Constructs That Failed Reliability and Validity Tests

5.6. Structural Model

The mean correlation coefficients, p-values and t-values associated with each relationship in the model are described in Table 8 below. According to the results, performance expectancy and social influence moderated by experience have a statistically significant influence over behavioural intention, while effort expectancy had no such effects. Appendix D shows that the cross correlation between social influence and the experience moderator is negative (R = -0.17). This supports the hypothesis that people in the early stages of experience will have a stronger effect on social influence. Finally, the results show that behavioural intention has a statistically significant impact on usage.

Casual Relationship	Original Sample Mean	Sample Mean	Standard Deviation	Standard Error	T Statistic	P Value
BI -> USE	0.12	0.13	0.07	0.071	1.76	0.04
EE -> BI	0.17	0.16	0.14	0.14	1.22	0.04
EE*EXP -> BI	-0.10	-0.07	0.25	0.25	0.38	0.44
EE*AGE-> BI	0.00	-0.00	0.07	0.07	0.10	0.46
PE -> BI	0.43	0.44	0.06	0.06	6.95	<.0.001
PE*AGE->BI	0.07	0.06	0.08	0.08	0.91	0.18
SI ->BI	-0.14	-0.07	0.15	0.15	0.92	0.18
SI*AGE -> BI	0.00	0.02	0.07	0.07	0.10	0.46
SI*EXP -> BI	0.37	0.28	0.19	0.19	1.93	0.03

Table 8 Bootstrap Statistical Output

Table 9 below shows that the total adjusted R^2 for behavioural intention was 0.57. Thus, the model was able to explain 57% of the variance in behavioural intention. However, since the squared correlation (R^2) between behavioural intention and usage was 0.04, the model accounted for negligible variance in actual usage.

The large amount of variance in behavioural intention explained by the model was attributed to the influence of performance expectancy (R^2 = 0.46) and social influences (R^2 = 0.21). The influence of facilitating conditions could not be confirmed due to quality concerns, while the impact of effort expectancy on behavioural intention could not be accepted at a 95% confidence interval. The effect of social influence on behavioural intention was only valid when moderated by age.

Interestingly, although the anxiety construct was not formally included in the analysis, in agreement in with the UTAUT study, it was found to have no

impact on behavioural intention (see Table 9).

Relationship	Path Coefficient	Correlation (R)	R^2
BI -> USE	0.13	0.21	0.04
EE -> BI	0.17	0.33	0.11
EE * EXP -> BI	-0.10	-0.26	0.07
EE*AGE -> BI	0.01	0.13	0.02
PE -> BI	0.43	0.67	0.45
PE*AGE -> BI	0.07	0.08	0.01
SI -> BI	-0.14	0.46	0.21
SI*AGE -> BI	0.01	0.08	0.01
SI*EXP -> BI	0.37	0.10	0.01
AX -> BI	0.02	0.00	0.00
BI			0.57
USE			0.07

Table 9 Squared Correlations of Constructs and Relationships

Table 10 below summarizes the findings of the UTAUT model as applied to consumer acceptance of the online desktop.

No.	Hypothesis	Result	Reasoning
H1	PE will have a significant positive influence on BI	**Accepted**	$p < 0.05$, T-statistic > 1.64
H2	EE will have a significant positive influence on BI	Rejected	T-statistic < 1.64
H3	SI will have a significant positive influence on BI	Rejected	$p > 0.05$, T-statistic < 1.64
H4	FC will have a significant positive influence on USE.	Not Determined	Reliability and Validity
H5	BI to use an online desktop will have a significant positive influence on USE.	**Accepted**	$p < 0.05$, T-statistic > 1.64
H6	The influence of PE on BI will be moderated by (a) GENDER and (b) AGE, such that the effect will be stronger for men and particularly for younger men.	a) Not Determined b) Rejected	a) Too few females represented b) $p < 0.05$, T-statistic > 1.64
H7	The influence of SI on BI will be moderated by (a) AGE and (b) EXP, such that the effect will be stronger for older persons at the early stage of experience.	a) Rejected b) **Accepted**	a) $p > 0.05$, T-statistic < 1.64 b) $p > 0.05$, T-statistic < 1.64 (negative correlation between EXP and SI)
H8	The effect of EE on BI will be moderated by (a) GENDER, (b) AGE and (c) EXP, such that the effect will be stronger for women, particularly for younger women, and particularly at early stages of experience.	a) Not Determined b) Rejected c) Rejected	a) Too few females represented b) $p > 0.05$, T-statistic < 1.64 c) $p > 0.05$, T-statistic < 1.64
H9	The influence of FC on the usage of an online desktop will be moderated by (a) AGE and (b) EXPERIENCE such that the effect will be stronger for older users, particularly in the early stages of experience.	a) Not Determined b) Not Determined	H4 Not Determined (Reliability and Validity)
H10	UTAUT will account for a significant percent of the variance (adjusted R^2) in usage intention to use to an online desktop.	**a) Accepted**	52% variance explained by the model.

Table 10 UTAUT Model Findings

CHAPTER 6. DISCUSSION OF RESEARCH RESULTS

The primary aim of this study was to validate the UTAUT model in the context of consumer acceptance of the online desktop. The secondary objective was to explore the factors that influence the adoption of the online desktop. This chapter provides a descriptive analysis of the research results with these research objectives in mind.

6.1. Discussion of Research Question 1

Question 1. Is the UTAUT model valid when applied to consumer adoption of the online desktop?

The variance explained by the UTAUT research model was below the 70 percent recorded in the Venkatesh et al. (2003) study and yet was well above 40 percent commonly expressed in studies employing the TAM (David, 1989; Taylor and Todd, 1995). The reduced variance of 57 percent in usage attention may have been attributed to the omission of the facilitating conditions construct from the model.

The results concluded that there was no significant impact of effort expectancy on behavioural intention, even when moderated by age and experience (see Table 10). Venkatesh et al. (2003, p.450) states that “effort-oriented constructs are expected to be more salient in the early stage of a new behaviour”. The results pertaining to the effort expectancy construct could indicate that the use

of an online desktop does not necessarily constitute a new behaviour, since an online desktop is used in similar manner to a traditional desktop. It could also reflect the fact that the sample comprised of early adopters, 30 percent of whom worked in technical, scientific and engineering fields (see Table 9). Most individuals in the sample indicated that it would be easy for them to become skilful at using an online desktop. The effort expectancy construct may not have exerted an influence over behavioural intention, due to an overall lack of variability in its item responses.

The impact of social influence on behavioural intention was significant only when the relationship was moderated by the experience moderator. Those who did not regard themselves as experienced online desktop users were more likely to consider the impressions of others in their decision making. However, the variance explained by social influence when moderated by experience was only one percent of behavioural intention (see Table 9). A possible explanation for this is that early adopters are among the first to adopt new technologies, and therefore they tend to have fewer relevant others to influence their decision making. Another explanation is that the use of an online desktop is entirely voluntary. Venkatesh et al. (2003) states people's reliance on the opinions of others tends to be significant only in mandatory settings.

The impact of performance expectancy on behavioural intention was by far the most significant result of the study. Performance expectancy was conclusively found to explain 45 percent of the variance in usage intention (see Table 9). This result was consistent with the findings in the UTAUT article, wherein it

was stated “the performance expectancy construct… is the strongest predictor of intention and remains significant at all points of measurement in both voluntary and mandatory settings” (Venkatesh et al., 2003, p. 447). However, the results rejected the notion that performance expectancy should be moderated by age because “younger people tend to place more importance on extrinsic rewards” (Venkatesh et al., 2003, p. 450).

The relationship between behavioural intention and usage was found to be statistically significant. However, behavioural intention only explained 7 percent of the variance in usage (see Table 9). This result points to a limitation of the research method. Instead of using actual usage data, the survey participants reported their usage in the survey instrument. Figure 21 illustrates that around 80 percent of the individuals surveyed reported that they typically spent less than 20 hours using an online desktop service each month. Around thirty five percent of the survey respondents reported zero hours. Considering the online desktop is an early stage technology, the majority of individuals in the sample had used it only on an experimental basis. As a result, the survey participants found it difficult to estimate the extent to which they typically used an online desktop service. To provide conclusive evidence of a weak relationship between behavioural intention and usage, it would be necessary to rerun the regression analysis using actual usage data.

The facilitating conditions construct was omitted from the study due to quality and validity concerns. In the Venkatesh et al. (2003) paper, it was mentioned that the facilitating conditions relating to support infrastructure could potentially

be captured by the effort expectancy construct. This effect was observed in the research results. The measurement item FC2 was designed to test whether the respondent had the knowledge necessary to use an online desktop. As shown in Appendix D, this measure was highly correlated with the effort expectancy construct, leading to discriminant and convergent validity problems.

The findings indicate that the UTAUT model is somewhat suitable as a tool for analysing the propensity of consumers to adopt the online desktop. While the model did explain 57 percent of the variance in usage intention, a single construct, performance expectancy, was accountable for a significantly high proportion of the explanatory power of the model.

6.2. Discussion of Research Question 2

Question 2. Are consumers likely to adopt the online desktop?

In the analysis, the performance expectancy construct had the highest bearing on behavioural intention to use an online desktop. Thus, the degree to which consumers feel that the online desktop will benefit them is the overriding factor that determines whether they are likely to adopt it.

In Figure 17, it is evident that most users felt that they would find an online desktop somewhat useful, although they were not in strong agreement over this. It is likely that the perceived usefulness of an online desktop is diminished, due to the fact that consumers are already benefiting from the capabilities of a

traditional desktop.

The question on whether an online desktop would provide enhanced mobility had a similar mean response to the question on its perceived usefulness. This finding suggests that enhanced mobility is one of the main perceived benefits of using an online desktop. An online desktop provides enhanced mobility in that users are able to use “borrowed” equipment while they travel, and still connect to a familiar desktop environment. For example, many people are not comfortable installing, or are not allowed to install, personal applications on their work computers. So they use online desktops to access applications such personal email and calendars.

The mean response to the question on whether an online desktop would provide increased flexibility was slightly lower than the mean response on mobility, although it was still in the “somewhat agree” range. Increased flexibility is provided by decoupling the device from the desktop, enabling users to use a common desktop environment on any number of devices.

Figure 17 shows that the individuals in the sample were indifferent about whether an online desktop would increase their productivity or save them time. This may not reflect the long term potential of the online desktop since it is still in a developmental stage of its evolution, however, the response may point to a perception among users that an online desktop does not provide any significant added capability other than increased mobility and flexibility.

The mean responses to the questions on effort expectancy tended toward the "agree" range (see Figure 17). This result indicates that early adopters do not perceive an online desktop as being particularly difficult to use. The result is not particularly surprising since online desktops tend to emulate their offline counterparts. Furthermore, as the sample consisted of early adopters, it is likely that the mean responses to the effort expectancy questions are overstated in relation to the broader population of consumers on the Internet. As online desktop platforms mature and begin attract mainstream consumers, the ease-of-use factor is likely to exert more of an influence on behavioural intention.

Figure 19 shows that the survey participants expressed indifference about whether they considered using an online desktop was trendy. As category of product, the online desktop is too immature a technology for it to have broader societal social influences associated with it. The survey participants responded negatively to the question of whether other people felt it was important they should use an online desktop. This negative response most likely relates to the fact the technology is not widespread. The impact of social influence on behavioural intention may become more pronounced as the technology proliferates into the broader market.

Although the facilitating conditions construct was excluded from the analysis due to quality, validity and reliability concerns, it is interesting to consider the responses summarized in Figure 20. Consistent access to the Internet is a requirement of online desktop usage. The survey respondents were in partial

agreement that they had access the Internet at any time. This tempered response suggests that it may be a while before traditional desktops can be substituted for their online counterparts.

As illustrated in Figure 20, most participants agreed that they had the necessary knowledge to use an online desktop. This observation was consistent with the findings on effort expectancy. The sample also indicated that the costs associated with online desktop use were somewhat prohibitive. Since the sample consisted of CosmoPOD users, it is likely that many of survey participants were referring to the high cost of a CosmoPOD premium account, specifically. At present, all other online desktop providers offer their service to free to consumers.

Venkatesh et. al. (2003) did not incorporate the anxiety construct in the UTAUT model as it was found to have no impact on behavioural intention. However, for informational purposes, the mean responses to anxiety related questions are presented in Figure 22. Most individuals expressed moderate concern over the security and privacy of their information. It must be noted that these responses have no bearing on the intention of users to use an online desktop. The R^2 values pertaining to the relationship are presented in Table 9 are a testament to this.

This section has so far examined the various factors that influence the adoption of the online desktop. From this analysis, it is evident that the solution offers consumers increased flexibility and mobility. However, overall it is of

moderate usefulness to the consumer. These drivers may not be powerful enough to provoke mass adoption in the medium term.

CHAPTER 7. CONCLUSION

7.1. Introduction

This chapter synthesizes the findings of the research. It contains both observations and reflections on the results of the study and provides recommendations for future research.

7.2. The Validity of the UTAUT Model

A key objective of the study was to validate the UTAUT model in the context of consumer adoption of the online desktop. The model explained 57 percent of the variance in consumer intention to use an online desktop. This was below the 70 percent of variance reported in the Venkatesh et al. (2003) paper, but yet was well above 40 percent commonly expressed in studies employing the TAM (Davis, 1989; Taylor and Todd, 1995). The key findings of the UTAUT analysis are listed below:

- *Performance Expectancy*. Its influence on behavioural intention was conclusive and was found to explain a significant proportion of the variance (45 percent) in behavioural intention.
- *Social Influence*. Its impact on behavioural intention was significant only when the relationship was moderated by the experience moderator. Even then, it explained only 1 percent of usage intention.
- *Effort Expectancy*. Its influence on behavioural intention was found to be insignificant, even when moderated by age or experience.

- *Age*. It failed make any significant contributions to any of the relationships it moderated.
- *Experience*. It contributed to the influence of social influence on behavioural intention, however did not contribute to effort expectancy's relationship with behavioural intention.
- *Behavioural Intention.* Its impact on usage was statistically significant; however, it only explained 7 percent of the variance in usage.

The following constructs were not included in the UTAUT analysis:

- *Voluntariness of use*. It was omitted due to the fact that consumer use of an online desktop is entirely voluntary.
- *Facilitating Conditions*. It was omitted from the study as its measurement items were found to be invalid and unreliable.
- *Gender*. It was omitted because there were too few females represented in the sample to make the analysis meaningful.

The following insights were drawn from the UTAUT analysis:

- In studies that examine early stage technologies, the effect of social influences on behavioural intention may be diminished due to the fact there are fewer peers available to influence behaviour.
- If the sample comprises of early adopters, the impact of effort expectancy may be reduced as early adopters typically have a higher level of competency in learning and absorbing new technologies.
- There may be significant overlap between indicators of facilitating conditions and those of the effort expectancy construct.

- When verifying the impact of behavioural intention on usage, it is essential to obtain real usage data. This is particularly true when examining early stage technologies, since the difficulty of estimation is compounded.

7.3. Consumer Adoption of the Online Desktop

A secondary goal of the study was to assess whether consumers are likely to adopt the online desktop. The approach taken in the analysis was to examine the factors that influence its adoption. The following conclusions were drawn:

- The online desktop is of moderately useful to consumers since there is significant overlap in functionality with a traditional desktop.
- Consumers perceive the main benefits of using an online desktop are increased flexibility and mobility.
- Consumers do not expect to obtain productivity gains from using an online desktop.
- Consumers generally find online desktop's easy to use as they emulate traditional desktops.
- Consumers are moderately concerned about the security and privacy of their information. However, this is not a barrier to adoption as anxiety related factors are not a determinant of behavioural intention.

7.4. Recommendations for Future Research

The UTUAT model was found be to somewhat applicable to the research

context. However, many of the constructs in the model made little contribution to the variance explained. This would seem to suggest that further study is necessary to ascertain whether these constructs are applicable when examining consumer propensity to adopt an early stage technology. In this context, would be interesting to assess whether the UTAUT model offers any substantial benefit over traditional acceptance models such as TAM. In general, technology acceptance researchers are advised to consider the applicability of their models in different stages of the technology life cycle.

CHAPTER 8. REFERENCES

Agarwal, R and J. Prasad (1997) The role of innovation characteristics and perceived voluntariness in the acceptance information technologies. *Decision Sciences*, 28 (3), 557-582.

Agarwal, R., Sambamurthy, V. and Stair, R.M. (2000) The Evolving Relationship Between General and Specific Computer Self-Efficacy - An Empirical Assessment. *Information Systems Research*, 11(4), 418-430.

Ajzen I. (1988) *Attitudes, Personality, and Behaviour*. Buckingham: Open University Press.

Ajzen, I. (1991) The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211.

Ajzen, I. and Madden, T. J. (1986) Prediction of goal-directed behavior: Attitudes, intentions, and perceived behavioral control. *Journal of Experimental Social Psychology*, 22, 453-474.

Anderson J.E, Schwager P.H. (2005) SME Adoption of Wireless LAN Technology: Applying the UTAUT Model: Proceedings of the 7th Annual Conference of the Southern Association for Information Systems. East Carolina, East Carolina University.

Bandura, A. (1977) *Social Learning Theory*. New York: Prentice-Hall.

Bandura, A. (1986) Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1997) *Self-efficacy: The exercise of control*. New York: W. H. Freeman.

Bandura, A. (1998) Health promotion from the perspective of social cognitive theory. *Psychology and Health*, 13, 623-649.

Barclay, D., Higgins C. and Thompson R. (1995) The Partial Least Squares PLS Approach to Causal Modelling: Personal Computer Adoption and Use as an Illustration. *Technology Studies*, 2 (2), 285-309.

Burns A.C. and Bush R.F. (1998) *Marketing Research*, 3rd ed. New Jersey: Prentice Hall International Inc.

Carlsson C., Carolsson J., Hyvönen K., Puhakainen J. and Walden P. (2006) Adoption of Mobile Devices/Services – Searching for Answers with the UTAUT: Proceedings of the 39th Hawaii International Conference on System Sciences. Åbo Akademi: Institute for Advanced Management Systems Research.

Carlsson, C., Hyvönen, K., Repo, P. and Walden, P. (2005) Asynchronous Adoption Patterns of Mobile Services: Proceedings of the 38th Hawaii

International Conference on System Sciences (HICSS-38). Island of Hawaii.

Chakravorti B. (2003). The Slow Pace of Fast Change: Bringing Innovations to Markets in a Connected World. Harvard Business School Press.

Chan H.C, Jin J., Jin Y. (2004) Instant Messaging Acceptance and Use Among College Students. Singapore: National University of Singapore. Available from: http://www.pacis-net.org/file/2004/S04-003.PDF (accessed 14/6/06).

Charmy B. (2005). Google to acquire YouTube for $1.65 billion in stock. *Dow Jones Market Watch*. Available from: http://www.marketwatch.com/News/Story/Story.aspx?guid=%7B05306ED9-F56E-467C-BBA3-AFD9EB7335F8%7D&siteid=yhoo&dist=yhoo

Chin, W. W. (1998). The Partial Least Squares approach for Structural Equation Modeling. In A. Marcoulides (Ed.), *Modern methods for business research*, p. 295-336. Mahwa, N.J. : Lawrence Erlbaum Associates.

Compeau, D. R. and Higgins, C. A. (1995) Computer Self-Efficacy: Development of a Measure and Initial Test. *MIS Quarterly*, 19 (2), 189-211.

Davis, F. D., Bagozzi, R. P. and Warshaw, P. R. (1989) User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 35, 982-1003.

Davis, F.D., R.P. Bagozzi, and P.R. Warshaw (1992) Extrinsic and Intrinsic Motivation to use Computers in the Workplace. *Journal of Applied Social Psychology*, 22, 1111-1132.

Dillon, A. and M. Morris (1996) User acceptance of information technology: theories and models. In: Williams, M. (ed.) *Annual Review of Information Science and Technology.* New York: Information Today.

Dillon, A. and Morris, M. G. (1996) User acceptance of information technology: Theories and models. Annual Review of Information Science and Technology. *Information Today*. 31, 3-32.

Donahue, (1999) S. Outsourced and Out of Mind. *Business 2.0,* June 1999.

Duncan G. (2006).Google Docs and Spreadsheets Does Writely. Digital Trends News, October 11 2006. Available from: http://news.digitaltrends.com/article11501.html (accessed 14/11/06).

Efron, B. and Gong, G. (1983) A Leisurely Look at the Bootstrap, the Jackknife and Cross-Validation. *The American Statistician*, 37, 36-48.

Fishbein, M. and I. Ajzen (1975) Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research. MA: Addison-Wesley.

Fornell, C. and D.F. Larcker (1981) Evaluating Structural Equation Models with

Unobservable Variables and Measurement Error. *Journal of Marketing Research*, 18, 39–50.

Garrity, (2000) *The Fast Forward MBA in Business Math*. Canada: John Wiley & Sons.

Gefen D., Straub D. and Boudren M. (2000). Structural Equation Modelling and Regression: Guidelines for Research Practice. *Communications of the Association for Information Systems, 4(*7).

Goodhue D., Lewis W. and Thompson R. (2006). PLS, Small Sample Size, and Statistical Power in MIS Research: Proceedings of the 39th International Conference on Systems Sciences. Los Alamitos: IEEE Computer Society Press.

Gould W., Putblado J. (2005) *Guidelines for bootstrap samples*, StataCorp. Available from: http://www.stata.com/support/faqs/stat/reps.html (accessed 14/11/2006).

Hof, R.D. (1998) How the 'PC killer' was humbled: slow machines and cheap rivals undercut network computer. Business Week, April 13.

Hoffman, D. L., and Novak, T. P. (1995). *Marketing In hypermedia computer-mediated environments: Conceptual foundations*. Available from: http://www2000.ogsm.vanderbilt.edu/cmepaper.revision.july11.1995/cmepaper.

html (accessed 14/11/2005).

Hulland J.S. (1999) Use of Partial Least Squares (PLS) in Strategic Management Research: A Review of Four Recent Studies. *Strategic Management Journal*, 20 (February), 195–204.

Igbaria, M., Zinatelli, N., Cragg, P. & Cavaye, A. L. M. (1997). Personal Computing Acceptance Factors in Small Firms: A Structural Equation Modelling. *MIS Quarterly*, 21 (3), 279-305.

Lubrin, E. Lawrence E., Navarro K.F., and Zmijewska A. (2006) Awareness of Wireless Sensor Network Potential in Healthcare Industry: A Second UTAUT Study. *Wireless Sensor Networks*, 538.

Markoff J. (2006) Software Out There. The New York Times, 5th April 2006. Available from: http://www.nytimes.com/2006/04/05/technology/techspecial4/05lego.html?ex=1301889600&en=9394047561fd82ca&ei=5088&partner=rssnyt&emc=rss (accessed 14/11/06).

Markoff J. (2006). After a debugging race, will Vista measure up? The New York Times, October 8, 2006. Available from: http://www.iht.com/articles/2006/10/08/business/vista09.php (accessed 14/11/06).

Mathieson, K. (1991). Predicting user intentions: Comparing the technology acceptance model with the theory of planned behavior. *Information Systems Research*, 2(3), 173-191.

McNeil, J. M. (1974) Federal Programs to Measure Consumer Purchase Expectations, 1946-73: A Post-Mortem. *Journal of Consumer Research*, 1 (December), 1-10.

Moon, J. W. and Kim, Y. G. (2001) Extending the TAM for a world-wide-web context. *Information and Management*, 38(4), 217-230.

Moore, G. C. and Benbasat, I., (1991) Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research,* 2(3), 192-222.

Moore, G.C. and Benbasat, I. (1991) Development of an Instrument to

Measure Perceptions of Adopting an Information Technology Innovation. *Information Systems Research*, 2 (3), 192-222.

Pedhazur, E.J. (1997) *Multiple Regression in Behavioral Research: Explanation and Prediction*. Fort Worth: Harcourt Brace College Publishers.

Rogers, E. (1962) *Diffusion of Innovations*. New York: Free Press.

Rogers. E. M. and Shoemaker. F F. (1971) *Communications of innovations: a cross-cultural approach.* New York: Free Press.

Ryan, B. and Gross, N. C. (1943) The diffusion of hybrid seed corn in two Iowa communities. *Rural Sociology*, 8, 15-24.

Schuff D.,and St. Louis R. (2001) Centralization vs Decentralization of Application Software. *Communications of the ACM*, 44 (6), (June 2001). P 88-94.

Sheppard, B. H., Hartwick, J. and Warshaw, P. R. (1988) The theory of reasoned action: A meta-analysis of past research with recommendations for modifications and future research. *Journal of Consumer Research*, 15(3), 325-343.

Susarla A., Barua A., Whinston A.B. (2003) Understanding the service component of Application Service Provision: An Empirical Analysis of Satisfaction with ASP Services! , MIS Quarterly, 27(1), 91-123.

Tam, K.Y and Kai-Lung H. (2001) A Choice Model for the Selection of Computer Vendors and its Empirical Estimation. *Journal of Management Information Systems*, 17(4), 97-124.

Taylor S. and Todd, P. A. (1995a) Assessing IT usage: The role of prior experience. *MIS Quarterly*, 19 (2), 561-570.

Taylor, S. and Todd, P.A. (1995b) Understanding Information Technology Usage: A Test of Competing Models. *Information Systems Research*, 6(2), 144-176.

Thompson, R.L., Higgins, C.A., and Howell, J.M. (1991) Personal computing: Toward a conceptual model of utilization. *MIS Quarterly*, 15, 125-143.

Traudt E., Konary A. (2005). Worldwide and U.S. Software as a Service 2005-2009 Forecast and Analysis: Adoption for the Alternative Delivery Model Continues. IDC.

Triandis, H. C. (1979) Values, Attitudes, and Interpersonal Behavior. Beliefs, Attitudes, and Values. Nebraska: University of Nebraska Press.

Valente, T. W. (1995) Network models of the diffusion of innovations. Cresskill, New York: Hampton Press.

Vallerand, R. J. (1997) Toward a hierarchical model of intrinsic and extrinsic motivation. In Zanna M.P.S. (ed.), Advances in experimental social psychology (pp. 271-360). New York: Academic Press.

Venkatesh, V. (2000) Determinants of Perceived Ease of Use: Integration Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model. *Information Systems Research*, 11(4), 342-365.

\Venkatesh, V. and F. D. Davis (2000) A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies, Management Science, 46, 186-204.

Venkatesh, V., Morris, M. G., Davis, G. B. and Davis, F. D. (2003) User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27 (3), 425-478.

Vigayan, P., Perumal, V., and Shanmugam, B. (2005). Multimedia Bank and Technology Acceptance Theories. Journal of Internet Banking. Available from: http://www.arraydev.com/commerce/JIBC/2005-02/vignesan.htm (accessed 14/11/2006).

Wang Y., Lin H. and Luarn P. (2006). Predicting consumer intention to use mobile service. *Information Systems Journal*, 16, 157.

Welman, J.C. and Kruger, S.J. 2005. Research Methodology for the Business and Administrative Sciences. Cape Town: Oxford University Press.

Whelpton, P., Campbell A., and Patterson J., 1966. *Fertility and Family Planning in. the United States.* Princeton: Princeton University Press.

Zhang J., Chan S., Fang X. (2004) *Enterprise User Adoption of VOIP*. Chicago: School of Telecommunications and Information Systems, DePaul University.

APPENDECES

Appendix A. Survey Instrument

Indicator	Description	Type
	Biographical Information	
N/A	Occupation	1-17 dummy variable
GENDER	Gender	0/1 dummy variable
N/A	Education	1-8 dummy variable
AGE	Current Age	continuous dummy variable
BI	***Behavioural Intention***	
BI1	I intend to use an online desktop in the next 12 months.	1-7 Likert scale
BI2	I predict I would use an online desktop in the next 12 months.	1-7 Likert scale
BI3	I plan to use an online desktop in the next 12 months.	1-7 Likert scale
PE	***Performance Expectancy***	
PE1	I would find an online desktop useful.	1-7 Likert scale
PE2	An online desktop would give me enhanced mobility.	1-7 Likert scale
PE3	Using an online desktop would increase my productivity.	1-7 Likert scale
PE4	I would save time by using an online desktop.	1-7 Likert scale
PE5	Using an online desktop would simplify my life.	1-7 Likert scale
PE6	Using an online desktop would provide increased flexibility.	1-7 Likert scale
EE	***Effort Expectancy***	
EE1	I would find online desktops easy to use.	1-7 Likert scale
EE2	It would be easy for me to become skillful at using an online desktop.	1-7 Likert scale
EE3	My interaction with an online desktop would be clear and understandable.	1-7 Likert scale
EE4	Learning to operate an online desktop would be easy for me.	1-7 Likert scale
SI	***Social Influences***	
SI1	People who are important to me think I should use an online desktop.	1-7 Likert scale
SI2	I am trendy when I use an online desktop.	1-7 Likert scale
FC	***Facilitating Conditions***	
FC1	The costs of an online desktop service do not inhibit my use of it.	1-7 Likert scale
FC2	I have the knowledge necessary to use an online desktop.	1-7 Likert scale
FC3	There is help available if I need it.	1-7 Likert scale
FC4	I am able to access the Internet at any time.	1-7 Likert scale
	Anxiety*	
AX1	I feel apprehensive about using an online desktop.	1-7 Likert scale
AX2	I am concerned that the provider of my online desktop service might lose valuable information.	1-7 Likert scale
AX3	I am worried about the privacy of my information.	1-7 Likert scale
AX4	I am worried about the security of my information.	1-7 Likert scale
AX5	I am concerned that I will not be able to access my online desktop when I need it.	1-7 Likert scale
	Experience	
EXP1	Would you consider yourself experienced at using an online desktop?	0/1 dummy variable

***These questions are incorporated for informational purposes only.**

Appendix C - Discriminant Validity Cross Correlation Matrix

	BI	EE	EE * EXP	EE*AGE	FC	FC*AGE	FC*EXP	PE	PE*AGE	SI	SI*AGE	SI*EXP
sqrt(AVE)	***0.98***	***0.90***	***0.96***	***0.96***	***0.56***	***0.86***	***0.79***	***0.87***	***0.92***	***0.90***	***0.91***	***0.92***
BI	1.00											
EE	0.33	1.00										
EE*EXP	-0.26	0.43	1.00									
EE*AGE	0.13	0.30	0.15	1.00								
FC	0.19	0.18	-0.08	0.12	1.00							
FC*AGE	0.20	0.02	-0.11	-0.02	**0.67**	1.00						
FC*EXP	-0.29	0.22	0.89	0.10	0.09	0.04	1.00					
PE	0.67	0.34	-0.11	0.13	0.23	0.21	-0.10	1.00				
PE*AGE	0.08	0.14	0.11	0.65	0.10	0.09	0.11	0.05	1.00			
SI	0.46	0.23	-0.04	0.16	0.23	0.19	-0.06	0.49	0.01	1.00		
SI*AGE	0.08	0.24	0.12	0.58	0.14	0.18	0.08	0.04	0.67	0.05	1.00	
SI*EXP	0.10	0.13	0.55	0.11	0.07	0.06	0.54	0.24	0.01	0.69	0.01	1.00
USE	0.21	0.01	-0.20	-0.14	0.20	0.11	-0.21	0.16	-0.16	0.14	-0.07	-0.03

Appendix B - Outer Loadings

	BI	EE	EE * EXP	EE*AGE	FC	FC*AGE	FC*EXP	PE	PE*AGE	SI	SI*AGE	SI*EXP
BI1	0.98											
BI2	0.97											
BI3	0.98											
EE1		0.88										
EE1*AGE				0.92								
EE1*EXP1			0.93									
EE2		0.94										
EE2*AGE				0.98								
EE2*EXP1			0.98									
EE3		0.91										
EE3*AGE				0.96								
EE3*EXP1			0.97									
EE4		0.89										
EE4*AGE				0.97								
EE4*EXP1			0.97									
FC1					0.87							
FC1*AGE						0.95						
FC1*EXP1							0.50					
FC2					**0.06**							
FC2*AGE						0.82						
FC2*EXP1							0.93					
FC3					**0.45**							
FC3*AGE						0.82						
FC3*EXP1							0.84					
FC4					**0.55**							
FC4*AGE						0.83						
FC4*EXP1							0.84					
PE1								0.86				
PE1*AGE									0.91			
PE2								0.83				
PE2*AGE									0.92			
PE3								0.90				
PE3*AGE									0.93			
PE4								0.91				
PE4*AGE									0.93			
PE5								0.86				
PE5*AGE									0.91			
PE6								0.86				
PE6*AGE									0.89			
SI1										0.89		
SI1*AGE											0.96	
SI1*EXP1												0.87
SI2										0.91		
SI2*AGE											0.85	
SI2*EXP1												0.96

Appendix D - Cross Loadings

	BI	EE	EE * EXP	EE*AGE	FC	FC*AGE	FC*EXP	PE	PE*AGE	SI	SI*AGE	SI*EXP
BI1	**0.98**	0.32	-0.25	0.15	0.17	0.17	-0.29	0.63	0.08	0.45	0.09	0.10
BI2	**0.97**	0.33	-0.24	0.12	0.17	0.21	-0.26	0.69	0.08	0.45	0.09	0.12
BI3	**0.98**	0.32	-0.26	0.12	0.22	0.23	-0.28	0.63	0.07	0.43	0.07	0.08
EE1	0.34	**0.88**	0.28	0.22	0.22	0.10	0.13	0.35	0.07	0.24	0.19	0.09
EE1*AGE	0.07	0.22	0.14	**0.92**	0.11	-0.01	0.08	0.06	0.65	0.14	0.60	0.09
EE1*EXP1	-0.19	0.48	**0.93**	0.12	-0.02	-0.04	0.84	-0.04	0.06	0.01	0.09	0.53
EE2	0.28	**0.94**	0.45	0.26	0.10	-0.04	0.23	0.29	0.14	0.17	0.18	0.12
EE2*AGE	0.13	0.27	0.12	**0.98**	0.12	-0.03	0.08	0.13	0.61	0.13	0.52	0.08
EE2*EXP1	-0.26	0.42	**0.98**	0.13	-0.11	-0.14	0.87	-0.11	0.11	-0.06	0.09	0.52
EE3	0.30	**0.91**	0.40	0.26	0.21	0.05	0.20	0.32	0.13	0.22	0.24	0.14
EE3*AGE	0.13	*0.27*	0.14	**0.96**	0.09	0.00	0.11	0.12	0.65	0.17	0.57	0.12
EE3*EXP1	-0.24	0.42	**0.97**	0.14	-0.04	-0.08	0.85	-0.09	0.12	-0.03	0.13	0.54
EE4	0.26	**0.89**	0.44	0.35	0.12	-0.07	0.24	0.26	0.19	0.19	0.26	0.14
EE4*AGE	0.15	0.34	0.16	**0.97**	0.12	-0.04	0.10	0.16	0.62	0.17	0.57	0.12
EE4*EXP1	-0.28	0.35	**0.97**	0.16	-0.11	-0.16	0.87	-0.14	0.13	-0.07	0.13	0.53
FC1	0.18	0.13	-0.07	0.12	**0.87**	0.61	0.01	0.17	0.13	0.21	*0.14*	0.06
FC1*AGE	0.19	0.01	-0.12	-0.01	0.72	**0.95**	-0.01	0.18	0.12	0.19	0.20	0.06
FC1*EXP1	-0.12	0.08	0.42	0.11	***0.66***	0.45	***0.5036****	-0.02	0.11	0.08	0.10	0.36
FC2	0.32	***0.61***	0.22	0.22	***0.0623****	0.06	0.26	0.31	0.20	0.14	0.17	0.01
FC2*AGE	0.21	0.07	-0.05	-0.03	0.24	**0.82**	0.06	0.21	0.05	0.12	0.13	0.03
FC2*EXP1	-0.28	0.23	0.90	0.11	-0.14	-0.10	**0.93**	-0.14	0.12	-0.11	0.09	0.48
FC3	0.20	0.30	0.00	0.12	**0.45**	0.29	0.18	0.31	0.10	0.31	0.07	0.14
FC3*AGE	0.17	0.01	-0.11	-0.06	0.40	**0.82**	0.07	0.23	0.04	0.20	0.08	0.09
FC3*EXP1	-0.22	0.15	0.69	0.07	0.19	0.10	**0.84**	-0.02	0.08	0.08	0.04	0.54
FC4	0.18	0.37	0.07	0.11	**0.55**	0.31	0.24	0.24	0.06	0.06	0.13	-0.03
FC4*AGE	0.16	0.05	-0.06	-0.03	0.45	**0.83**	0.12	0.17	0.01	0.08	*0.12*	0.01
FC4*EXP1	-0.24	0.17	0.68	0.05	0.25	0.13	**0.84**	-0.07	0.04	-0.10	0.05	0.37
PE1	0.71	0.36	-0.14	0.17	0.18	0.14	-0.13	**0.86**	0.07	0.41	0.04	0.16
PE1*AGE	0.05	0.18	0.15	0.68	0.08	0.07	0.12	0.06	**0.91**	0.02	0.63	0.03
PE2	0.48	0.30	0.00	0.17	0.12	0.08	0.00	**0.83**	0.03	0.40	0.06	0.27
PE2*AGE	0.10	0.19	0.14	0.70	0.08	0.05	0.11	0.04	**0.92**	0.04	0.67	0.03
PE3	0.59	0.26	-0.10	0.07	0.19	0.21	-0.11	**0.90**	0.05	0.47	0.04	0.26
PE3*AGE	0.06	0.08	0.09	0.53	0.10	0.11	0.12	0.05	**0.93**	0.02	0.61	0.03
PE4	0.58	0.26	-0.12	0.09	0.24	0.21	-0.11	**0.91**	0.06	0.46	0.03	0.22
PE4*AGE	0.07	0.11	0.09	0.52	0.10	0.08	0.09	0.07	**0.93**	0.01	0.58	-0.01
PE5	0.50	0.28	-0.08	0.06	0.24	0.22	-0.08	**0.86**	0.04	0.45	-0.01	0.23
PE5*AGE	0.08	0.07	0.06	0.54	0.11	0.10	0.08	0.05	**0.91**	-0.03	0.57	-0.04
PE6	0.57	0.31	-0.08	0.12	0.24	0.23	-0.06	**0.86**	0.02	0.35	0.04	0.12
PE6*AGE	0.04	0.13	0.09	0.60	0.09	0.10	0.07	0.02	**0.89**	0.02	0.57	0.00
SI1	0.38	0.23	-0.04	0.18	0.21	0.17	-0.05	0.45	0.06	**0.89**	0.09	0.56
SI1*AGE	0.09	0.25	0.08	0.55	0.19	0.21	0.03	0.08	0.63	0.07	**0.96**	-0.01
SI1*EXP1	0.06	0.14	0.51	0.14	0.04	0.03	0.50	0.22	0.05	0.63	0.05	**0.87**
SI2	0.44	0.19	-0.04	0.12	0.21	0.16	-0.05	0.43	-0.03	**0.91**	0.00	0.68
SI2*AGE	0.05	0.17	0.16	0.52	0.01	0.07	0.14	-0.04	0.57	0.00	**0.85**	0.04
SI2*EXP1	0.11	0.11	0.51	0.08	0.07	0.07	0.50	0.22	-0.02	0.64	-0.02	**0.96**