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A New Theory of Technology Usage

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Keywords: dual-purposed IT, needs-based perspective, pleasure-oriented IT, productivity-oriented IT, theory of technology usage, TTU

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A New Theory of Technology Usage

Introduction

Understanding individuals' IT usage has become a major research topic in the field of information systems (IS) (Straub and Burton-Jones 2007). Since the 1980's, a conceptual framework, rooted in the theory of reasoned action (TRA), has been developed to explain technology usage and has been employed by many scholars as the basis for their own work (Ajzen and Fishbein 1980; Davis 1989). This framework, summarized in Figure 1, suggests that the most important predictor of IT usage is an individual's intention to use the technology, which in turn is determined by the individual's perceptions about the usage (Davis et al. 1989). As Schwarz and Chin (2007) suggest, perceptions are very broad and complex, covering appraisals of the technology, social pressure, abilities of the user, benefits of performing the behavior, and so forth. Examples of some important perception-based constructs are perceived usefulness, perceived ease of use, and perceived behavioral control (Davis 1989; Pavlou and Fygenson 2006).

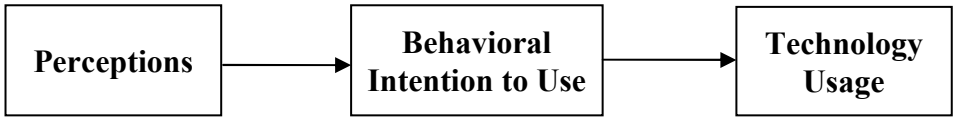

Figure 1: The Traditional Framework of Technology Usage

In spite of its popularity and significant contributions, there is a growing concern that the traditional perception-intention-usage framework is deficient in a number of important respects (Bagozzi 2007; Benbasat and Barki 2007). First, as an intention-based behavioral model, the framework is concentrated on behavioral intention rather than on usage (Taylor and Todd 1995).

Second, its predictive ability may be limited when applied to technologies used for pleasure and fun—blogging, gaming, music downloading, and photo or video sharing (van der Heijden 2004). Third, the framework is far from being satisfactory in explaining technology usage (Lee et al. 2003; Straub and Burton-Jones 2007). Finally, the intention-usage relationship is questionable and its underlying logic remains debatable (Sheeran 2002).

In light of these gaps, the current paper presents a preliminary effort to develop the theory of technology usage (TTU). The proposed new theory attempts to advance theoretical understanding of system usage and to direct future research toward new avenues. The purpose of this paper is thus to offer a new perspective on IT usage that draws on a literature so far largely unconsidered in theorizing about user behavior, and that synthesizes the various parts of this literature to develop an integrated way of predicting IT usage. As a conceptual breakthrough, this innovative perspective leads to the creation of a new theoretical model that differs from the traditional perception-intention-usage framework.

This article is organized around three main themes. The first concerns a detailed discussion of the deficiencies of the traditional framework, thereby providing a context for appreciating the necessity to develop new theories of IT usage. The second is to review the literature related to our new perspective—the needs-based perspective—and to synthesize the literature into a more coherent body of knowledge—the theory of technology usage. The third is to propose a conceptual model of IT usage with its basis on TTU and to provide a foundation and stimulus for empirical research into the model. As part of this third theme, the paper identifies some major variables, propositions, and methodological suggestions.

Deficiencies of the Traditional Framework

Deficiency of Attention on Usage

The traditional perception-intention-usage framework is also known as an intention-based behavioral model because it assumes that technology usage occurs with the formation of intention to use (Taylor and Todd 1995). In other words, the framework is concentrated on behavioral intention (Davis et al. 1989). This concentration has led to an important dysfunctional consequence, that is, IS researchers have intensively studied behavioral intention but given comparatively little attention to technology usage. For instance, in a meta-analysis of research on technology-use behavior, Lee and his colleagues (2003) find that among 99 individual studies, only 15 of them investigate usage and all of the remaining concentrate entirely on behavioral intention. This indicates that most IS scholars prefer to use behavioral intention rather than usage as the ultimate dependent variable in their research models.

However, given that the utmost objective of user behavior research is to explain technology usage, it is unjustifiable and unreasonable to focus intensively on behavioral intention rather than on usage. Moreover, this deficiency of attention on usage can result in a superficial and stereotypical understanding of the behavior of using an information technology and in losing opportunities to investigate the direct and indirect effects of perceptions on usage. Therefore, it is necessary and desirable to have a theory that is entirely concentrated on and completely built around technology usage.

Deficiency of Studying Pleasure-Oriented IT

When the traditional framework of technology usage was developed in 1980's, information technologies are predominately single-user systems employed in an organizational context to enhance productivity and efficiency (Chesney 2006). Therefore, these technologies are

known as productivity-oriented IT, such as groupware, spreadsheets, word processing, operating systems, and customer-account management systems (Massey et al. 2007). Formally, productivity-oriented IT can be defined as information systems developed to improve individual, group, and organizational productivity by enhancing end users' abilities to create, store, retrieve, and otherwise process information needed for performing relevant tasks (e.g., transaction processing, decision making). Naturally, the traditional framework developed at that time aims to explain the behavior of using productivity-oriented IT and to reflect the utilitarian nature of the technologies (van der Heijden 2004). To meet this aim, IS researchers theorize that the framework should explain how an information system can help users better perform their jobs and how easy it is for the users to use the system. Thus, the identified key perception variables are perceived usefulness (PU) and perceived ease of use (PEOU) (Davis 1989).

However, with the emergence and development of the World Wide Web, IT evolved from single-user systems in an organizational context to web-based systems supporting many widely-distributed users in a social network setting. More to the point, such web-based systems are often not entirely productivity-oriented but rather have substantial pleasure-oriented qualities (Starbuck and Webster 1991). For instance, most of the Web 2.0 technologies noted earlier (i.e., blogging, gaming, and video sharing) are not used for job productivity but for pleasure and relaxation. This indicates that IT progression can be viewed as an evolutionary process from productivity-oriented IT to encompass pleasure-oriented IT. By the latter, we mean the information systems that are based on Web technology, enabled by the Internet, and used by people for pleasure and fun.

As IT evolves from productivity-oriented to encompass pleasure-oriented systems, the explanatory power of the traditional framework may be affected or correspondingly limited (van

der Heijden 2004). This is because the evolution has created conditions under which traditional perception variables have largely ceased to be sole salient determinants (Benbasat and Barki 2007). Some prior studies find that this is really the case (Hsu and Lu 2004; Li et al. 2005). Such a finding indicates that the traditional framework of IT usage may not work very well for pleasure-oriented IT and that the pleasure nature of an information system may be an important boundary condition to the validity of the traditional framework (van der Heijden 2004). Therefore, new theories are called forth to improve our understanding of using technologies encompassing pleasure-oriented.

Deficiency of Explaining Technology Usage

Despite its key role in the traditional framework, technology usage has been relatively insufficiently explained (Lee et al. 2003). For example, applying the framework to popular software applications, Adam and his colleagues (1992) find that the framework can only explain 15%, 4%, 35%, and 30% of the variance in the usage of Email, WordPerfect, Lotus 1-2-3, and Harvard Graphics, respectively. Similarly, investigating personal computing acceptance factors in small firms, Igbaria and his colleagues (1997) find that the framework can only explain 25% of the variance in usage. Even with a large number of antecedents, the explained variance in usage remains largely unimproved, averaging around 30% (Burton-Jones and Straub 2006). More notably, synthesizing previous empirical studies on technology acceptance and usage, Wu (2009) shows that in average, the traditional framework may only explain as low as 14% of the variance in usage. Taken together, the fact that at least 70% of the variance is unexplained suggests the deficiency of the traditional framework and the need for new theories on which more robust research model can be built (King and He 2006).

Deficiency of the Intention-Usage Relationship

Although the intention-usage relationship is grounded on a theory (i.e., TRA), its validity and reliability has been seriously questioned by some scholars. For instance, Warshaw and Davis (1985) argue that many human behaviors are unreasoned, determined not by conscious intentions but by non-cognitive habits or mindless scripts. They further argue that actual behaviors can also be influenced by a variety of factors over and above the present intention, such as anticipated changes in intention, ability limitations, and possible environmental facilitators/constraints. Similarly, Rhodes and his colleagues (2003) also suggest that intentions are not always tightly linked to what people really do. This is because intentions are often under cognitive control while actual behaviors are usually performed impulsively, even unconsciously. For this reason, Rhodes and his colleagues contend that researchers need to do more work on evaluating the accuracy of intentions data that they collect. Specifically, they should follow-up to see if individuals surveyed actually perform the behavior of interest over the specified time periods.

The time gap between measurement of intention and performance of behavior also concerns researchers. Warshaw and Davis (1985) suggest that the time lag between measuring intention and usage can inevitably reduce the correspondence between current intention and future usage. In a study investigating the issues related to intention-behavior consistency, Pieters and Verplanken (1995) point out that when people change their mind during the time gap, the original intention will also no longer correspond with the actual behavior. That is, intention-behavior consistency will be very low and the behavior is unlikely to occur. Similarly, Sheeran and Orbell (1998) find that the intention-behavior relationship tends to diminish when the time gap between the two exceeds a few months.

As discussed above, behavioral intention is formed prior to the actual usage and the gap in time can be large (Bagozzi 2007). During this large time gap, events causing a change in intention may occur and the behavioral intention formed earlier may decrease and even disappear (Sheeran and Orbell 1998). Thus, the predictive accuracy of the measured intention tends to be low and the intention-usage relationship is likely to be weak. Moreover, environmental and/or personal impediments may also prevent the technology usage behavior from being enacted. Not surprisingly, researchers suggest that present intention may not be the direct and effective determinant of future technology usage (Pieters and Verplanken 1995).

The Needs-Based Perspective on Behaviors

Much of the work related to needs-behavior relationship has focused on the question of why certain behaviors are desired. This focus, which can be seen in the early writings of McDougall (1908), Engle (1904), and Woodworth (1918), has a significant and long lasting effect. That is, it leads researchers to investigate the energization (i.e., motivation) rather than the direction (i.e., process) of behavior (Deci et al. 1991). The research in this stream proposes that behavior is motivated by human needs and is performed to satisfy such needs (Maslow 1943). Below, we review some important findings about the needs-based perspective on behaviors.

Maslow's hierarchy of needs

In an attempt to formulate a theory of motivated human behavior, Maslow (1943) has developed the Hierarchy of Needs model. The theoretical basis of the model is that human behaviors are motivated by unsatisfied needs, and that certain lower needs must be satisfied before higher ones can be met (Maslow 1954). As such, the five-stage model is often portrayed in the shape of a pyramid, with the lowest level of need at the bottom and the highest at the top. Figure 2 shows the model.

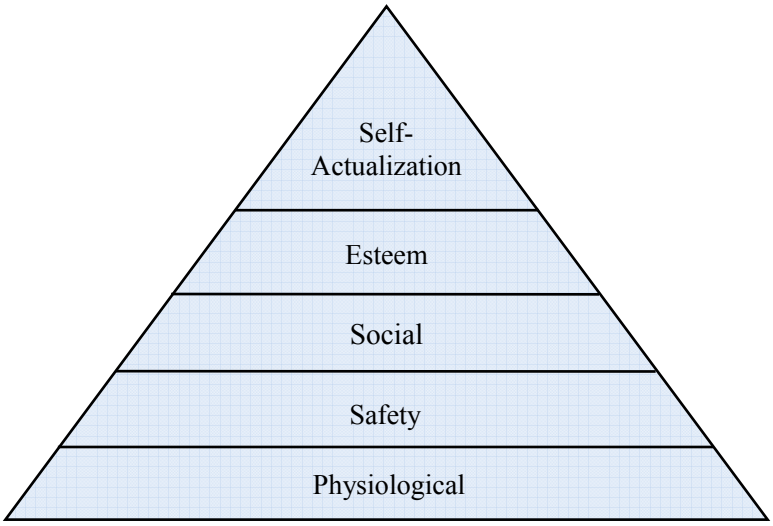

Figure 2: Maslow's Hierarchy of Needs

According to Maslow (1943; 1954), many human behaviors are in fact motivated by these basic needs. The physiological needs are the literal requirements for human survival and thus are tied to instinctive behaviors such as eating food and drinking water. The safety needs can be seen as a preference for a predictable and orderly world, in which unfairness and inconsistency are under control and unmanageable or dangerous things do not happen. The safety needs may manifest themselves in such behaviors as building fences and installing locks. The third layer is social, including needs for love, affection, and belongingness. Examples of associated behaviors involve joining a religious group and giving and receiving love. The esteem needs reflect normal human desire to be accepted, valued, and respected by others. Such needs often motivate an individual to work hard to gain promotion or to study diligently to maintain good grades in school. The top level of needs, self-actualization, refers to the desire for self-fulfillment, that is, the desire to become more and more what one is, to become everything that one is capable of becoming. The self-actualization needs may explain why a poet writes, an artist paints, and a musician makes music. Maslow's Hierarchy of Needs remains valid today for

understanding motivated human behavior and for managing workforce and reward system (Cianci and Gambrel 2003).

The Need for Competence

Woodworth (1918; 1958) argues that behavior is generally aimed at producing an effect on the environment and the behavior is ongoing and primary. This suggests the existence of a need for being effective in one's interactions with the environment (Deci and Ryan 1985). More to the point, this need is the energy behind many activities such as learning survival skills and exploring unknown lands. Later, seeing capacity as the accumulated result of one's interaction with the environment, White (1959) uses the term *competence* to connote this need. Therefore, competence here refers to the capacity for effective interactions with the environment, which is critical to better human life. According to White, there is inherent satisfaction in exercising and extending one's capacity.

It is important to note that experientially, competence motivated behavior is engaged in for the direct, immediate reward of performing the activity, not for the sake of acquiring the resulting skills and abilities that maximize fitness and the probability of survival (Deci and Ryan 2002). This point can be illustrated by using a singer as an example. Generally, for a singer, the ultimate aim of performing on a stage is to earn money and make a living, but experientially, singing in front of an audience is engaged in for the immediate pleasure and gratification that accompanies the activity itself. In addition, Deci (1975) argues that the need for competence usually leads individuals to seek and conquer challenges that are optimal for their capacities, and that competence results from interacting with stimuli that challenging. This argument is supported by the finding that when children are free to select the activities they will participate,

they tend to choose those that are just beyond their current level of competence (Danner and Lonky 1981).

The Need for Self-Determination

DeCharms (1968) proposes that the need for self-determination is a contributing factor in all motivated behaviors, though it is the central force only for intrinsically motivated activities. Self-determination is a quality of human functioning that involves the experience of choice, that is, the experience of an internal perceived locus of causality (Deci and Ryan 1985). Thus, the need for self-determination can be viewed as a desire to choose and control, rather than being forced to perform, one's activities. This need often leads individuals to engage in interesting behaviors, which typically has the benefit of developing capacities and of working toward a flexible accommodation with the social environment (DeCharms 1968).

When self-determined, individuals act out of choice rather than obligation or coercion, and those choices are based on an awareness of their needs and on a flexible interpretation of external events (Deci and Ryan 1985). In addition to controlling one's activities, self-determination generally also involves a control over environment and outcomes. This suggests that individuals tend to perform activities that they can control. When performing self-determined activities, individuals act autonomously, regulate their own behaviors, and respond to events in a manner filled with psychological empowerment. In other words, the individuals act in ways that make positive use of knowledge and understanding of their own characteristics, strengths, and weaknesses (Wehmeyer et al. 1996). Self-determined individuals are those who set goals, see options, make decisions, speak up for themselves, and are likely to do whatever they can to achieve success (Martin & Marshall, 1996).

Summary of the Research on Human Needs

Early work in psychology has established that there exist various levels of human needs and that such needs can be the primary drives of behaviors. Subsequent research on this topic further indicates that human needs motivate not only instinct behaviors such as sleeping and eating, but also social activities like performing music and joining a sport club. Although these various needs may be equally valuable, it is important to note that a central human need is to be effective in interactions with the environment, which serve the fundamental purpose of improving human life. While it may be crude to claim that human needs are contributing factors in all motivated behaviors, it is definitely a serious mistake to fail to consider human needs in the context of using information technology. To fill this critical gap in the literature, we propose the theory of technology usage that integrates a needs-based perspective into a context-aware framework.

The Theory of Technology Usage

Perhaps, the most frequently asked questions about technology usage are "why" questions. "Why Tom is using Microsoft Word?" "Why did Linda visit the website of eBay last Saturday?" "Why are these students interested in playing online games?" IS researchers are eager to find answers to these questions. They want to know the causes of these behaviors.

In this paper, we contend that these "why" questions fall within the research domain of needs-behavior relationship and can be adequately addressed by needs-based perspective. More specifically, we contend that these behaviors are motivated by various personal or professional needs and are performed to satisfy such needs. To flesh out these theoretical contentions into a scholarly contribution, we propose the theory of technology usage. Figure 3 depicts the theory in the form of a conceptual model.

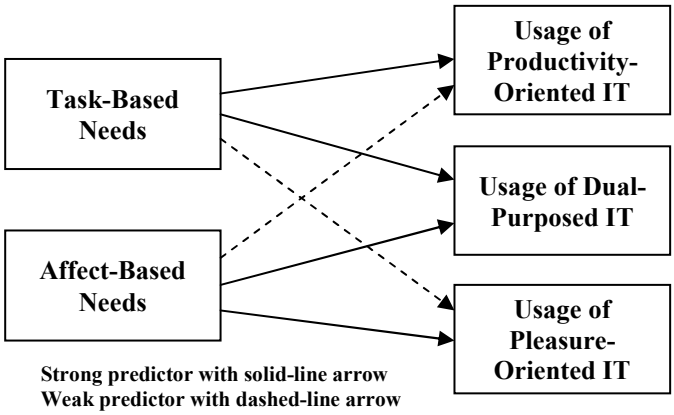

Figure 3: The First Model of the Theory of Technology Usage

Unlike the traditional framework of technology usage, the TTU does not include behavioral intention, but proposes that technology usage can be directly predicted by two groups of determinants: task-based needs and affect-based needs. The dependent variable, technology usage, is divided into three categories, based on the trichotomization of information technology: productivity-oriented, pleasure-oriented, and dual-purposed. Previous research suggests that some technologies can be used for both productivity and pleasure (Chesney 2006; Starbuck and Webster 1991). Hence, it is rational to expect the existence of another broad category of technology that has dual functional purposes—improving productivity and providing fun. As used here, dual-purposed IT refers to information systems that can be utilized by individuals either to perform their job/school related activities or to have fun and enjoyment.

As a context-aware model, the TTU asserts that the predictive significance of task- and affect-based needs is context dependent. Specifically, it proposes that in the context of productivity-oriented IT, task-based needs are strong predictors whereas affect-based needs are very weak ones; in the context of pleasure-oriented IT, their predictive abilities reverse; in the context of dual-purposed IT, they both are strong predictors. The TTU can thus be represented in a different form with a moderator of "the purpose of the IT" (Figure 4).

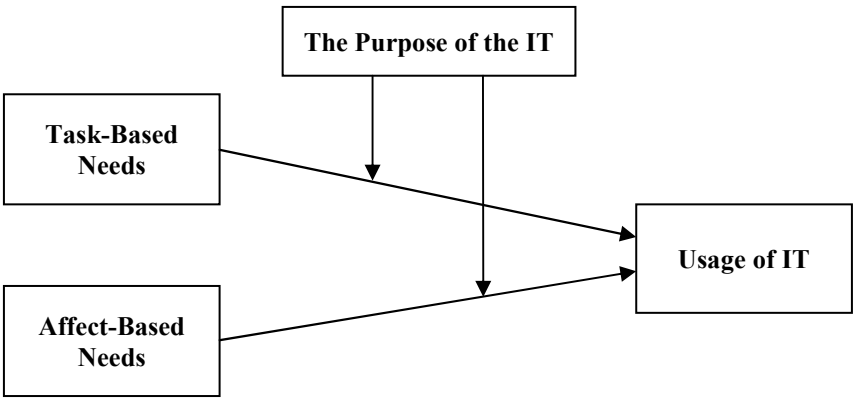

Figure 4: The Second Model of the Theory of Technology Usage

Task-based needs refer to the desires to use a particular information system to accomplish tasks. This group of needs is the energy behind behaviors of using many enterprise software applications such as customer relationship management systems, enterprise resource planning systems, and supply chain management systems (Jeyaraj 2006). They can also be the primary drivers of using numerous personal software applications such as spreadsheets, word processing, and electronic tax-filing systems (Habelow 2000). It is important to note that these enterprise or personal software applications are mainly productivity-oriented, suggesting that task-based needs should be strong predictors of usage of both productivity-oriented and dual-purposed IT. On the contrary, task-based needs are likely to be weak predictors of usage of pleasure-oriented IT in that this category of technology is primarily not designed and used to satisfy job/school related tasks, such as managing customer accounts and writing a research paper.

Affect-based needs can be defined as the desires to use a particular information system to attain a positive psychological state. This group of needs is theorized as the key drivers of using pleasure-oriented IT because the technology is mostly used to get positive emotional states such as flow and enjoyment (Hsu and Lu 2004). For the same reason, this group of needs is also regarded as the salient determinants of usage in the context of dual-purposed IT. In other words,

the IT is also employed by individuals for emotional rewards. In contrast, these needs are expected to play a relatively weak role in predicting the usage of productivity-oriented IT in that this category of technology is not designed and employed for the purpose of experiencing pleasure and having fun.

Support for the TTU comes not only from the need-based perspective in psychology discussed earlier, but also from theoretical perspectives in IS field. For instance, focusing on the linkage between information systems and individual performance, Goodhue (1995) posits that technology usage is highly related to the task-technology fit (TTF), which is defined as the degree to which system characteristics match user task needs. More to the point, the TTF perspective suggests that users will evaluate, accept, and use an information system when it provides features and support that fit their task needs. In a related vein, Liang and Wei (2004) draw on the TTF perspective to develop the fit-viability framework for assessing the success or failure of m-commerce applications. The framework recognizes that the fit between mobile technology characteristics and task needs is critical to the acceptance and success of the m-commerce application.

Support for the TTU also comes from IS research that focuses on the effects of user needs in various contextual situations. For example, Kappelman and McLean (1991) find that when user participative behaviors are studied in combination with user needs-based attitudes, the relationship between user participation and system success will be stronger than when researchers consider only user participation. According to McKeen et al. (1994), system success is a very broad concept and can be measured in terms of system usage. Therefore, the finding suggests that user needs will have a positive and significant effect on system usage. Focusing on IT consulting service, Iyer and colleagues (2006) argue that procurement and usage of IT is

needs-based and can be interpreted by using resource-based view of the firm. In particular, they suggest that IT is procured and used by organizations as a valuable resource to accommodate their needs for sustained competitive advantage.

The direct link between needs and technology usage is also buttressed by the fact that information systems are generally designed and used to fulfill different needs (Habelow 2000). Microsoft Word is designed and used to satisfy the need for producing and processing basic documents; supply chain management systems are developed and employed to fulfill the need to monitor a supply chain to ensure process integrity and quality; electronic commerce systems are built up to accommodate the need of buying and selling products or services over the Internet. All these examples clearly indicate the theoretical importance of various needs as vital determinants of technology usage (Jeyaraj 2006).

Testing the TTU

There are several issues that need to be addressed in order to test and apply the theory. Here, we outline these issues and suggest approaches for dealing with them.

First, to recognize and understand system usage context, researchers must have a simple and workable way to trichotomize their target information systems into productivity-oriented, pleasure-oriented, or dual-purposed. To settle this issue, we propose a two-step procedure. The underlying assumptions of this procedure are (1) if a system is mainly used for work/school only, then it is regarded as productivity-oriented, (2) pleasure-oriented systems allow users to have fun and are primarily used for non-school related personal purposes such as gaming, (3) a system widely used for personal purposes can also be productivity-oriented if users are not very likely to have fun in using it (i.e., the system only improves individual task efficiency), and (4) if an

information system can be regularly used for work/school, it must have substantial productivity-oriented qualities and thus can not be categorized as purely pleasure-oriented.

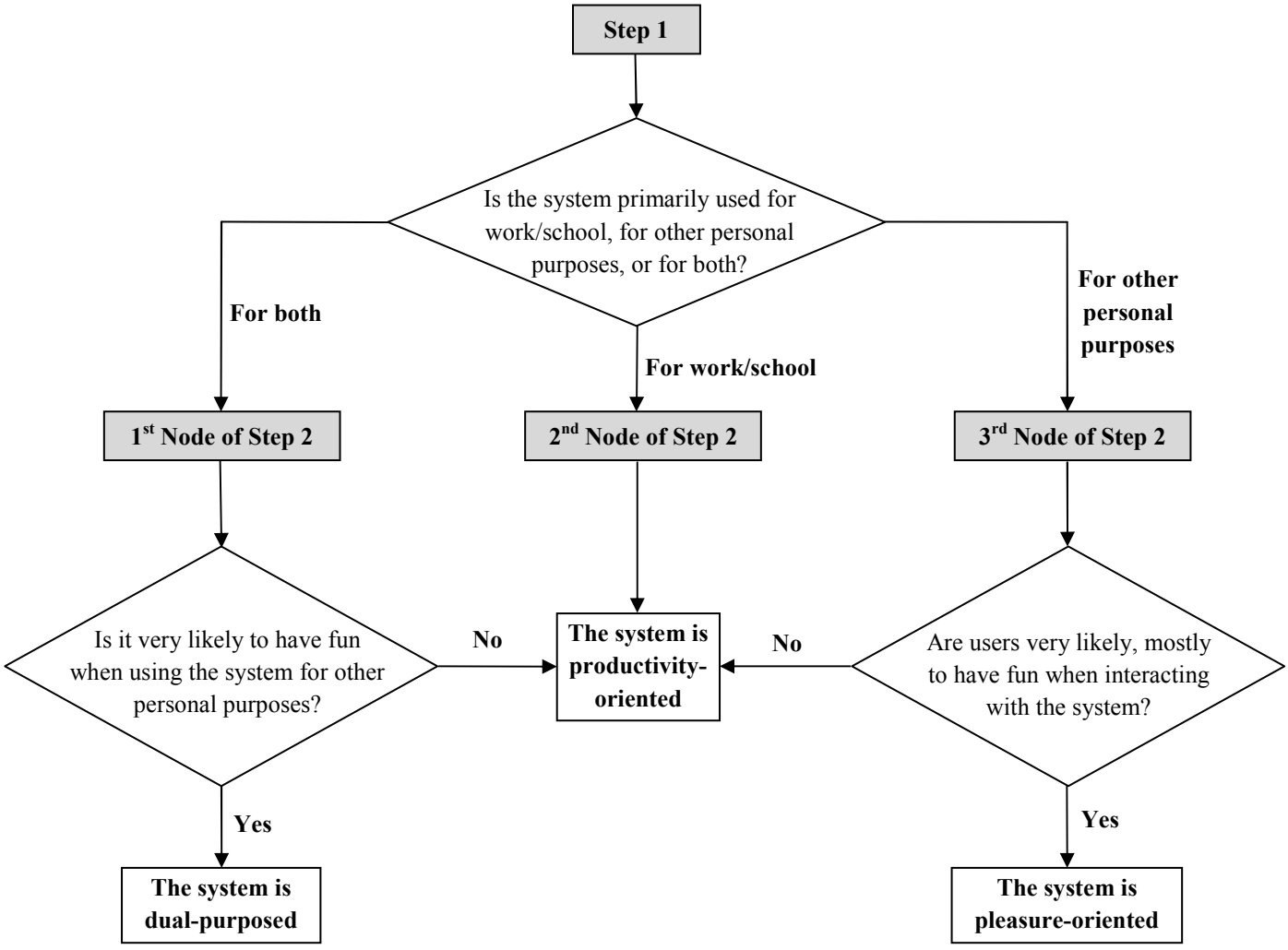

Figure 5: A Two-Step Procedure for Categorizing IT

With these assumptions, we illustrate the two-step procedure as a flow diagram in Figure 5. The first step is to identify whether the system is commonly and widely used for work/school, for other (non-school related) personal purposes, or for both. If it is for both, then go to the first node of Step 2; if it is mainly used for work/school, then go to the second node; if it is primarily used for other personal purposes, then go to the third node. The goal of the second step is to

judge whether users are very likely to have fun when using the system for other personal purposes. If users are and it is at the first node, then the system is categorized as dual-purposed (assumption 4); if users are and it is at the third node, then the system is categorized as pleasure-oriented (assumption 2). At both the first and third nodes of Step 2, if users are not very likely to have fun, then the system is categorized as productivity-oriented (assumption 3), as is always the case at the second node (assumption 1).

Second, although measures for independent variables are not readily available, useful ideas on how to measure them can still be obtained from the extant literature. Specifically, Maslow (1954), DeCharms (1968), and Deci and Ryan (1985) suggest that when studying human needs, a researcher must take into account their three important characteristics: level, frequency, and duration. In IS domain, level of needs largely relates to the hierarchy of system functions. For example, the highest level of function of Microsoft Word may be regarded as processing documents, which can be further specified into a lower level of two functions—creating new documents and modifying existing documents. Studying level of needs can thus be seen as to investigate the needs of using different levels of system functions. Frequency refers to how often a need arises and can be evaluated on a daily, weekly, monthly, or even yearly basis. Duration refers to how long a need lasts and can be assessed in minutes, hours, or even days. The independent variables can thus be measured in terms of frequency and duration of the needs at different levels. Using the same example, task-based needs for Microsoft Word can be measured in terms of the frequency and duration of the needs of processing documents (1st level) and of creating new documents and modifying existing documents (2nd level). Although affect-based needs may be irrelevant in this example of productivity-oriented IT, they can still be measured in

terms of the frequency and duration of the needs for pleasure, fun, or joy by processing documents, creating new documents, and modifying existing documents.

Third, with respect to the dependent variables, measures can be readily obtained from the IS literature. Previous research has measured system usage in terms of actual-usage, self-reported-actual-usage, and degree-of-usage. Actual-usage is an objective measure and usually requires the use of system logs to collect data. For example, Lu and Gustafson (1994) set the target system to record how many times the subjects use the system during a 5-month period. Self-reported-actual-usage is subjective and is commonly measured by asking research participants to report on their frequency and duration of using a target system. In general, frequency is indicated by number of times per day or week, while duration is determined by number of hours used daily or weekly. Please note that this set of frequency and duration differs from that discussed earlier. This set is used to measure usage, whereas the other is employed to assess needs. Occasionally, self-reported-actual-usage is measured by asking respondents the number of tasks performed by using the target information system. For example, Adams et al. (1992) ask their survey subjects to report the number of email messages they send and receive on a typical day.

As a subjective measure, degree-of-usage gauges the intensity and extent of using an information system on an ordinal scale. Specifically, users are asked to indicate the amount of time spent on a target system per day on a six-point ordinal scale ranging from (1) “almost never” to (6) “more than 3 hours per day,” and to report their frequency of usage on another six-point ordinal scale ranging from (1) “less than once a month” to (6) “several times a day.” Apparently, the application of an ordinal scale constitutes the key difference between degree-of-usage measure and the aforementioned two measures for actual-usage and self-reported-actual-usage.

In subsequent work, researchers have extended this measure to investigate other dimensions of system usage. For instance, using a five-point ordinal scale ranging from (1) "not at all" to (5) "a great extent," Igbaria (1993) assesses the extent of using different software packages and the extent of using a target system for different business tasks.

The fourth issue involves whether both task- and affect-based needs should be studied in the context of productivity- or pleasure-oriented IT. We think that in order to better understand the determinants of usage of different systems, it is necessary and important to study task-based needs in the context of pleasure-oriented IT, and vice versa. At the same time, it is also certain that when researchers are studying productivity-oriented IT, they should focus their major attention on task-based needs and include into their research models as many such needs as possible. Alternatively, if their target information system is pleasure-oriented, they should have more affect-based than productivity-based needs as determinants and concentrate their main research efforts on the former.

Discussion

This article is motivated by the remarkable observation that the traditional intention-centered framework has limited ability to predict system usage and has low explanatory power for pleasure-oriented IT. Information technologies have evolved from productivity-oriented to encompass pleasure-oriented systems and their roles have changed toward providing social and leisure functions (Benbasat and Barki 2007). Our main objective is thus to develop the theory of technology usage to cope with this evolution. The new theory draws heavily from the needs-based perspective and explicitly takes into account different system use contexts. To advance our thoughts about the theory, below we discuss some important insights and implications.

Insights into the Theory

One major problem with the traditional framework is that it pays little attention to the behavior of using pleasure-oriented IT and thus leaves its independent variables with little value in predicting such usage. This can be illustrated by the following example. As a key construct in the traditional framework, perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis 1989, p. 320). Although perceived usefulness is a very influential determinant in the context of productivity-oriented IT, it is unlikely to work well or be of much use in the setting of pleasure-oriented IT (van der Heijden 2004). This is because usually there is no specific job associated with blogging or online gaming; individuals use pleasure-oriented IT for fun and leisure but not for a job. Therefore, job performance has nothing to do here and perceived usefulness is doomed to lose its predictive power.

This issue has been appropriately addressed by the TTU. By incorporating both task- and affect-based needs, the theory enables researchers to effectively study both productivity- and pleasure-oriented IT. More importantly, it also allows them to investigate the "usefulness" of a system through the broadly conceptualized construct—task-based needs. In particular, the "usefulness" of a system can be examined by asking users to evaluate their needs of using the system to enhance their job performance.

Another important independent variable in the traditional framework, perceived ease of use, is defined as "the degree to which a person believes that using a particular system would be free of effort" (Davis 1989, p. 320). Perceived ease of use is not captured by the TTU in that we think it plays a less important role nowadays for two reasons. First, over the last two decades, system design has developed rapidly to a point where standardized modules and interfaces are routinely employed to create information systems that are user-friendly and easy to navigate

through (Hoffer et al. 2008). Consequently, most of today's information systems tend to be easy to use. Second, as personal computers have become ubiquitous, most of contemporary system users have turned into well-experienced ones. Thus, these veteran users are likely to perceive most information systems as easy to use (Li et al. 2005). Hence, we think ease of use is less likely to be a deciding factor than it was ten or twenty years ago.

Our expectation that ease of use is less important than task- and affect-based needs is also in line with our answers to those "why" questions presented earlier. There is no doubt that reasonable persons would like to use a system that they find easy to use. However, ease of use per se is not the cause of using the system, but are the task- or affect-based needs. In other words, people use Microsoft Word not because of its ease of use but simply because of its capability to satisfy their task-based needs of processing documents. To sum up, ease of use is not a primary determinant but a secondary factor, and thus is not incorporated into our theory.

It is important to note that task-based needs tend to be examined differently for different information systems. Specifically, the way they are examined largely depends on the task that users can accomplish by using the system. For example, unlike a word processing system, an electronic commerce system allows users to accomplish the task of shopping online. The task-based needs thus can be examined in terms of the need to purchase products online and the need to search the website for product information or reviews. Future research should be cautious in this matter and select appropriate methods.

Implications for Researchers

From a perspective of theory advancement, the propositions and concepts underlying the TTU provide important implications for future research. In any context of system use, there are opportunities to apply and validate the TTU, refine and expand the model, and test its boundary

conditions. By doing so, future empirical research can enrich our understanding of task- and affect-based needs and of their direct impacts on usage in different system use contexts, and thus can provide more useful recommendations for practice.

The current paper has provided the theoretical basis for task- and affect-based needs and has discussed some of their measurement issues. However, it has yet to offer an overall measurement instrument for them. Consequently, future research is necessary to create valid and reliable scales to measure task- and affect-based needs. The creation process often include reviewing existing relevant instruments, selecting and modifying appropriate items, creating new items if necessary, and then undertaking an extensive scale development process to establish validity and reliability (Moore and Benbasat 1991).

Future research can also address how other variables relate to task- and affect-based needs in predicting system usage. Given that perceptions are key determinants in traditional IT usage framework, it should be of great value to study task- and affect-based needs together with perception variables such as perceived usefulness, perceived ease of use, and perceived behavioral control. Likewise, researchers can compare the predictive significance between the needs and the perceptions, as well as the explanatory power between the traditional framework and the conceptual model developed in this paper. Such future research in a particular context, be it productivity-oriented, pleasure-oriented, or dual-purposed, will be very helpful in our better understanding of behaviors of using different information systems.

Affect-based needs mainly involve the psychological needs for fun, pleasure, and flow. Fun refers to the psychological state of enjoyment; the need for fun thus can be seen as the desire to enjoy using an information system. Pleasure refers to the psychological state of feeling good or happy; the need for pleasure thus can be viewed as the desire to feel good or happy with using

an information system. The need for flow refers to the desire to attain psychological state in which people are so involved in using an information system that nothing else seems to matter (Csikszentmihalyi 1990). Other important affect-based needs are for playfulness and arousal. The former refers to cognitive spontaneity in information system interactions (Webster and Martocchio 1992), while the latter is defined as the psychological state of feeling excited, stimulated, or active when using an information system (Holbrook et al. 1984). To thoroughly investigate and compare these critical affect-based needs, future empirical work is encouraged.

Conclusion

We have developed the theory of technology usage, reviewed its research base, and discussed how it can be applied to different system use contexts. The theory incorporates the core concepts of the needs-based perspective on behaviors, and maps these concepts in a way that permits prediction and understanding of technology usage. We have also emphasized that as IT evolves from productivity-oriented to encompass pleasure-oriented technologies, researchers must trichotomize their target systems. Future research is expected to empirically test the theory and to advance the methods required to test it.

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