Consumer Acceptance of Windows 7 and Office 2010 – The Moderating Effect of Personal Innovativeness

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The sustained upgrade of information systems provides most users with more comprehensive functions that make an individual's everyday tasks simpler and easier. This study investigated the moderating effect of an individual's personal innovativeness (PI) on the relationship within a core attitudinal model to Windows 7 and Office 2010. A total of 812 usable subjects, coming from two phases of field survey from different time periods, chosen from university students and faculty members for phase I and professionals and employees for phase II, were split into two groups—high personal innovativeness and low personal innovativeness—to test empirically the proposed research model. Results indicated that, with greater PI, positive relationship compatibility and attitude was significantly strengthened, and a positive relationship between attitude and adoption intention was significantly strengthened, but the relationships between computer playfulness and attitude, and between relative advantage and attitude were attenuated; the influence of both computer playfulness and relative advantage on perceived usability indicated a positively strengthened relationship. The findings provide a foundation for an enhanced theory on users' acceptance of a new OS and its applications.

Keywords: Personal innovativeness; perceived usability; computer playfulness; compatibility; relative advantage

ACM Classification: H4

1. INTRODUCTION

The market for computer operating systems (OS) is dominated by Microsoft's Windows system, and most users in Taiwan, who use it widely for both work and lifestyle, are familiar with the current system which acts as a platform for programs such as Microsoft Office and Internet Explorer, allowing users to easily deal with data, files, videos etc. and routinely conduct information exchange with friends and colleagues over the Internet. Although the current Windows XP mode has provided users with the flexibility to run many older productivity applications in a virtual environment, Windows 7 has been launched just three short years after Vista, shoring up its predecessor's inadequacies (Microsoft, 2009). Windows Vista offered a flashy new interface, but its poor performance and lack of both backward compatibility and compelling features made some users regret upgrading and others refuse to leave Windows XP. Recognizing this, there are some functionality features integrated into Windows 7 to make it both easier to use and safer. It allows users to run many earlier versions of Windows applications from their desktop computers with

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seamless applications, which makes it easy for users to install and run their XP applications directly from their Windows 7-based PC. The SmartScreen filter may be used for enhanced network security, designed to help protect the user from existing and emerging online threats. The filter detects malicious websites or fake notifications from social networking sites, phishing e-mails, scams out to get users' personal information, and other dangers. In addition to safety considerations, Windows 7's multi-touch technology provides users with a more natural way to interact with their computer. Users scroll through a webpage by dragging a finger up or down the screen or sweep two fingers back and forth to zoom in and out in addition to traditional input devices such as the keyboard and the mouse. In summary, by significantly improving some of the features in previous versions of Windows, Windows 7 is definitely providing many welcome and needed features that are enough to make it a better OS than its predecessor.

In addition, Microsoft Office 2010 will be released as a follow-up to the launch of Windows 7. It will provide users with a wider range of customizable functions and useful business tools such as Word, Excel, PowerPoint and OneNote 2010. Current users are expected to have more enriched and satisfying interactions between the user and the interface, with better control and enjoyment. The new Outlook, for example, which is able to connect with social websites like Facebook and Twitter and follow status updates and more, all in one location, has an added information pane that gives individuals more information about communications and daily schedules. Once set up, users will be able to view pictures of contacts (even in large cc lists), previous conversations, attachments shared, meetings attended, and much more. With several interface enhancements for better work flow, inclusion of the Ribbon across all applications in the suite, and the capability to manage and access documents on your desktop, the Web, and even your Windows Mobile handset, Office 2010 is taking advantage of today's technologies to help the modern user work anywhere. Therefore, the main objective of this study was to propose an integrated framework in which the important role of individual traits and personal innovativeness play as a moderating factor to identify antecedents and consequences of core attitudes to a new Window OS and its applications. Although innovation diffusion theory, developed by Rogers (1995), has been widely adopted by most researchers to evaluate an individual's perceptions about the characteristics of the target technology for acceptance behaviour (Agarwal and Prasad, 1998 a, b; Lu *et al*, 2005; Lu *et al*, 2008), personal innovativeness as a focal construct in evaluating individual characteristics in accepting an information system for this study will be further confirmed by differentiating two groups – those with higher and those with lower personal innovativeness.

2. LITERATURE REVIEW

Traditional innovation adoption examined a wide variety of innovations in many contexts and provided a rigorous theoretical grounding for studies of adoption of information technology (IT) (Rogers, 1995; Tornatzky and Klein, 1982). To conceptualise the characteristics of an innovation, ten perceived attributes of innovations were developed by Tornatzky and Klein (1982); these attributes were addressed most frequently in the seventy-five articles they reviewed. Results from their meta-analysis of studies on innovation characteristics suggested that three out of ten perceived characteristics (compatibility, relative advantage and complexity) were significantly related to innovation adoption. In a follow-up study, Moore and Benbasat (1991) empirically measured seven key elements of the perceived characteristics of an innovation, including compatibility, relative advantage, ease of use, observability, trialability, image and voluntariness; the convergent and discriminant validity of these innovation characteristics were also verified through a meta-analysis. However, these attributes played a key, important role in explaining how an emerging system will be adopted by users at the early stage, with 13.5% adopting the new idea on the basis of innovativeness. To determine further what characteristics to examine, Rogers (1995) explicitly identified the perceived characteristics of an innovation in five attributes: relative advantage, compatibility, complexity, trialability, and observability – all of which were thought important in the decision to adopt an innovation. These attributes were characterized as an information-centric view of the diffusion of innovations and were regarded as perceptual antecedents to the decision to adopt the innovation.

Reconfiguring the perceived attributes of innovation characteristics and combining them with the theoretical grounding of Rogers' (1995) work and the technology acceptance model (TAM) (Davis, 1989; Davis *et al*, 1992), Agarwal and Prasad (1998 a, b) proposed three perceived characteristics of an innovation: compatibility, relative advantage and ease of use. These were individual perceptions about a new information technology (IT) and were viewed as the predictors of the adoption behaviour. The authors shed further light on the relationships explicit in the technology acceptance models, and developed an operational measure of psychometric properties for their proposed constructs.

Relative advantage, ease of use and compatibility were labelled as individual perceptions about a new IT, primarily because the three perceptions were relative concepts rather than innate attributes of the innovation, and the attributes could be perceived differently by different individuals. First, in IT domains, relative advantage was defined as the extent to which the innovations were perceived by a potential adopter to offer an advantage over previous ways of performing the same task. Several studies supported the importance of relative advantage in predicting adoption behaviour (Tornatzky and Klein, 1982; Moore and Benbasat, 1991; Teo and Pok, 2003). Second, compatibility is "the degree to which an innovation is perceived as being consistent with the existing values, needs and previous experiences of the potential adopters" (Rogers 1995), and was subsequently confirmed to be a good predictor of an individual's attitude (Taylor and Todd, 1995; Chen *et al*, 2002, Jiang and Benbasat, 2007). Last, ease of use is viewed as a contrast to Rogers' notion of complexity and is defined as the degree to which a potential adopter perceives an innovation technology to be effortless. Innovations that are perceived by users to be easier to use and less complex will more likely be accepted by potential adopters.

The study of users' acceptance of a new IT in the IT literature is of particular interest to researchers and professionals. To better understand and predict key outcomes associated with technology acceptance, several theoretical models have been proposed in the literature such as TAM (Davis, 1989; Davis *et al*, 1992; Chau and Hu, 2001; Chen *et al*, 2002; Dabholkar and Bagozzi, 2002), and diffusion of innovations (Rogers, 1995; Premkumar and Roberts, 1992; Agarwal and Prasad, 1998 a, b). TAM was originally derived from the theory of reasoned action (TRA) in social psychology (Ajzen and Fishbein, 1980), arguing that IT acceptance behaviours can be explained by individual beliefs about perceived usefulness and perceived ease of use of the IT. This model was well organized as a robust and parsimonious model to explain or predict users' acceptance of information (Lee *et al*, 2006; Im *et al*, 2008; van Raaij and Schepers, 2008). Rogers' (1995) theory of the diffusion of innovation has been proposed to conceptualize the complex behavioural and social process by which individuals adopt new IT. Based on a meta-analysis of a variety of innovation studies in diverse contexts, Rogers' work argued that information about the innovations was processed by adopters to form perceptions about the characteristics of the innovation, which served as the driver for innovation adopting decisions. Agarwal and Prasad (1998 a, b) addressed a measure of the individual's subjective assessment of the utility offered by TAM and Rogers' work in a specific task-related context, and conceptually defined an individual's perceptions about the innovation's characteristics comprising ease of use, compatibility and relative advantage. More importantly, an individual's stable characteristics, personal innovativeness in the domain of IT (PIIT) was proposed as a moderating effect on the antecedent, as well as the consequences of individual perceptions about a new IT.

In addition, some dominant constructs in much of the research focused on further understanding users' reactions to information systems (IS) have been on notions of instrumentality. Microcomputer playfulness was originally developed by Webster and Martochhio (1992); it captured individuals' cognitive spontaneity in microcomputer interactions and their deriving a great deal of satisfaction from such interactions. It has potentially important practical implications for the management information system (MIS). Individuals with higher microcomputer playfulness in microcomputer interaction were thought to be more positive than those with less microcomputer playfulness; this led to more motivation to engage in microcomputer interactions in the future. Subsequently, several studies have empirically confirmed it to be a significant predictor of several important outcomes related to technology use in such expert systems as Dijkstra (1999), World Wide Web usage (Atkinson and Kydd, 1997), Microsoft Excel (Hackbarth *et al*, 2003) and Microsoft Office applications (Yager *et al*, 1997; Serenko and Turel, 2007). To precisely gauge microcomputer playfulness in understanding an individual's involvement with a system, prior studies tested it by alternating forms of construct validity for measure, via an existing measure to identify another construct that exhibits desirable psychometric (Webster and Martocchio, 1992; Agarwal and Prasad, 1998 a; Dijkstra, 1999; Hess *et al*, 2006). For example, Agarwal and Prasad (1998 a) utilized computer playfulness (CPS) as an alternate measure to assess a personality trait relevant to information technology use. This phenomenon was motivated by the fact that both scales were considered to be identical to an individual trait. Furthermore, Yager *et al* (1997) confirmed it to be a stable characteristic of individuals by using longitudinal study to examine its temporal and situational stability as investigated by Webster and Martochhio (1992). Their findings supported that computer playfulness was a stable trait and demonstrates internal consistency and unidimensionality as a construct measure. Based on these results, computer playfulness was comprehensively incorporated into the TAM as a driver of perceived usefulness and perceived ease of use (Agarwal and Venkatesh, 2002; Hackbarth *et al*, 2003; Serenko *et al*, 2007) or combined with other personality traits (e.g. PI or self-efficacy) as the antecedent of cognitive absorption (Agarwal and Karahanna, 2000), involvement with a system (Hess *et al*, 2006) and computer training performance (Martocchil and Webster, 1992). Researchers have studied computer playfulness either as an individual trait coming from an individual with more or less playfulness during interaction with the system, or as a state referring to affective or cognitive episodes that are experienced in the short run in human-computer interactions (HCI). That is, some individuals interact spontaneously and innovatively with computers and derive a great deal of satisfaction from such interactions. Such interactions are thought to lead to important outcomes such as increased learning, high satisfaction etc. As a result of the initial studies into microcomputer playfulness, a great deal of research has been undertaken to determine how, why, and in what situations individuals playfully interact with computers (Atkinson and Kydd, 1997; Agarwal and Prasad, 1998 a, b).

In the context of IS and HCI research, the notion of perceived usability has been seen as a key construct, and has been noted and developed in assessing the quality of a range of different systems (Nielsen, 1993), particularly for website usability, which was designed and based on criteria of effectiveness, efficiency, the satisfaction to attract visitors who enjoyed the content of a website and engagement in online activities or website loyalty (Benebunan-Fich, 2001; Agarwal and Venkatesh, 2002; Flavián *et al*, 2006; Venkatesh and Agarwal, 2006; Casaló *et al*, 2008). Nielsen (1993) defined usability as a measure of the quality of the user experience during interaction with a web-based or traditional software application. For Nielsen, it was comprised of five characteristics: ease of learning, efficiency of use, ease of remembering, error frequency and subjective satisfaction. A generalized definition of usability, derived from the evaluation of the international standards organization (ISO), was the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use (Karat, 1997). To extend the definition of usability in assessing a firm's web presence, Agarwal and Venkatesh (2002) proposed and organized it into five major categories: content, ease of use, promotion, made-for-the-medium and emotion. Another study evaluated the metric system and instrument for all categories using the Microsoft Usability Guideline (MUG), which was a comprehensive collection of usability criteria for the evaluation of websites. These captured various theories to cover a wider range of usability-related data, such as the categories of content and ease of use regarding the design of websites that were conceptually similar to individual perceptions in the TAM (perceived usefulness and perceived ease of use) and the relative advantage of Rogers (1995). Further, Venkatesh and Agarwal (2006) empirically proved usability assessment in the context of websites through a longitudinal field study, which combined additional data (370 respondents) gathered six months later from the study by Agarwal and Venkatesh (2002). Their finding indicated that perceived usability categories performed as a driver of technology use, and were also seen as the outcome of individual characteristics and product type. Leonard and Riemenschneider (2008) evaluated usability of the Web in terms of usefulness and ease of use, where usefulness is defined as an individual's expectation that using IT will enhance his or her performance, and ease of use refers to the degree to which an individual expects IS to be free of effort (Davis *et al*, 1992). For this, combining these two user perceptions into a perceived usability, referring to the user's ability to use a new operating system, is proposed as the research model to enhance individual capabilities to do productive work efficiently, easily and effectively, through system use, emphasising the importance of perceived usability applied to existing operation systems is primarily because this construct calls attention to a broader context in considering what it means to support individual work when compared to so-called traditional operating systems. In this study, the assessment of perceived usability in the IT domain is considered to be significantly different to perceived ease of use and perceived usefulness in the TAM (Davis 1989; Davis *et al*, 1992); even though it was successfully designed for evaluating the website's usability, it contributed to more successful interaction between the users and the site, and helped the users to make a purchase (Benebunan-Fich, 2001; Lavie and Tractinsky, 2004).

Some research has been built on the model of diffusion of innovations and has examined the effect of situation factors such as environment characteristics (Premkumar and Roberts, 1992) and individual characteristics (Karayanni, 2003) on evaluating the adoption of innovation technology. These factors were directly incorporated into their model as direct effects of external variables influencing adopting an innovation, but much of the research did not further investigate the moderating effects of external variables that could provide a much more meaningful investigation. To underscore the effects of moderating factors via the approach of the LISREL technique, these were tested by Dabholkar and Bagozzi (2002) and Im *et al* (2008) to examine further their moderating effects on relationships within external factors and the core model for users' adoption of an innovation. Specifically, a core model comprised of tested constructs was viewed as a baseline, and moderating effects of external variables were meaningfully split into two groups that acted as significant difference aspects of individual traits or conditions in some cases. From an innovation perspective, this study aims to explore whether some antecedent variables have a direct effect on user attitude, and in turn, influence adoption intention towards Windows 7 and Office 2010, given that individuals are divided into higher PIIT and lower PIIT. The main reason is that an important motivation for an individual with their level of PIIT will be excitement from his/her higher motivation to adopt a new OS in the early stage of an emerging innovation that has not been proved. Moreover, an important role was also played by an individual characteristic as an external variable in TAM, and theory clearly highlights in recent studies the need for of a new technology (Lu *et al*, 2005; Lu *et al*, 2008), but this construct does not seem to have a significant interacting effect between individual perception and adoption decisions regarding a new IT.

3. RESEARCH MODEL AND HYPOTHESES

In order to explore users' reactions to a new OS and application software, the research model shown in Figure 1 consists of two salient parts – a core model and a moderator effect of an individual trait. First, three constructs of the core model, derived from a review of much relevant literature, have a positive impact on attitude towards use (Premkumar and Roberts, 1992; Rogers, 1995; Agarwal and Karahanna, 2000; Dabholkar and Bagozzi, 2002), and the role of a mediator variable of PIIT is played by the influence of computer playfulness, relative advantage and compatibility in attitude towards use, which, in turn, affects adoption intention of Windows 7 and Office 2010.

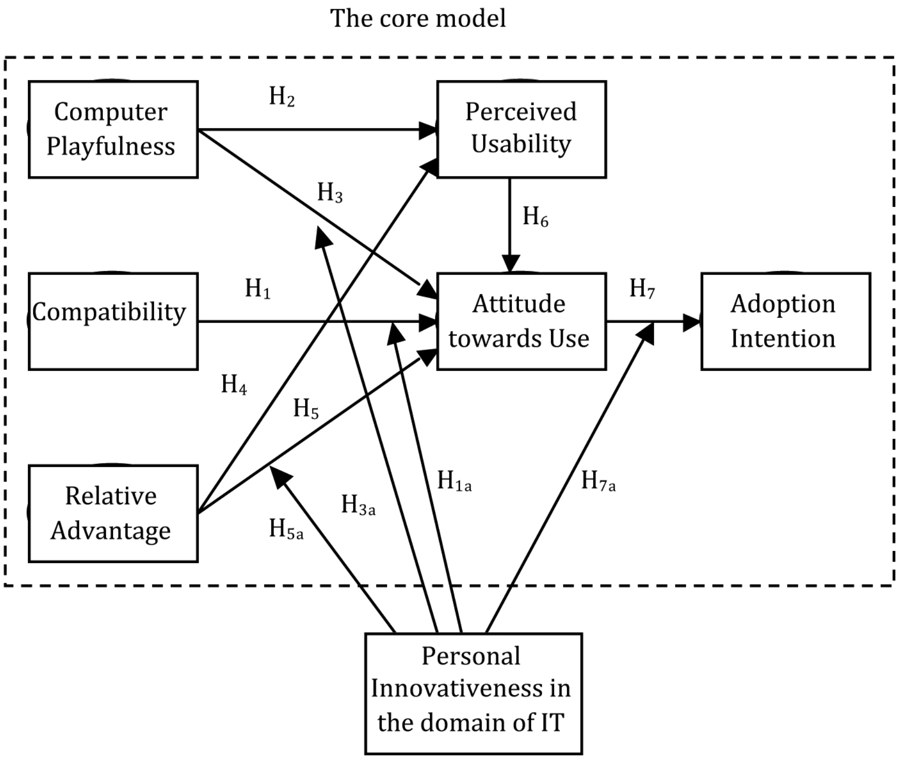

Figure 1: Research Model

3.1 The Core Model

The core model of this study is based on the attitudinal model that was influenced by four variables affecting adoption intention. Four antecedent variables of attitude are comprehensively reviewed from the theory of innovation diffusion (Rogers, 1995; Agarwal and Prasad, 1998 a, b), cognitive playfulness in human-computer interactions (e.g. Martocchio and Webster, 1992) and individual beliefs in the TAM (Davis 1989; Davis *et al*, 1992; Leonard and Reimenschneider, 2008). These capture individual perceptions and are discussed in detail in the following sections.

3.1.1 Compatibility

Compatibility has been acknowledged in the context of IT from Rogers' theory of diffusion of innovations as a part of the perceived attribute of innovations. It is conceptually defined as the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters (Rogers, 1995 p. 224). An ideal will be compatible and less uncertain to the potential adopters and will fit to the individual's life situation, and it is clearly depicted that an individual's perceptions about a new IT are influenced by three impact factors: sociocultural values and beliefs, previously introduced ideas, and client needs for the innovation. Subsequently, Agarwal and Prasad (1998 a, b) considered this construct to be one of three of an individual's perceptions about a new IT, and these were associated with the interaction of PIIT, which correlated highly with intentions to use a new IT. Results indicated that the influence of compatibility associated with the interaction of PIIT on intentions to use was significant. Not only did it provide evidence for the theoretical grounding of moderating effects, but it also resulted in an interesting theme for this study.

In contrast to prior work in the definition of compatibility, Karahanna *et al* (2006) further disaggregated operational compatibility into four distinct dimensions by summarizing empirical research in information systems that had examined compatibility beliefs. They emphasized that operational compatibility was not only treated as a unidimensional construct but that four distinct constructs existed, with high correlation to each other; this was consistent with "preferred work style", and with "an existing situation" (e.g. Agarwal and Prasad, 1998 a; Chau and Hu, 2001; Chen *et al*, 2002; Serenko *et al*, 2007). Further, this was conceptually defined as the "perceived cognitive distance between an innovation and precursor methods for accompanying tasks." Empirical results indicated that compatibility with values is an antecedent of compatibility with existing practice and compatibility with experience, and that both perceived usefulness and perceived ease of use are affected. However, research has validated this to be correlated with an individual's attitude (Tornatzky and Klein, 1982; Premkumar and Roberts, 1992; Taylor and Todd, 1995; Atkinson and Kydd, 1997; Chen *et al*, 2002; Teo and Pok, 2003; Jiang and Benbasat, 2007), identical to both perceived usefulness and perceived ease of use as the antecedents of the individuals' attitude in the TAM. This study yields to the original definition of compatibility developed by Rogers (1995), arguing that a new operating system reconfigures the traditional system to be compatible with existing values and beliefs, previously introduced ideas and potential adopters' needs. Thus:

H1. Compatibility will have a positive effect on attitude towards use.

3.1.2 Computer Playfulness

Microcomputer playfulness explains an individual's tendency to interact spontaneously, flexibly, creatively and imaginatively with computers (Webster and Martocchio, 1992; Agarwal and Karahanna, 2000; Hackbarth *et al*, 2003; Hess *et al*, 2006; Serenko and Turel, 2007). Webster and

Martocchio (1992) explicitly defined computer playfulness as "the degree of cognitive spontaneity in microcomputer interaction." It was considered either a state or an individual trait, depending on the degree of individual involvement during interaction with microcomputers. This was viewed as an individual trait representing a relatively enduring tendency to interact playfully with the microcomputer, or it was viewed as a state that represented a temporal playfulness with the microcomputer, coming from the characteristics of the software or social influences (Webster and Martocchio, 1992). As individuals become familiar with a specific system, they are more likely to explore a specific system and interact spontaneously with it. Other research has argued that computer playfulness was a system-specific trait that would slowly approach stable status over a period of time, because the experience of using a specific system increases over time. An individual with a high level of playfulness would be perceived to have a higher intention to adopt a specific system than the individual with a low level of playfulness (Hackbarth *et al*, 2003).

This construct has been subjected to extensive empirical testing in various settings (Webster and Martocchio, 1992; Atkinson and Kydd, 1997; Agarwal and Karahanna, 2000). Webster and Martocchio (1992) have confirmed that computer playfulness is positively associated with computer involvement, positive mood, satisfaction, learning, creativity and exploratory computer behaviour in human-computer interactions (HCI), indicating that individuals with the higher playfulness trait demonstrate higher performance and show higher affective responses to a microcomputer training task. Furthermore, computer playfulness was described as an individual characteristic, which was tested to have an effect on World Wide Web usage when individuals were accessing the Web through the computer (Atkinson and Kydd, 1997). Playfulness was highly related to use of the computer for specific types of tasks, mainly because the playfulness characteristic might result in more successful training outcomes on the computer. Based on this inference, computer playfulness was incorporated into the TAM as the antecedent of perceived usefulness (Rogers, 1995; de Ruyter *et al*, 2001) and perceived ease of use (Hackbarth *et al*, 2003; Serenko and Turel, 2007). In this study, when interacting with a new OS and application software, individuals with more playfulness are more likely to examine the user benefits options available and experiment with them. This system is expected by existing users to be relatively easy to use, to have fast responses, to be personalized and to have more playful features that contribute to potential users' perceptions of usefulness. Thus:

H2. Computer playfulness will have a positive effect on perceived usability.

H3. Computer playfulness will have a positive effect on attitude towards use.

3.1.3 Relative Advantage

Relative advantage is the degree to which using an innovation is perceived as being more advantageous than using its precursor. It is manifested in the form of increased efficiency, increased effectiveness, economic gains, and enhanced status (Davis *et al*, 1992; Rogers, 1995). Rogers (1995) argued that perceived relative advantage of an innovation was positively related to its rate of adoption. Agarwal and Prasad (1998 a, b) further captured the relative advantage as the extent to which a potential adopter views the innovation offering an advantage over pervious ways of performing the same task, and as one of the individual's perceptions about a new IT that influenced an adoption decision. The importance of relative advantage has been identified as the most powerful attribute, possibly because the user may pay attention to the innovations that may provide more advantages than the current products or services. For example, the relative advantage of using online shopping reflects the users' acknowledgement that this new way of shopping provides different advantages over alternative shopping formats (e.g. brick-and-mortar). If an individual believes that he or she gains more benefits by shopping via the specific website than shopping through a physical store, such as convenience, ease of use and option of range etc., the individual will prefer this shopping option for his or her purchase, especially users who have been viewed as "time-starved". A similar contention applied in various domains has been confirmed to be highly correlated to a user's adoption of IT (Premkumar and Roberts, 1992), e-service (de Ruyter *et al*, 2001), WAP-enabled mobile phones (Teo and Pok, 2003) and web-shoppers (Karayanni, 2003).

A rational adoption decision would involve evaluating the advantages of a new technology, including economic profitability, social prestige or other benefits (Nielsen, 1993). Prior studies have empirically tested that the relative advantage of an innovation correlated highly with a user's attitude and behaviour (Tornatzky and Klein, 1982; Premkumar and Roberts, 1992; Teo and Pok, 2003). For this, a new operating system that provided a high relative advantage over an existing operating system was perceived by mass users of Microsoft's operating systems as something they should proceed to use, in that this continuously provided greater flexibility and higher capability to deploy virtual Windows environments in managing personal computers or in organizational use. In view of the advantages of a new IT product, it would thus be expected to be more advantageous than an older version of the same applications, and would also result in more positive attitudes towards use. Thus:

H4. Relative advantage will have a positive effect on perceived usability.

H5. Relative advantage will have a positive effect on attitude towards use.

3.1.4 Perceived Usability

The notion of usability was a key issue in the HCI and IS research, and it was evaluated by two approaches: One was described as multifaceted and was assessed by using a variety of different measures; the other was related to an individual's subjective assessment in the form of his or her judgment (Agarwal and Venkatesh, 2002). This construct has been widely used as an evaluative criterion of a Web site, such as online shopping (Karayanni, 2003), and commercial Web sites (Benebunan-Fich, 2001; Leonard and Reimenschneider, 2008) and online consumer loyalty (Flavián *et al*, 2006; Casaló *et al*, 2008). Perceived usability was defined as the extent to which a product could be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use (Karat, 1997). Venkatesh and Agarwal (2006), drawing on the definition of Karat (1997) of usability in HCI and IS research, argued that users' perceived usability was a subjective construct derived from prior studies (e.g. Nielsen, 1993; Agarwal and Venkatesh, 2002) to evaluate website usability and whether the design of websites can attract or cause new visitors to pay attention, and is likely to change their mind to retain after using the website.

For this, perceived usability was utilized as a new user's perception at the beginning of IS research, and here, it is defined as an individual perception of how an operating system can perform information-related tasks easily, usefully and efficiently. This definition is conceptually redefined from the usability of the website well fitted to the usability of a new IT product (e.g. Leonard and Reimenschneider, 2008), primarily focusing attention on explicating how users evaluated a new OS for their task domain and individuals' information usage. Drawing on individual beliefs, integrating perceived usefulness and perceived ease of use of the TAM into a perceived usability to evaluate a new OS is not merely to enhance individual performance, but to enhance individual capabilities to do productive work. Thus:

H6. Perceived usability will have a positive effect on attitude towards use.

3.1.5 Attitude Towards Use

Azjen and Fishbein (1980) depicted attitude as an individual's learned predisposition to respond in a consistently favourable or unfavourable manner to a given object, and that it greatly affects the performance of a user's positive feelings behaviour. In the TAM framework, attitude was defined as the user's evaluation of the desirability of his or her using a specific system, and presented it as having a higher correlation with a user's behavioural intention (Davis 1989; Davis *et al*, 1992), and attitude retained in their model is to facilitate the intended conceptual replication of the study (Taylor and Todd, 1995; Chau and Hu, 2001; Dabholkar and Bagozzi, 2002). Yet, they did not reflect an individual's attitude to their model as the evaluation of feelings of favour or disfavour towards using technologies. Other studies have presented it, though, as being directly linked to an individual's intentions, such as Serenko *et al* (2007) and Lu *et al* (2008). However, reassessing the research mode proposed by Agwaral and Prasad (1998 a, b), this study aims to fill the void that attitudinal beliefs and assessment play an increasingly important role in evaluating the individual's technology acceptance decision. Thus:

H7. Attitude towards use will have a positive effect on adoption intention.

3.2 Moderating Effects of Personal Innovativeness in the Domain of IT (PIIT)

PIIT represents the degree to which an individual is willing to try out any new information technology (Agarwal and Prasad, 1998 a, b), and its primary concept is derived from Rogers' theory of the diffusion of innovations. It was explicitly defined and delineated that individuals are characterized as innovative if they adopt a new technology earlier than any other adopters. Prior studies to some degree treated it as an individual trait associated with external factors in predicting user adoption of new technology (Lewis *et al*, 2003; Lu *et al*, 2005; Lu *et al*, 2008). In particular, Agarwal and Prasad (1998 a, b) saw it as a key mediator for the antecedents as well as the consequences of perceptions, primarily derived from the perspective of information processing of the development of perceptions (Rogers, 1995). In follow-up studies, this has been perceived as an external variable in technology acceptance literature (Lewis *et al*, 2003; Lu *et al*, 2005; Lu *et al*, 2008), but the studies did not utilize this as a moderating factor to test the interaction of other perceptions on users' attitude. To highlight the importance of PIIT that existed with certain differences, this study has characterized PIIT as the risk-taking propensity, which is divided into two groups by the median from the sample. Given the different level of perceptions, individuals with higher PIIT are more likely to take risks than individuals with lower PIIT. Individuals with higher PIIT associated with perceptions about a new IT (relative advantage, ease of use and compatibility) in this framework are more likely to facilitate a more positive intention toward a new OS and applications software.

Prior studies tested the interaction between perceptions and PIIT via regression analysis, presenting the interaction between compatibility and PIIT as statistically significant on intentions; but others indicate non-significance (Agarwal and Prasad, 1998 a) On the other hand, in evaluating the interaction between PIIT and computer playfulness, Agarwal and Prasad (1998 b) viewed computer playfulness as an alternate scale of the PIIT to highlight high convergent and discriminant validity, primarily because two scales were considered to be the same personality traits regarding IT usage. However, on the basis of different definitions of these two constructs, this study aims to explore the interaction between these constructs on attitude toward using Windows 7 and Office 2010, given that computer playfulness will be activated by individuals with higher PIIT to strengthen a more positive attitude towards use. Thus:

With greater PIIT

H1a. The positive relationship between compatibility and attitude towards use will be strengthened.

H3a. The positive relationship between computer playfulness and attitude towards use will be strengthened.

H5a. The positive relationship between relative advantage and attitude towards use will be strengthened.

H7a. The positive relationship between attitude towards use and adoption intention will be strengthened.

4. METHOD

4.1 Sample and Procedures

A survey instrument was developed to measure the variables and was conducted to test the hypotheses, especially when consumers' innovativeness trait was considered to be as a mediator between different consumers. To gain sample generalizability across consumers in the Window 7 and Office 2010 environment, two phases of data collection for the study were adopted over different time periods and with different targets. First, the data were collected from three midsize universities in southern Taiwan. The total number of students enrolled was approximately 16,000 students and 600 faculty staff for each university. At this stage's completion, the second phase for data collection focused on professionals or employees through street-intercept personal interviews, and a questionnaire concerning Word files was emailed to various industries. Initially, to avoid deficiencies in the questionnaire, a pilot study was conducted featuring thirty-six undergraduates, twelve graduate students from eight faculty staff, who voluntarily participated in the pre-test; they were asked to provide some recommendations about the wordings of the questionnaire. Based on feedback, minor changes were made to improve the clarity of the questions and layout out of the survey. The results indicated that some construct revisions were needed and ensured that the instrument possessed acceptable validity.

After the pre-test, the first phase survey, using paper and pencil, was handed out to all attendees who completed the three-hour presentation of Windows 7 and Office 2010 workshops held in three universities. In addition to faculty members, most attendees were undergraduates and graduated students coming from a variety of majors and recruited from their courses. They were appropriately targeted as usable subjects for studying the effects of emerging features of computer OSs and application software because they were perceived as computer-literate and comfortable with new technology (Lee *et al*, 2006). Another reason was that they were more motivated to spend more time trying or using these new technologies, and had comprehensively utilized new technologies for their course material and presentations on campus (Webster and Martocchio, 1992; Agarwal and Prasad, 1998 a; Lee *et al*, 2006; van Raaij and Schepers, 2008). These were generally adopted by prior studies to validate their hypothesized model for time considerations. The workshops were presented by product service engineers from Microsoft's local agent, and they demonstrated a lot of detailed information about some of the features of Windows 7 and Office 2010 that highlighted how significantly different they were from previous versions of Windows OS (XP and Vista) and Office 2007, respectively. In the conference room, Windows 7 and Office 2010, with unique design features and more reliable performance, made its debut for all attendees through PowerPoint slides, including instruction and hands-on practice. Some greatly useful features, like HomeGroup, Windows Media Center, and Windows Touch, were significantly emphasized, concentrating on their simpler and easier use compared with previous versions, to enhance current users speed through everyday tasks.

The second phase was targeted at professionals and employees to differentiate consumer innovativeness in two different groups. Results indicated that in the first phase of questionnaire survey a total of 454 subjects joined the presentations and completed the questionnaire after the workshop, while 415 subjects complete the questionnaire in the second phase. Of these, thirty-two subjects of phase I and twenty-five subjects of phase II were excluded for data analysis after screening questionnaire incompleteness and inconsistencies. As a result of phase I, 422 effective subjects indicated that 180 (42.7 percent) of 422 were females, and 57.3 percent were males; 328 (77.73 percent) were undergraduates, forty-two (9.95 percent) were graduated students and fifty-two (12.32 percent) were faculty members. 390 effective subjects of phase II indicated that 61.94% of subjects were male and 39.06% were female; 282 (72.30 percent) of subjects were employed in service industries; 56 (14.36 percent) of subjects were professionals, while the others were housewives (13.33 percent). The subjects for phase II were aged from twenty to forty-nine years, and students were excluded from the initial survey in an attempt to meet the survey's requirements. All of the subjects had prior experience with the use of the XP system, and ninety-six subjects (thirty-two subjects for phase I and sixty-four subjects for phase II) had already updated their OS from XP to Windows 7, primarily because they expected that the system design or some novelty features – like those enabling effective communication skills, researching, learning and problem solving (which are highly linked to their work or lifestyles) – would dominate the future of mainstream OSs.

4.2 Measures

The variables identified in the research model were measured using multi-item indicators which aimed to capture the underlying theoretical domain of the construct. Most items were measured using a five-point Likert-type scale ranging from strongly disagree to strongly agree, except for the attitude construct which was measured using semantically different scales. The choice of theoretical constructs to be examined was determined through a review of the theoretical adoption literature as well as a summary of the measurement items is provided in Table 1.

5. DATA ANALYSIS AND RESULTS

5.1 Exploratory Factor Analysis

In order to assess convergent and discriminant validities, thirty-three measured-items were used to measure seven research constructs subjected to principal components analysis with VARIMAX rotation. Table 2 shows that the Kaiser-Meyer-Olkin measure-sampling adequacy was 0.914, confirming the appropriateness of proceeding with the analyses. Next, all items presented high factor loadings on their underlying corresponding construct (> 0.40) and had low factor loadings on other constructs (cross-loadings). The results indicated that a seven-factor model was identified and cumulatively explained up to 61.46 percent of the variance. Further analysis on the reliability of the scales was conducted by examining the Cronbach alpha scores for each. All scales had alpha scores of 0.79 or better, greater than Nunnally's guideline (greater than 0.70), indicating that internal consistency, reliability and dimensionality were satisfactory.

In the follow-up analysis, this study further adopted a two-step approach to model construction and testing (Anderson and Gerbing, 1988). First, all measured variables developed in the measurement model were tested using confirmation factor analysis (CFA) to confirm measured variables that were highly loaded into their underlying construct (loading factor of each item less than 0.50 should be deleted), and also the reliability and validity of both constructs were computed from a LISREL output file. Second, all path coefficients as hypotheses were tested using structural equation modeling (SEM), including the relationships between the interaction of PIIT on the attitudinal model.

Construct	Code	Question wording	Source
Perceived Usability (USE)	USE1 USE2 USE3 USE4 USE5 USE6 USE7	1. XYZ is easy to use understand. 2. XYZ is sample to use, even when using it for the first time. 3. The structure and contents of XYZ are easy to understand. 4. The functions provided by XYZ can enhance my effectiveness. 5. XYZ can improve my performance in my work. 6. I think XYZ to be useful in my work. 7. I think using XYZ can quickly finish my work.	Karat (1997), Lavie and Tractinsky (2004), Leonard and Riemenschneider (2008)
Compatibility (COMP)	COMP1 COMP2 COMP3 COMP4 COMP5	1. Using XYZ fits into my lifestyle. 2. Using XYZ fits into my prior experience of computer use. 3. XYZ is integrated with way I perform my job. 4. Using XYZ would be compatible with all aspects of my job. 5. The unique characteristics provided by XYZ meet my current needs.	Karahanna and Agarwal (2006), Moore and Benbasat (1991), Serenko and Turel (2007)
Personal Innovativeness (PI)	PI1 PI2 PI3 PI4	1. If I heard about XYZ, I would like ways to experiment with it. 2. Among the peers, I am usually the first to try out XYZ. 3. In general, I am usually hesitant to try out XYZ. 4. I like to experiment with XYZ.	Agarwal and Karahanna (2000), Leonard and Riemenschneider, (2008), Lu *et al* (2008)
Relative Advantage (RA)	RA1 RA2 RA3 RA4 RA5	Compared with WINDOW XP, 1. XYZ offers me more novelty contents. 2. XYZ provides higher system stability. 3. XYZ with higher information security meets my needs. 4. XYZ offers me personalized services 5. XYZ provide highly compatible with application software.	Moore and Benbasat (1991), Premkumar and Roberts (1999), Teo and Pok (2003)
Computer Playfulness (PLAY)	PLAY1 PLAY2 PLAY3 PLAY4 PLAY5	For each adjective listed below, please circle on the response that best matches a description of yourself when you interact with XYZ on computer. 1. Spontaneous. 2. Playful. 3. Flexible. 4. Creative. 5. Imaginative.	Agarwal and Prasad (1998a), Dijkstra (1999), Serenko and Turel (2007)
Attitude towards Use (ATT)	ATT1 ATT2 ATT3 ATT4	When using XYZ, I make my feel___: 1. Positive/Negative 2. Good/Bad 3. Beneficial/Harmful 4. Valuable / Worthless	Dabholkar and Bagozzi (2002), Taylor and Todd (1995)
Adoption Intention (INT)	INT1 INT2 INT3	1. I plan to use XYZ in the future. 2. I intend to use XYZ in the future. 3. I believe that I will buy XYZ in the future.	Lu *et al* (2008), Taylor and Todd (1995)

Note: XYZ presents Windows 7 and Office 2010.

Table 1: Constructs and Measurement Items

Variables	USE	COMP	PI	RA	PLAY	ATT	INT
USE1	**0.90**	0.12	0.09	0.11	0.12	0.03	0.08
USE2	**0.86**	0.10	0.17	0.16	0.02	0.12	0.11
USE3	**0.80**	0.12	0.20	0.12	0.01	0.01	0.08
USE4	**0.84**	0.10	0.03	0.12	0.10	0.11	0.04
USE5	**0.82**	0.09	0.16	0.18	0.05	0.07	0.09
USE6	**0.90**	0.09	0.12	0.10	0.09	0.02	0.01
USE7	**0.92**	0.20	0.02	0.04	0.13	0.11	0.02
COMP1	0.10	**0.90**	0.03	0.09	0.10	0.04	0.05
COMP2	0.11	**0.86**	0.08	0.12	0.10	0.05	0.13
COMP3	0.02	**0.94**	0.09	0.03	0.07	0.02	0.12
COMP4	0.11	**0.89**	0.01	0.16	0.03	0.11	0.02
COMP5	0.21	**0.87**	0.11	0.09	0.09	0.10	0.13
PI1	0.10	0.09	**0.84**	0.12	0.13	0.10	0.12
PI2	0.18	0.11	**0.67**	0.10	-0.15	0.13	0.21
PI3	0.11	0.06	**0.81**	0.16	0.14	0.13	0.03
PI4	0.07	0.12	**0.69**	0.04	0.13	0.20	0.14
RA1	0.12	-0.13	0.02	**0.75**	0.11	0.11	0.09
RA2	0.16	0.22	0.10	**0.78**	0.18	0.12	0.02
RA3	0.20	0.26	0.09	**0.79**	0.12	0.11	0.06
RA4	0.13	0.10	0.11	**0.87**	0.05	0.04	0.01
RA5	0.10	0.10	0.03	**0.77**	0.13	0.12	0.13
PLAY1	0.05	0.09	0.03	0.02	**0.84**	0.12	0.16
PLAY2	0.11	0.11	0.01	0.04	**0.88**	0.11	0.12
PLAY3	0.05	0.12	0.05	0.06	**0.90**	0.12	0.10
PLAY4	0.09	0.04	0.04	0.05	**0.86**	0.14	0.15
PLAY5	0.22	0.08	0.02	0.12	**0.78**	0.20	0.15
ATT1	0.01	0.03	0.02	0.01	0.10	**0.84**	0.05
ATT2	0.12	0.02	0.01	0.09	0.13	**0.82**	0.10
ATT3	0.09	0.03	0.09	0.07	0.05	**0.82**	0.02
ATT4	0.11	0.01	0.09	0.03	0.04	**0.79**	0.07
INT1	0.07	0.04	0.01	0.07	0.08	0.12	**0.90**
INT2	0.04	0.06	0.09	0.06	0.08	0.07	**0.88**
INT3	0.06	0.02	0.06	0.12	0.03	0.04	**0.92**
Eigenvalue	8.98	3.06	1.92	1.53	1.42	1.20	1.06
Cumulative percentage of variance explained	11.64	21.97	30.94	38.80	45.83	52.03	58.06
Cronbach's α	0.94	0.92	0.81	0.86	0.88	0.81	0.90

Note: USE = Perceived Usability; COMP = Compatibility; PI = Personal Innovativeness; RA = Relative Advantage; PLAY = Computer Playfulness; ATT = Attitude towards Use; INT = Adoption Intention

Table 2: Results of Factor Analysis

5.2 Confirmatory Factor Analysis and Construct Validity

CFA was most appropriately applied to measures that had been fully developed and their factor structures validated. The measurement scales were refined through the development of a strategy of confirmatory models (Jöreskog and Söbom, 1996; Byrne, 1998; Hair *et al*, 2006). Statistical software LISREL version 8.52 was used for the CFA, and some widely used indicators were also used to evaluate the measurement model fitting to the data, such as root mean square error of approximation (RMSEA), standardized root mean square (RMR), normed fit index (NFI), non-normed fit index (NNFI), goodness of fit index (GFI), comparative fit index (CFI), and adjusted goodness of fit index (AGFI) (Bagozzi and Yi, 1988; Jöreskog and Söbom, 1996; Byrne, 1998). As a result, all the measured items showed an acceptable fit (χ^2 = 1429.93, *df* = 474, RMSEA = 0.050, NNFI = 0.96, NFI = 0.97, CFI = 0.97, standardized RMR = 0.045, GFI = 0.89, AGFI = 0.86), indicating that a seven-factor model provided a good fit to the data.

To further confirm reliability, construct reliability with a seven-factor model was used to assess its reliability via the CFA approach, and considered a cut-off value of 0.60 (Fornell and Larcker, 1981; Anderson and Gerbing, 1988). Table 3 shows that all measures fulfilled the recommended levels of construct reliability (CR), as indicated by the earlier recommended value in the CFA. In addition, the factor loadings of all measured items were greater than the recommended value of 0.50 and with each having significance at the 0.001 level (Hair *et al*, 2006). Discriminant validity was tested using the average variance extracted (AVE); all constructs indicated a greater than suggested value of 0.50 (Fornell and Larcker, 1981). Not only all constructs for the model showed high construct reliability, but also the item loadings were very high, at 0.70 and above (see Table 3).

The items also showed discriminant validity. Table 4 shows all AVEs for each construct displayed on a diagonal of the correlation matrix, which are greater than the off-diagonal construct correlations in the corresponding rows and columns; therefore all constructs share more variance with their indicators than with other constructs (Fornell and Larcker, 1981; Bagozzi and Yi, 1988). The results shown in Table 3 and Table 4 provide strong empirical support for the reliability and validity of the scales in the model.

5.3 Structural Equation Modeling and Test of Moderating Variable

Following up the CFA test, structural equations modeling (SEM) was suggested to evaluate the causal relationships between exogenous variables and endogenous variables (Anderson and Gerbing, 1988). The results of the SEM presented the completely standardized path coefficients and *p* value. The core model of this study (dotted lines in Figure 1) was first assessed using SEM, and all models fit indices, indicating an acceptance level (χ^2 = 1221.33, *df* = 367, RMSEA = 0.054, NFI = 0.95, NNFI = 0.96, CFI = 0.97, standardized RMR = 0.05, GFI = 0.91, AGFI = 0.89). Seven hypothesized paths (H_1 - H_7) linking exogenous variables (computer playfulness, compatibility and relative advantage) to endogenous variables (perceived usability, attitude towards use and adoption intention), and those among the endogenous were simultaneously estimated by Maximum Likelihood (ML) in the LISREL. Results indicated that three exogenous variables for standardized path coefficients on attitude towards use (H_1: $\gamma_{21} = 0.34, p < 0.01$; H_2: $\gamma_{12} = 0.24, p < 0.01$; H_3: $\gamma_{22} = 0.44, p < 0.01$; H_5: $\gamma_{23} = 0.17, p < 0.05$) and perceived usability (H_4: $\gamma_{13} = 0.32, p < 0.01$) were significant. In addition, two relationships between two endogenous variables were also tested to be statistically significant, with a standardized value of path coefficient (H_6: $\beta_{21} = 0.32$, $p < 0.01$; H_7: $\beta_{32} = 0.54$, $p < 0.01$). As expected, all hypotheses for the core model of this study were well supported.

Although a full direct effects model was confirmed in order to fit all respondents, the focus of the study was to incorporate a moderating effect of personal innovativeness on the core model to

Construct	Item	Loading	S.E	t-value
Perceived Usability CR= 0.93 AVE = 0.65	USE1	0.78	0.43	-
	USE2	0.76	0.42	22.01
	USE3	0.82	0.31	22.44
	USE4	0.78	0.38	20.01
	USE5	0.84	0.28	27.58
	USE6	0.82	0.32	22.51
	USE7	0.83	0.29	24.35
Compatibility CR = 0.90 AVE = 0.63	COMP1	0.83	0.29	-
	COMP2	0.73	0.45	18.19
	COMP3	0.79	0.37	20.54
	COMP4	0.81	0.32	20.02
	COMP5	0.81	0.32	18.98
Personal Innovativeness CR = 0.81 AVE = 0.52	PI1	0.75	0.44	-
	PI2	0.75	0.47	21.01
	PI3	0.70	0.52	18.24
	PI4	0.68	0.54	18.34
Relative Advantage CR = 0.86 AVE = 0.56	RA1	0.75	0.42	-
	RA2	0.77	0.45	20.09
	RA3	0.78	0.40	19.10
	RA4	0.72	0.48	18.45
	RA5	0.73	0.46	19.28
Computer Playfulness CR = 0.88 AVE =0.60	PLAY1	0.74	0.46	-
	PLAY2	0.81	0.32	23.18
	PLAY3	0.77	0.41	20.26
	PLAY4	0.72	0.53	18.08
	PLAY5	0.83	0.30	24.50
Attitude towards Use CR = 0.81 AVE = 0.52	ATT1	0.72	0.53	-
	ATT2	0.68	0.55	19.06
	ATT3	0.73	0.45	19.21
	ATT4	0.74	0.46	18.19
Adoption Intention CR = 0.89 AVE = 0.74	INT1	0.81	0.32	-
	INT2	0.86	0.29	27.16
	INT3	0.90	0.18	32.24

Note: S.E = Standard error
Construct Reliability (CR) = $(\Sigma\lambda_i)^2 / [(\Sigma\lambda_i)^2 + \Sigma var(\varepsilon_i)]$;
Average Variance Extracted (AVE) = $(\Sigma\lambda^2_i)$ / n Where λ_i is the component loading to an indicator and $var(\varepsilon_i) = 1 - \lambda^2_i$; n is the number of items.

Table 3: Psychometric Properties of Measures

gain more meaningful data in evaluating users' adoption intention of a new OS and application software at the early stage. For this, personal innovativeness as an exogenous variable of moderating effects on full direct effects modes has been widely perceived as a relatively stable individual characteristic in the technology acceptance literature (Rogers, 1995; Agarwal and Prasad, 1998 a; Lu *et al*, 2008). This epitomized the risk-taking propensity to develop more positive intentions toward the use of an innovation. However, these studies did not further discuss how consumer attitude influences their intention to use an innovation, but was directly affected by

	USE	COMP	PI	RA	PLAY	ATT	INT
USE	**0.65**						
COMP	0.28	**0.63**					
PI	0.27	0.21	**0.52**				
RA	0.39	0.41	0.33	**0.86**			
PLAY	0.09	0.21	0.11	0.15	**0.60**		
ATT	0.14	0.18	0.11	0.28	0.34	**0.52**	
INT	0.18	0.14	0.19	0.10	0.13	0.20	**0.74**

Table 4: Construct and Inter-Construct Correlations

consumer perceptions about an emerging IT. Baron and Kenny (1986) elucidated a role of moderator effect within a correlation framework played as the direction of the correlation changes, from a strong to a weak relation, or to no relation at all, as opposed to finding a crossover interaction (p. 1174). To identify the important of moderator interactions effect, PIIT was used as a moderating variable for this study, divided into a high and a low group based on a median split following prior studies (Baron and Kenny, 1986; Dabholkar and Bagozzi, 2002; Im *et al*, 2008), because it was not a categorical variable such as sex or age. The interaction of PIIT on the core model was tested for high and low groups using the SEM technique. By comparing each path of completely standardized coefficient between two groups, it can be verified that, given an individual with higher PIIT, a positive relationship will be strengthened or attenuated from group difference and not arise from measurement errors (Baron and Kenny, 1986).

To determine whether moderating effects were truly presented and, in turn, resulted in their direction and significance, a rigorous procedure was adapted from Jöreskog and Sörbom (1996), which verified whether factor loadings were essentially the same or significantly different across the two groups (Dabholkar and Bagozzi, 2002; Im *et al*, 2008). The procedure was tested as follows: First, four models were explicitly defined and were individually pre-formed comparing the high and low groups for a moderating variable. Model A was defined as all factor loadings constrained across the groups, and the error variance of endogenous variables items was also constrained. Model B was defined as factor loadings free but error variance constrained. Model C was defined as both factor loadings and error variance free, and Model D was defined as factor loadings constrained but error variance free. Second, if Model A and D (or Model B and C) were compared with a significant difference, this difference would be caused by error variances in dependent variables. In each case, Model A and Model D were tested to be the same (the χ^2 of difference between two models was statistically non-significant), and Model B and C were also tested to be non-significantly different. Results indicated that by comparing both sets, error variances in dependent variables do not cause significant differences across the low and high groups.

Again, the test compared Model A and B (or Model C and D). If these results were significantly different from each other, this would be caused by the different factor loadings and path coefficients, which would imply that a moderating effect existed across the low and high groups (Dabholkar and Bagozzi, 2002; Im *et al*, 2008). Table 5 shows Model A and B (Model C and D were identical to Model A and B). The difference, χ^2, between the two models divided by the change in degree of freedom was tested to be statistically significant, and the model-fitting indices for Model A and B were significantly different, mainly caused by factor loading instead of error variances.

Moderating Variables	Model	χ^2	df	RMSEA	S.RMR	NFI	NNFI	CFI	GFI	AGFI	$\Delta\chi^2/\Delta df$
Personal	A	1333.11	390	0.055	0.052	0.95	0.96	0.96	0.90	0.89	4.86**
Innovativeness	B	1221.33	367	0.054	0.050	0.95	0.96	0.97	0.91	0.89	

Note: * Significant at $\alpha = 0.01$ level

Table 5: Structural equations results for moderating effects models

6. DISCUSSION

6.1 Moderating Effect of PIIT

The proposed hypotheses for a moderating effect are shown in Table 6. Higher PIIT strengthened the relationship between consumer perceptions of compatibility and their attitude toward using Windows 7 and Office 2010 (H_{1a}), and between consumer attitude and their adoption intention of Windows 7 and Office 2010 (H_{7a}), as hypothesized. Contrary to the predictions, a higher PIIT significantly attenuated (instead of strengthened) the relationship between computer playfulness and consumer attitude towards using Windows 7 and Office 2010 (H_{3a}). This does not reflect that individuals with higher PIIT facilitate those who often tend to interact spontaneously, inventively, and imaginatively with Windows 7 and Office 2010, but results in a positive individual attitude

Hypotheses for Core Model / Moderating Effects	Path Coefficient (standardized)			Strengthen/ Attenuated
	Whole sample [n =812]	Low PIIT [n=277]	High PIIT [n=535]	
H_1 : COMP → ATT	0.34**			
H_{1a} : COMP → ATT		0.05	0.24	S**
H_2 : PLAY → USE	0.24**			
H_{2a} : PLAY → USE		0.13	0.32	S**
H_3 : PLAY → ATT	0.44**			
H_{3a} : PLAY → ATT		0.43	0.27	COD
H_4 : RA → USE	0.27**			
H_{4a} : RA → USE		0.15	0.46	S**
H_5 : RA → ATT	0.17*			
H_{5a} : RA → ATT		0.33	0.31	NCH
H_6 : USE → ATT	0.32**			
H_7 : ATT → INT				
H_{7a} : ATT → INT	0.54**	0.32	0.45	S**

Note: * Significant at $\alpha = 0.05$ level.
** Significant at $\alpha = 0.01$ level.
S** = supported (change is in correct direction and ≥ 0.1).
S* = supported (change is in correct direction, ≥ 0.05 and < 0.1).
NCH = no change as hypothesized (i.e., change is < 0.05).
COD = change in opposite direction as hypothesized and ≥ 0.05.

Table 6: Structural equations results for hypotheses in whole sample and moderating effects

towards using them. As discussed previously, PIIT and computer playfulness were tested by Agarwal and Prasad (1998 a) in terms of distinct personality traits relevant to IT usage, but did not further shed light on the relationship between PIIT and computer playfulness. A possible explanation may be that individuals with higher PIIT are more willing to try out Windows 7 and Office 2010, but do not reflect a highly situation-specific characteristic of an individual's tendency to interact spontaneously, inventively, and imaginatively with a new OS and application software. That is, an individual with higher PIIT will not facilitate his or her higher tendency to interact playfully with a new IT, but will significantly attenuate an individual positive attitude when he or she is interacting with Windows 7 and Office 2010. The user would try some of the functions for the distinction between the incumbent system and the new system in the short run, and possibly consider replacing it fully.

Another relationship between relative advantage and attitude towards use (H_{5a}) was no significant change between two groups in PIIT. A reason might be that current users did not perceive some of the innovative functions provided by Windows 7 and Office 2010 to be more impressive than previous versions or did not excite their intrinsic motivation, but they took it for granted that new ideas or novelty features could be upgraded from existing products via a series of technical improvements some years later, and also users did not perceive the new systems as an innovation approach in the domain of IT. Thus, the relative advantage of Windows 7 and Office 2010's influence on individual attitude was considered irrelevant to an individual's PIIT.

Two unexpected relationships were found in this study. First, a higher PIIT strengthened the relationship between computer playfulness and perceived usability (H_{2a}). This would indicate that an individual with higher PIIT reflects a personality trait that presents his or her tendency to interact with a new system spontaneously, flexibly and imaginatively, and will facilitate performance of his or her tasks easily or efficiently. Second, a higher PIIT strengthened the relationship between relative advantage and perceived usability (H_{4a}), indicating that a new system, compared with an existing system, provides more innovative features, aspects of security, system stability and personalized applications for users who confidently expect to reach their specific goals effectively, efficiently and satisfyingly.

6.2 Managerial Implications

The results obtained in this research imply different managerial implications. First, this study suggests that the system providers or marketers should emphasize the important role of the perceived compatibility for individuals with higher PIIT. Currently, providers and marketers consider compatibility of a new system as being limited to meeting most users' lifestyles, prior experience or current needs in the context of IS, rather than more closely being compatible with users' personality traits, whose perceptions about a new system lead to a high willingness to try it out, especially when an emerging system is introduced into the market at the early stage. Second, the attitude-adoption intention relationship is also strengthened with higher PIIT, which has interesting implications for practice. Marketers, who expect that most users might be attracted by a new system, need to ensure that a user's positive or favourable attitudes toward a new system are already in place so that these behaviours (positive attitude or favourable attitude) will significantly cause them to use that innovative system instead of the status quo. Prior studies (e.g. Agarwal and Prasad, 1998 a, b) empirically tested whether the influence of a user's perception about a new IT on their intentions was directly influenced by and interacted with PIIT, but did not involve an individual's attitude and higher/lower PIIT. To confirm these relationships, findings from this study showed that individuals with higher PIIT, instead of lower PIIT, provided insights into the high likelihood of an individual's adoption intention toward a new system. By introducing PIIT as a moderating effect into the interactions between attitude and adoption intention toward a new system, it indicated that an individual's personality trait was significantly relevant to behaviour intentions only when he or she was perceived as having higher PIIT. This could be consistent with the expectation of adopter categorization in the innovation adoption; these users are termed 'early adopters' – they adopt new ideas relatively earlier than other members of a social system (Rogers, 1995). On the contrary, individuals with lower PIIT may have a propensity for less risk taking, and that may result in an attitude towards the use of a new system, but not intensively form adoption intentions towards a new system. They may be likely to try out a new system, mainly stemming from their curiosity or exploratory attitude, and deliberately evaluate it depending on various situations or environment.

Third, computer playfulness resulted in the opposite to what was hypothesized. With the prevalence of computer usage, high levels of playfulness deriving from a new OS and application software would facilitate an individual's positive attitude, mainly because computer playfulness was viewed as being a system-specific trait (Hackbarth *et al*, 2003) or individual characteristic (Atkinson and Kydd, 1997), but it ignores the factor which stems from an individual's perceptions. The playfulness concept, to most computer users to some degree, could easily be viewed as similar to ease of use and usability that results in increasing feelings of joy or pleasure in the WWW environment; if so, for lower PIIT individuals, their intrinsic motivation would be greatly facilitated because they easily fall into a playful state during their interaction with a new system. Marketers of Windows 7 and Office 2010 view them as providing more human-computer interfaces for current users, and expect that users will be highly involved in the activity with pleasure and enjoyment.

In addition, two unexpected findings from the empirical tests showed that, with a greater PIIT, the influence of both computer playfulness and relative advantage on usability would be strengthened. It indicates that individuals with higher PIIT would easily predict their attitude and adoption intention towards a new OS and application software if the innovations are perceived as being better than using its precursor. New multimedia capabilities and the advent of virtual reality to a new OS and to new application packages offer new ways to further increase current users' positive attitude. Concurrent with new playfulness-enhancing technology, system designers have growing abilities to customize and individualize systems. Finally, the influence of relative advantage on attitude indicates no difference across the groups. Compared with Windows XP or Vista, Windows 7 provides more innovative features in terms of system flexibility, virtualization and stability for life and work. But, from the perspective of IT development, general users take these features for granted, possibly because they make no difference in innovation technologies, and do not result in a positive attitude for different groups.

7. LIMITATIONS AND RESEARCH DIRECTIONS

There were some limitations for this research regarding the sample methods and research constructs. First, two sample groups for different subjects were sampled over different time periods, a similar approach but not truly a longitudinal study. Second, this study focused on exploring users' adoption intention at the early stage of Windows 7 and Office 2010, not actual usage. Third, some of the unique characteristics of a technological adoption process are not considered to be involved in the core model of the present study, including other moderating factors such as situational factors (self-efficacy or cost) and user identity (age, gender or prior experience). These may result in different responses to potential users adopting Windows 7 and Office 2010. The current research has provided a conceptualization and operational measure of both individual perceptions of a new operating system and their intrinsic motivation, and has provided a better understanding of what kind of technological features influence potential users' perceptions that form during the browsing process; this may help marketers to meet individual user needs more effectively.

In addition, future research could introduce another operating system, such as Apple Mac OS, a Unix-based graphical operating system which is becoming an increasingly popular OS. Comparing different operation systems and segmenting individual user traits could differentiate early adopters from general users, and would be useful for both academicians and professionals, in that it would help them to better understand consumer behaviour in the emerging operation systems environment.

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