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Research Article

Effects of Extrinsic and Intrinsic Motivators on Using Utilitarian, Hedonic, and Dual-Purposed Information Systems: A Meta-Analysis

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Abstract

While many studies have found that perceived usefulness—an extrinsic motivator—is the strongest determinant of using utilitarian systems, others have found that it is less important than perceived enjoyment—an intrinsic motivator—in predicting hedonic system usage. In light of these interesting but mixed findings, our research applies the motivation theory to investigate the effects of extrinsic and intrinsic motivators on system-use behavior in utilitarian, hedonic, and dual-purposed contexts. We then construct associated hypotheses and empirically test them by analyzing data collected from the literature. The results generally confirm our prediction that, in the context of utilitarian systems, extrinsic motivators are more important than intrinsic motivators, whereas, in the context of hedonic systems, intrinsic motivators play a more critical role than extrinsic motivators. The results thus substantiate our contention that, when information systems vary from utilitarian to hedonic, the most important determinants shift from extrinsic to intrinsic motivators. This paper contributes not only to a new application of the motivation theory to IT adoption, but also to an integrated and in-depth analysis of motivators, which may reorient IS scholars toward potentially more fruitful avenues for studying user behavior.

Keywords: *Behavioral Intention, Dual-Purposed IT, Enjoyment, Extrinsic Motivation, Flow, Hedonic, Image, Intrinsic Motivation, Job Relevance, Motivation Theory, Perceived Ease Of Use, Perceived Usefulness, Playfulness, System Usage, Technology Acceptance Model, TAM, Utilitarian.*

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Effects of Extrinsic and Intrinsic Motivators on Using Utilitarian, Hedonic, and Dual-Purposed Information Systems: A Meta-Analysis

1. Introduction

Having dethroned predecessors such as the stages of growth model (Nolan 1973, 1979), the technology acceptance model (TAM) is now considered as one of the most influential theories in information systems (IS) field, and has been widely accepted as a parsimonious and practical framework for IT adoption (Davis, Bagozzi, & Warshaw, 1989). However, while highlighting TAM's remarkable accomplishments, senior IS scholars have pointed out several dysfunctions that may leave the academic field with an incomplete understanding of system-use behavior (Benbasat & Barki, 2007). One dysfunction that deserves critical attention is that TAM may not be as robust in hedonic system-use contexts as it is in utilitarian system-use settings (Hsu & Lu, 2004; Koufaris, 2002; Lin & Bhattacherjee, 2010; van der Heijden, 2004). In other words, perceived usefulness and perceived ease of use may not be the sole prominent determinants for using hedonic systems (Wu & Du, 2012).

Hedonic systems are mainly used in homes or leisure environments, whereas utilitarian systems are mostly employed in workplace settings (Brown & Venkatesh, 2005; van der Heijden, 2004). Utilitarian systems aim to provide instrumental value to users, and they are created and exploited for improving individual, group, and organizational productivity; in contrast, hedonic systems aim to provide self-fulfilling values to users, and are employed for pleasure and relaxation (Sun & Zhang, 2006; van der Heijden, 2004). Therefore, hedonic systems usually have pleasure-oriented rather than productivity-oriented functions. It is primarily these functions that allow computers to be used not only for work or school, but also for personal purposes such as online shopping and social networking.

Although many studies have found that perceived usefulness in TAM is the strongest determinant of user acceptance in utilitarian system-use environments, many others have found that perceived usefulness is less influential than perceived enjoyment in hedonic system-use settings (Hsu & Lu, 2004; Koufaris, 2002). To advance theory, research, and practice on IT adoption, IS scholars must explain these mixed findings. Such explanations may also help reorient "IT adoption and acceptance research toward potentially more fruitful avenues and away from 'TAM++ research' that adds little knowledge to TAM" (Benbasat & Barki, 2007, p. 212). Unsurprisingly, researchers have provided valuable insights for investigating this issue. For example, van der Heijden (2004, p. 697) suggests that "the focus on the hedonic versus utilitarian nature of systems helps explain these mixed findings". Similarly, Brown and Venkatesh (2005) suggest that it is essential to focus on the hedonic versus utilitarian nature of systems when comparing TAM studies in home environments with those in workplace settings. Nevertheless, IS researchers have yet to reach a definitive and compelling explanation for the mixed findings.

Our study makes an effort in reaching a defininite and compelling explanation for the mixed findings . Specifically, our explanation for these mixed findings is that intrinsic motivators such as enjoyment are the most salient drivers for using hedonic systems developed for leisure and fun, whereas extrinsic motivators manifested through perceived usefulness play the most important roles in predicting usage of utilitarian systems such as spreadsheets and word processing. In other words, we contend that, when information systems vary from utilitarian to hedonic, the most important determinants shift from extrinsic to intrinsic motivators.

Our purpose, therefore, is to substantiate this explanation and thus address the core research questions: (1) Will the primary predictors of system-use behavior be different when IT applications vary from utilitarian to hedonic?, (2) How is extrinsic motivation distinct from intrinsic motivation in terms of their predictive power in different system-use contexts?, and (3) What are the most prominent extrinsic and intrinsic motivators of using utilitarian or hedonic systems? To provide a sound theoretical basis for developing associated hypotheses, we draw on a key theory of psychology, the motivation theory (Deci, 1975; Deci & Ryan, 1985; Deci & Ryan, 1987).

The motivation theory should be useful for studying system-use behavior for several reasons. First, it is a well-established general theory of human behavior and can adequately explain various psychological processes that are involved in volitional activities such as using information systems.

Second, the theory focuses on extrinsic motivation and thus may be a good fit to investigate the behavior of using utilitarian systems because such system usage is mainly motivated by external goals such as solving job-related problems and improving task performance. Third, the theory also considers intrinsic motivation, which is likely the main driver for using hedonic systems. Therefore, it should shed light on the determinants of such a system-use behavior. Based on the theory, we develop the conceptual framework and research hypotheses in Section 3. We then evaluate the framework and hypothoses by using a meta-analysis approach, which makes it feasible to investigate various extrinsic and intrinsic motivators in various system-use contexts in this single study.

2. Theoretical Background

2.1. Types of Information Technology

From the viewpoint of practical use and functional capacity, information technology may be broadly classified as utilitarian or hedonic (Massey, Khatri, & Montoya-Weiss, 2007; van der Heijden, 2004). This classification is somewhat shaped by the hedonic consumption perspective that distinguishes between utilitarian and hedonic products (Hirschman & Holbrook, 1982; Holbrook & Hirschman, 1982). With such a classification, researchers intend to promote the notion that information systems can be used not only in work or education environments for job/school-related tasks, but also in homes and leisure settings for fun and breaks from the daily grind.

Indeed, many technologies integrated into daily lives, especially social networking applications, are not entirely productivity oriented but rather have a substantial hedonic orientation. Facebook, MySpace, and Twitter provide online spaces where individuals create profiles and connect with friends, family, and others to create personal networks. In this way, they can stay abreast of events, parties, and other social functions (Cheung & Lee, 2010). Such social networking systems are commonly not used for work or school-related tasks, but rather for the pleasure of sharing personal stories in words, pictures, and videos (Krasnova, Spiekermann, Koroleva, & Hildebrand, 2010).

However, some researchers suggest that utilitarian and hedonic IT may not necessarily be at opposite ends of one spectrum; some computer technology may be used for both productivity and pleasure (Chesney, 2006; Starbuck & Webster, 1991). For example, email is an indispensable work tool, but it can also be used at home for fun, which the movie "You've got mail"[1] portrays. Hence, we may rationally identify another broad type of technology that has dual functions—improving productivity and providing entertainment (Sun & Zhang, 2006). In light of this, the current research extends the aforementioned classification by trichotomizing information technology into utilitarian, hedonic, and dual-purposed categories. By the third category, we mean the information systems that individuals can use either to perform their job/school related activities or to have fun.

It is important to note that the boundaries among utilitarian, hedonic, and dual-purposed systems are not as apparent as their names suggest (Sun & Zhang, 2006). In other words, it is difficult to determine how dual purposed a system must be to be so classified, or how "primary" it must be to be classified utilitarian or hedonic. To our best knowledge, the IS literature has yet to offer guidance on this matter. Although this may be an inherent limitation of a trichotomy, the 80 percent (or four-fifths) rule of thumb, which has been applied in the employment field (Greenberg, 1979) and retirement plan context (Rose, 2012), may offer a quick and simple way to delineate between systems. Under the rule of thumb, a system is classified as utilitarian if it is used in a work or education environment to improve job or school performance more than 80 percent of the time, or as hedonic if it is employed in the home for fun and relaxation more than 80 percent of the time, or as dual-purposed if the first two conditions are not met.

[1] Interestingly, the professional social networking site LinkedIn is also used not only for hedonic reasons but also for business or work purposes such as job searching, recruiting, and keeping in touch with business networks.

2.2. The Motivation Theory

Regarded as a well-established proposition, the motivation theory focuses on human needs that are pivotal to health and that arise through interactions with an environment (Deci, 1975; Deci & Ryan, 1985). The theory suggests that individuals are active and volitional, and always initiate behaviors to satisfy the full range of their needs. Rooted in the motivation theory, the more recent self-determination theory (SDT) also maintains that human needs specify the content of motivation and provide a substantive basis for energizing and directing action (Deci & Ryan, 1987. The SDT further claims that understanding human motivation requires consideration of innate psychological needs for wellbeing and satisfaction. In summary, the motivation theory and its related theories hold that (1) needs-based motivations are the primary impetus for people to engage in various behaviors, and (2) such motivations can be broadly categorized into two major groups: extrinsic and intrinsic.

DeCharms (1968) suggests that we can attribute behaviors to an external perceived locus of causality—with external goals and demands being the motivators—or to an internal perceived locus of causality—with interests and desires serving as motivational forces. In this context, extrinsic motivation thus refers to performing behaviors for instrumental values such as monetary rewards, or for goals/outcomes that are separable from the behavior (Deci & Ryan, 1987, Deci, Vallerand, Pelletier, & Ryan, 1991). This definition suggests that extrinsic motivation focuses on goal-driven reasons, is not inherent in the behavior, and depends heavily on the external environment. Prior research indicates that extrinsic motivation is greatly important in a work environment and is particularly effective in the short term (Lazear, 1988). Besides monetary rewards, other extrinsic incentives include praise, relationship building, and career progression (Morris & Empson, 1998).

Extrinsic motivation pertains to a wide variety of behaviors performed for reasons beyond those inherent in the activity itself. Extrinsically motivated behaviors are thus instrumental and are performed not out of internal interests but out of external instrumental values (Deci, 1975). Individuals can be viewed as extrinsically motivated when their behaviors, whether pursuing a prize or a salary increase, are performed for reasons that can be separated from the activity itself. With external rewards, an instrumentality forms so that the activity becomes a means to an end rather than an end in itself (Deci & Ryan, 1987). In other words, the behavior is no longer performed because it is interesting or fun; instead, it is carried out in pursuit of external rewards (Deci, 1975). Some examples of extrinsically motivated behaviors are working for money, driving a car toward a destination, and reading textbooks for an upcoming exam (Powell, Symbaluk, & Honey, 2005).

Intrinsic motivation, on the other hand, refers to performing a behavior for its own sake—out of interest or for the pleasure and inherent satisfaction derived from the experience (Deci & Ryan, 1985; Deci & Ryan, 1987. This definition indicates that intrinsic motivation emphasizes experience-driven reasons, lies inherently in the activity, and is closely tied with individual interests. Prior research suggests that intrinsic motivation usually manifests in the form of positive emotions that individuals experienced previously when engaged in the same or similar activities (Csikszentmihalyi, 1975). Prior research also suggests that extrinsic motivation negatively impacts intrinsic motivation; that is, people performing an activity for external reward are often less intrinsically motivated than those who do it without the extra incentive (Greene & Lepper, 1974). Besides pleasure, some other examples of intrinsic motivators are arousal, excitement, enjoyment, and flow (Csikszentmihalyi, 1975; Holbrook, Chestnut, Oliva, & Greenleaf, 1984). Many behaviors are intrinsically motivated, such as solving puzzles, listening to music, and watching TV shows. Participating in such activities mostly fails to yield external rewards but rather confers positive, rewarding psychological states.

2.3. Extrinsic and Intrinsic Motivators Identified

Relying on the motivation theory, we identified six extrinsic and five intrinsic motivators from the individual studies included in this meta-analysis[2]. As Table 1 shows, punishment has been the least-studied extrinsic motivator; the TAM construct, perceived usefulness, has been the most widely studied. Although both job relevance and perceived usefulness measure some job-related properties of an information system, they are distinct variables. Job relevance focuses on the applicability of the system to daily jobs or other tasks, whereas perceived usefulness further assesses the system's perceived contribution to job performance and productivity. Reflecting an individual's innate need for interaction and collaboration, affiliation motivation is primarily employed to study communication systems such as instant messaging (e.g., Li, Chau, & Lou, 2005; Premkumar, Ramamurthy, & Liu, 2008). Notwithstanding that the six extrinsic motivators are distinct, their definitions and measurement items indicate that all except affiliation motivation are developed to study system-use behaviors in an organizational context. Specifically, they are "born" for utilitarian information systems.

Table 1. The Extrinsic and Intrinsic Motivators Identified

Extrinsic motivators			
Name	**Number of studies using the motivator**	**Definition**	**Examples of measurement items**
Perceived Usefulness	199 for BI 93 for usage	The degree to which a person believes that using an information system would enhance his job or task performance (Davis, 1989).	I find the information system useful in my job; using the information system improves my job performance.
Job Relevance	20 for BI 6 for usage	The degree to which an information system is applicable to an individual's job or task (Venkatesh & Davis, 2000).	In my job, usage of the system is important; in my job, usage of the system is relevant.
Image	16 for BI 9 for usage	The degree to which using an information system is perceived to enhance one's status in an organization or society (Moore & Benbasat, 1991).	In my organization, people who use the information system have more prestige than those who do not; in my organization, people who use the information system have a high profile.
Affiliation Motivation	4 for BI 1 for usage	An individual's desire for social interaction and a sense of communion with others (Bowlby, 1969).	I think being close to others and relating to them on a one-on-one level is one of my favorite and most satisfying pastimes; just being around others and finding out about them is one of the most interesting things I can think of doing.
Reward	1 for BI 2 for usage	A recompense resulting from using an information system.	How hard I work on using the information system is directly linked to (1) how much I am rewarded by the organization's management, and (2) how much I am recognized by my supervisor.
Punishment	0 for BI 1 for usage	A penalty resulting from not using an information system.	In order for me to avoid punishment in my job by the organization's management, it is necessary to use the information system; if I do not use the information system, my supervisor will not acknowledge me.

[2] Perceived ease of use (PEOU) refers to "the degree to which a person believes that using a particular system could be free of effort" (Davis, 1989, p. 320). Comparing this definition with those of extrinsic and intrinsic motivations, we think PEOU is neither an extrinsic nor an intrinsic motivator but is rather a system-specific variable. This is consistent with past research that suggests PEOU is a dynamic construct playing complex roles and may not be simply treated as an extrinsic or intrinsic motivator (Davis, Bagozzi, & Warshaw, 1992; Gefen & Straub, 2000; Venkatesh, 2000). Thus, we do not examine it in this meta-analysis.

Table 1. The Extrinsic and Intrinsic Motivators Identified (cont.)

Intrinsic motivators			
Name	**Number of studies using the motivator**	**Definition**	**Examples of measurement items**
Enjoyment	65 for BI 24 for usage	The extent to which using an information system is perceived as fun in its own right, aside from any performance consequences (Davis et al., 1992).	I enjoy using the information system; using the information system provides me a lot of enjoyment.
Flow	15 for BI 6 for usage	The state in which people are so involved in using an information system that nothing else seems to matter (Csikszentmihalyi, 1990).	While using the information system, I am immersed in the task I am performing; while using the information system, I am absorbed in what I am doing.
Playfulness	21 for BI 5 for usage	The degree of cognitive spontaneity in information system interactions (Webster & Martocchio, 1992).	When using the information system, I am spontaneous; when using the information system, I am playful.
Pleasure	5 for BI 2 for usage	The degree to which a user feels good or happy with using an information system (Holbrook et al., 1984).	Using the information system makes me feel happy; using the information system makes me feel pleased.
Arousal	5 for BI 2 for usage	The degree to which a user feels excited, stimulated, or active while using an information system (Holbrook et al., 1984).	Using the information system makes me feel excited; using the information system makes me feel aroused.

Note. The numbers in second column are based on the dependent variable of the studies. BI = Behavioral intention.

Among the five intrinsic motivators, enjoyment has been the most commonly studied, while arousal has has been the least studied. Flow is a complex, multidimensional construct with an important variant: cognitive absorption (Agarwal & Karahanna, 2000). Rather than treat cognitive absorption as a new construct, we consider it an extension of flow, with an extra dimension added to the four flow dimensions. IS research has regarded playfulness as an intrinsic motivator in that it explains an individual's intrinsic tendency to interact spontaneously, inventively, and imaginatively with an information system (Webster & Martocchio, 1992). In line with the motivation theory, each of the five intrinsic motivators captures aspects of positive affective experiences during system usage.

3. Research Model And Hypotheses

Prior research suggests that these extrinsic and intrinsic motivators can be the key determinants of system-use behavior (Agarwal & Karahanna, 2000; Davis et al., 1989; Venkatesh, 1999). The current research integrates prior work to facilitate a better understanding of the roles of extrinsic and intrinsic motivators in system usage. Here, our most central and fundamental contention is that, from a motivational perspective, when individuals are extrinsically motivated, they mostly use information systems for job/school related purposes that usually result in better performance; when they are intrinsically motivated, they mainly use information systems for various non-school related personal purposes that often lead to enjoyable experiences. To evaluate this contention, we construct and empirically test the following research hypotheses.

As described earlier, extrinsic motivation is external-goal directed; it arises from sources outside the activity itself, such as monetary rewards and job advancement. In addition, it obscures individuals' full sense of volition because their behaviors tend to be confined to actions instrumental in gaining rewards (Cooper & Jayatilaka, 2006). This suggests that, in the context of technology usage, extrinsic motivation will be highly associated with behaviors of using systems for external goals and rewards. According to prior research (Davis, 1989; Davis et al., 1989), such goals and rewards mainly involve improving job performance and increasing efficiency in work/school-related tasks. Because utilitarian systems are used mostly for such goals, we can reasonably theorize that extrinsic motivation will be greatly related to utilitarian system usage. Likewise, we can also reasonably theorize that the link between extrinsic motivation and hedonic system-use behavior will be comparatively weak because hedonic systems are often less helpful in the pursuit of such external goals and rewards. Taken

together, extrinsic motivators (i.e., perceived usefulness, job relevance, image, affiliation motivation, reward, and punishment) should have a stronger collective and individual impact on utilitarian system-use behavior than on hedonic system-use behavior. Therefore, we hypothesize:

H1a: *Extrinsic motivators will more strongly affect behavioral intention in the context of utilitarian systems than in the context of hedonic systems.*

H1b: *Extrinsic motivators will more strongly affect usage in the context of utilitarian systems than in the context of hedonic systems.*

The strong relationship between extrinsic motivation and behavior in the context of utilitarian systems is expected to carry over to the context of dual-purposed systems, mainly because both external goals and internal rewards motivate the use of dual-purposed systems. That is, external goals are also critical in such system-use contexts. Therefore, we can establish hypotheses that are similar to H1a-b if we compare system-use behavior in the context of dual-purposed systems with that in the context of hedonic ones. Specifically:

H2a*: Extrinsic motivators will more strongly affect behavioral intention in the context of dual-purposed systems than in the context of hedonic systems.*

H2b: *Extrinsic motivators will more strongly affect usage in the context of dual-purposed systems than in the context of hedonic systems.*

As the motivation theory asserts, intrinsic motivation arises from positive reactions to the experience of an activity itself; intrinsically motivated individuals engage in an activity primarily out of their own interest in it (Cooper & Jayatilaka, 2006). The theory also suggests that such activities usually allow individuals to enter positive psychological states of enjoyment and deep involvement (Amabile, 1996). Applying the theory to technology usage, we argue that intrinsic motivation will be highly correlated with using systems for internal rewards—fun and pleasure. Because users primarily glean such experiences from hedonic systems, intrinsic motivation is likely to be tightly associated with hedonic system usage. Alternatively, we can expect a relatively feeble relationship between intrinsic motivation and utilitarian system-use behavior because utilitarian systems are usually not designed or used for fun and pleasure. Taken together, we may posit that intrinsic motivators (i.e., enjoyment, flow, playfulness, pleasure, and arousal) have a stronger collective and individual influence on hedonic system-use behaviors than on utilitarian system-use behaviors. Thus, we propose the following hypotheses:

H3a: *Intrinsic motivators will more strongly affect behavioral intention in the context of hedonic systems than in the context of utilitarian systems.*

H3b: *Intrinsic motivators will more strongly affect usage in the context of hedonic systems than in the context of utilitarian systems.*

Logically, the strong relationship between intrinsic motivation and behavior in the context of hedonic systems is expected to carry over to the context of dual-purposed systems, mainly because internal rewards—fun and pleasurable experiences—also largely motivate the use of dual-purposed systems. Consequently, we can formulate hypotheses similar to H3a-b if we compare system-use behavior in dual-purposed systems with that in utilitarian systems. That is:

H4a: *Intrinsic motivators will more strongly affect behavioral intention in the context of dual-purposed systems than in the context of utilitarian systems.*

H4b: *Intrinsic motivators will more strongly affect usage in the context of dual-purposed systems than in the context of utilitarian systems.*

We have reasoned that extrinsic motivation rather than intrinsic motivation triggers the use of utilitarian systems, which is in accordance with the motivation theory that states that individuals

perform extrinsically motivated behaviors not because they are interesting or fun but because they are a means to achieve external goals (Deci, 1975). This assertion is also consistent with the observation that organizational employees typically use information systems to enhance job performance (Davis, 1989). Following this thought, we may logically postulate that extrinsic motivators rather than intrinsic motivators better predict utilitarian system use. Therefore, we hypothesize:

H5a: *In the context of utilitarian systems, extrinsic motivators will more strongly affect behavioral intention than will intrinsic motivators.*

H5b: *In the context of utilitarian systems, extrinsic motivators will more strongly affect usage than will intrinsic motivators.*

The above arguments also clearly indicate that intrinsic motivation rather than extrinsic motivation primarily drives hedonic system-use behaviors. This aligns with the motivation theory that states that individuals conduct intrinsically motivated behaviors to attain positive psychological states of enjoyment and emotional involvement (Deci & Ryan, 1985). This is also supported by findings that flow and enjoyment significantly affect intentions to play online games (Hsu & Lu, 2004; Wu, Li, & Rao, 2008). In that light, we may reasonably conjecture that intrinsic motivators more strongly affect hedonic system-use behaviors than extrinsic motivators. Thus, we propose the following hypotheses, parallel to H5a-b:

H6a: *In the context of hedonic systems, intrinsic motivators will more strongly affect behavioral intentions than will extrinsic motivators.*

H6b: *In the context of hedonic systems, intrinsic motivators will more strongly affect usage than will extrinsic motivators.*

We can simplify and abstract the above hypotheses and their theoretical by using the graphical model in Figure 1.

4. Methodology

This study employs a meta-analysis approach to test the research hypotheses. Meta-analysis allows researchers to combine findings from many individual studies that address the same research question (Hunter & Schmidt, 1990). It enables scholars to obtain an overview of a particular research topic and an improved understanding of the relationship between variables of interest (Wu & Du, 2012). A meta-analysis is especially relevant and useful for this research because the individual studies included in this meta-analysis (1) examine various extrinsic and intrinsic motivators, (2) investigate the effects of the motivators on behavioral intention and/or usage, and (3) cover a diverse set of system-use contexts that can be categorized as utilitarian, hedonic, or dual-purposed. In short, meta-analysis is perhaps the most effective way to verify our research hypotheses.

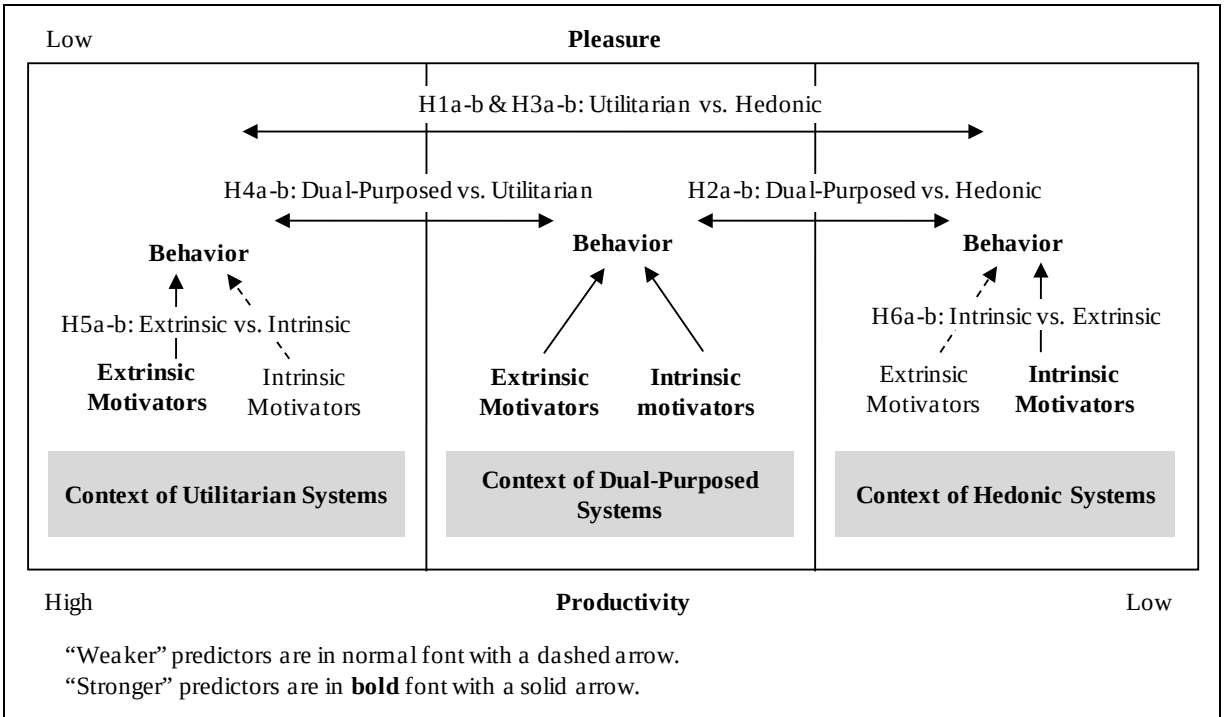

Figure 1. The Abstract Research Model

4.1. Sample

This research targets individual studies published from 1989 through 2009. A potential threat to the validity of a meta-analysis is the file-drawer problem; that is, the tendency for journals to publish studies with positive results more frequently than studies with negative or inconclusive outcomes (Rosenthal, 1979). Indeed, researchers widely believe that journals tend to publish studies with significant, hypothesis-supporting results and thus are susceptible to file-drawer problems (Ma & Liu, 2004; Wu & Lederer, 2009). To address this issue, we follow previous research and include individual studies from non-journal sources such as dissertations and conference proceedings.

To identify individual studies for potential inclusion in the analysis, we searched academic databases such as ABI/INFORM, Business Source Premier, ScienceDirect, Social Science Citation Index, ProQuest Dissertation and Thesis, and WorldCat Dissertation and Thesis. We also searched digital libraries for proceedings of some major IS conferences such as the Americas Conference on Information Systems, the Hawaii International Conference on System Sciences, and the International Conference on Information Systems. In addition, we scanned the references of some already identified research papers to locate additional studies. With such a comprehensive search strategy, we reduced the source bias and maximized the number of studies included, and thus improved the quality of this meta-analysis (Wu & Du, 2012).

In those electronic searches, we used such key words as behavioral intention, enjoyment, perceived ease of use, perceived usefulness, pleasure, TAM, technology acceptance, technology adoption, system usage, and system use. We included individual studies if they (1) revealed sample size, (2) described the system-use contexts being studied, (3) reported at least one correlation between an extrinsic/intrinsic motivator and intention/usage, or reported some other statistic that can be converted to a correlation per Wu and Lederer (2009).

Meta-analysis assumes that all individual studies included are independent of each other (Hunter & Schmidt, 1990). To ensure such independence, we carefully compared the description and data of studies. If two or more studies were based on a same data set, we considered them as one study and selected only one. Alternatively, when a study employed multiple data sets collected from the same

sample, we combined the data sets by simple averaging. According to Heneman (1986), this procedure is necessary to keep the assumption. In contrast, when a study employed multiple data sets collected from different samples, we treated each data set as an independent study. Again, such treatment is appropriate and in line with the assumption (Hunter, Schmidt, & Jackson, 1982). Finally, when a study presented one data set for behavioral intention and another data set for usage based on the same sample, we treated the two data sets as two separate studies for our research purposes.

The final sample of this meta-analysis includes 179 journal articles, 29 conference proceedings, and 21 dissertations. The 179 journal articles contributed 236 studies because forty-five each reported two or more independent studies. The 29 conference proceedings contributed 42 studies because eight each reported two independent studies, and one reported six independent ones. The 20 dissertations contributed 25 studies because two each reported two independent studies, and one reported four independent ones. Thus, in total, this meta-analysis comprises 303 useful individual studies, of which 207 focus on behavioral intention and 96 investigate usage. Appendix A shows these 303 studies and the data collected.

4.2. System-Use Contexts

To ensure the quality of classifying the system-use contexts, two authors independently (1) read the papers, (2) obtained the system names, (3) identified the end users sampled, (4) analyzed the functional purposes of the systems, (5) interpreted the system-use environments described in the original studies, and (6) classified the system-use contexts into the three types. The overall inter-rater reliability between the two coders for the classification was excellent: the agreement rate was 95.3 percent and Cohen's Kappa was 0.91. Disagreements in classification were resolved through discussion and clarification.

With this classification method, we found that the 303 individual studies employed over 120 different types of technology as their target information systems. Some most commonly used systems were the Internet, electronic mail, mobile communication, online shopping, job-related computing, Microsoft Office applications, and Web-based course management systems. After carefully classifying the system-use contexts, we found that, among the 303 studies, 183 focused on utilitarian system-use contexts, 73 investigated hedonic contexts, and 47 looked at dual-purposed contexts.

Table 2 presents more details on the three types of system-use contexts examined in this meta-analysis. ERP systems, office automation applications, and Web-based course management systems are some typical examples of technologies used in a utilitarian context. IPTV, social networking websites, and online shopping systems are important hedonic technologies used in a social and leisure setting. The Internet, Web technology, and personal computers are some typical examples of information systems used for dual purposes. Internet technology and personal computers can be used to transfer business files (utilitarian) or to watch thousands of different TV channels from around the world (hedonic). A website can be utilitarian if it is dedicated to business research database service such as ebscohost.com, or it can be hedonic if it is an online gaming website such as MSN Games. Thus, a website as a type of technology can be dual-purposed. Appendix A details the specific information system employed by each individual study, and Appendix B gives two detailed examples showing how to classify a system-use context.

Table 2. The Three Types of System-Use Contexts

Type of system-use contexts	Number of studies examining this type of system-use contexts	Number of different types of systems being studied	Examples of information systems
Utilitarian	183	86	Anti-spyware software, customer relationship management system, database system, ERP system, group decision support system, MS Word, organizational intranet, spreadsheet, telemedicine technology, Web-based banking technology, Web-based course management system .
Hedonic	73	26	Instant messaging for social chat, Internet Protocol Television (IPTV), online gambling, online game, online news, online shopping system, portable media player, social networking website, video-sharing website.
Dual-purposed	47	15	Communication technology, email system, Internet, mobile communication technology/device, mobile Internet, personal computer, Web site/service technology.

4.3. Test of Research Hypotheses

Before testing the research hypotheses, we performed an aggregate analysis of the correlations between the eleven extrinsic and intrinsic motivators and the two dependent variables (behavioral intention and usage). We found two outlier studies (for behavioral intention) reporting disproportionately large sample sizes (26,989 and 31,596 by Fu et al. (2006) — their source is bolded in Appendix A). Because the two outlier studies may generate abnormal analysis results, we followed Hunter and Schmidt (1990) and analyzed the data and reported results with and without the two.

The current research employs and reports only correlations corrected for measurement error (Hunter & Schmidt, 2004)[3]. Table 3 shows the results of the aggregate analysis. Numbers in brackets are for the results with the two outlier studies included. Because only the usefulness-intention correlation from the two outlier studies is relevant to this meta-analysis, brackets appear only in the first data row of the table. Given that different individual studies are usually conducted with different sample sizes, the best estimate of average *r*-value is not the simple mean across studies but a weighted average in which each correlation is weighted by the sample size in that study (Hunter & Schmidt, 1990). For this reason, we reported weighted average correlations[4].

As Table 3 shows, the most-studied correlation is the one between perceived usefulness and behavioral intention, which also has the highest weighted average (0.61/0.74) and median *r*-value (0.60). The average sample size ranges from 121 to 349, or to 525 when the two outlier studies are considered. While arousal-usage correlation has the smallest standard deviation (0.06), the largest, 0.22, goes to the correlation between playfulness and behavioral intention. The smallest minimum *r*-value is negative, -0.35, for the correlation between usefulness and usage. Three correlations have the largest minimum *r*-value of 0.27. While the affiliation-motivation-usage correlation has the smallest maximum *r*-value (0.08), the largest maximum *r*-value (0.98) goes to the usefulness-usage correlation.

[3] A measurement-error-corrected correlation is obtained via dividing the originally reported correlation by the square root of the product of the reliabilities of the two variables (Hunter & Schmidt, 1990).

[4] The weighted average correlation is given by the formula $\bar{r} = \frac{\sum(N_i r_i)}{\sum N_i}$, where $\bar{r}$ is the weighted average correlation, r_i is the correlation in study *i*, and N_i is the sample size in study *i*.

Table 3. Aggregate Analysis of the Correlations

Extrinsic motivators									
Correlation	Number of observations	Aggregate sample size	Average sample size	Weighted average	Standard deviation	Median	Maximum	Minimum	Failsafe N
Usefulness & intention	197 (199)	45,969 (104,554)	233 (525)	0.61 (0.74)	0.16	0.60	0.92	0.19	727
Usefulness & usage	93	20,660	222	0.42	0.19	0.41	0.98	-0.35	200
Job relevance & intention	20	3,898	195	0.47	0.17	0.46	0.84	0.11	510
Job relevance & usage	6	1,175	196	0.46	0.19	0.40	0.72	0.24	15
Image & intention	16	3,787	237	0.37	0.17	0.33	0.78	0.16	30
Image & usage	9	2,196	244	0.30	0.15	0.27	0.51	0.05	12
Affiliation motivation & intention	4	924	231	0.40	0.18	0.46	0.64	0.27	8
Affiliation motivation & usage	1	349	349	0.08	NA	0.08	0.08	0.08	NA
Reward & intention	1	243	243	0.24	NA	0.24	0.24	0.24	1
Reward & usage	2	364	182	0	0.19	-0.04	0.09	-0.18	NA
Punishment & intention	0	NA	NA	NA	NA	NA	NA	NA	NA
Punishment & usage	1	121	121	0.27	NA	0.27	0.27	0.27	1
Intrinsic motivators									
Correlation	Number of observations	Aggregate sample size	Average sample size	Weighted average	Standard deviation	Median	Maximum	Minimum	Failsafe N
Enjoyment & intention	65	16,030	247	0.52	0.19	0.53	0.90	0.11	195
Enjoyment & usage	24	6,473	270	0.33	0.16	0.38	0.73	0.06	35
Flow & intention	15	3,278	219	0.48	0.14	0.50	0.66	0.12	40
Flow & usage	6	1,492	249	0.39	0.21	0.25	0.56	0.13	12
Playfulness & intention	21	4,445	212	0.41	0.22	0.33	0.81	-0.13	45
Playfulness & usage	5	895	179	0.19	0.10	0.18	0.30	0.09	7
Pleasure & intention	5	1,064	213	0.43	0.12	0.41	0.60	0.27	12
Pleasure & usage	2	582	291	0.46	0.19	0.40	0.53	0.26	5
Arousal & intention	5	1,064	213	0.34	0.10	0.35	0.48	0.24	8
Arousal & usage	2	582	291	0.27	0.06	0.25	0.29	0.21	2

Note. NA refers to "not available" and indicates no such correlation or value. Appendix C provides more details on Falesafe N.

We evaluated the research hypotheses by employing *t*-tests to compare values of a correlation in different system-use contexts (Hypotheses 1a-4b), or to compare values of different correlations in a same system-use context (Hypotheses 5a-6b). In addition, we tested each hypothesis at both collective and individual levels. At the collective level, we focused on the combined effects that were obtained by pooling all the six correlations between the six extrinsic motivators and the dependent variable (i.e., behavioral intention or usage), or by pooling all the five correlations between the five intrinsic motivators and the dependent variable. At the individual level, we focused on the most-studied extrinsic motivator—usefulness—and the most-studied intrinsic motivator—enjoyment.

As Table 4 shows, seven of the twelve hypotheses are supported or partially supported. At the collective level, the six pooled extrinsic-motivator-intention correlations in the context of utilitarian systems are significantly larger than those in the context of hedonic systems; at the individual level, the usefulness-intention correlation in the context of utilitarian systems is also significantly larger than that in the context of hedonic systems. Thus, Hypothesis 1a is supported, both collectively and individually. The correlations between intrinsic motivators and intention/usage in the context of hedonic systems are significantly larger than those in the context of utilitarian systems at both collective and individual levels. Thus, Hypotheses 3a and 3b are both supported. The intrinsic-

motivator-intention correlations in the context of dual-purposed systems are significantly larger than those in the context of utilitarian systems, which supports Hypothesis 4a. The correlations between extrinsic motivators and intention/usage are significantly larger than those between intrinsic motivators and intention/usage in the context of utilitarian systems at both collective and individual levels. Thus, Hypotheses 5a and 5b are both supported. Hypothesis 6b is partially supported because in the context of hedonic systems, the enjoyment-usage correlation is significantly larger than the usefulness-usage correlation (individual level), but the pooled intrinsic-motivator-usage correlations are not significantly larger than the pooled extrinsic-motivator-usage correlations (collective level). Appendix D provides a more detailed analysis of the correlations involved in each of the hypotheses.

Table 4. T-Test Results for the Hypotheses

Correlation	Hypothesis investigated	Number of observations	Simple mean	Mean difference	T value	P value	Supported?
Extrinsic Motivators-BI in **Utilitarian** Context	**H1a** Collective	137	0.609	0.063	2.35	<0.01	Yes
Extrinsic Motivators-BI in **Hedonic** Context		58	0.546				
Usefulness-BI in **Utilitarian** Context	**H1a** Individual	111	0.644	0.083	3.08	<0.01	
Usefulness-BI in **Hedonic** Context		53	0.561				
Extrinsic Motivators-Usage in **Utilitarian** Context	**H1b** Collective	76	0.394	0.031	0.57	0.28	No
Extrinsic Motivators-Usage in **Hedonic** Context		19	0.363				
Usefulness-Usage in **Utilitarian** Context	**H1b** Individual	65	0.417	0.031	0.57	0.28	
Usefulness-Usage in **Hedonic** Context		15	0.363				
Extrinsic Motivators-BI in **Dual-Purposed** Context	**H2a** Collective	43	0.519	-0.027	-0.72	0.24	No
Extrinsic Motivators-BI in **Hedonic** Context		58	0.546				
Usefulness-BI in **Dual-Purposed** Context	**H2a** Individual	33	0.574	0.013	0.37	0.36	
Usefulness-BI in **Hedonic** Context		53	0.561				
Extrinsic Motivators-Usage in **Dual-Purposed** Context	**H2b** Collective	17	0.389	0.026	0.36	0.36	No
Extrinsic Motivators-Usage in **Hedonic** Context		19	0.363				
Usefulness-Usage in **Dual-Purposed** Context	**H2b** Individual	13	0.427	0.064	0.82	0.21	
Usefulness-Usage in **Hedonic** Context		15	0.363				
Intrinsic Motivators-BI in **Utilitarian** Context	**H3a** Collective	48	0.384	0.189	4.75	<0.01	Yes
Intrinsic Motivators-BI in **Hedonic** Context		33	0.573				
Enjoyment-BI in **Utilitarian** Context	**H3a** Individual	27	0.433	0.179	3.58	<0.01	
Enjoyment-BI in **Hedonic** Context		21	0.612				
Intrinsic Motivators-Usage in **Utilitarian** Context	**H3b** Collective	18	0.247	0.162	3.24	<0.01	Yes
Intrinsic Motivators-Usage in **Hedonic** Context		15	0.409				

Table 4. T-Test Results for the Hypotheses (cont.)

Correlation	Hypothesis investigated	Number of observations	Simple mean	Mean difference	T value	P value	Supported?
Enjoyment-Usage in **Utilitarian** Context	**H3b** Individual	13	0.262	0.246	5.11	<0.01	
Enjoyment-Usage in **Hedonic** Context		8	0.508				
Intrinsic Motivators-BI in **Utilitarian** Context	**H4a** Collective	48	0.384	0.117	2.59	<0.01	Yes
Intrinsic Motivators-BI in **Dual-Purposed** Context		30	0.501				
Enjoyment-BI in **Utilitarian** Context	**H4a** Individual	27	0.433	0.106	1.69	<0.05	
Enjoyment-BI in **Dual-Purposed** Context		17	0.539				
Intrinsic Motivators-Usage in **Utilitarian** Context	**H4b** Collective	18	0.247	0.048	0.86	0.20	No
Intrinsic Motivators-Usage in **Dual-Purposed** Context		6	0.295				
Enjoyment-Usage in **Utilitarian** Context	**H4b** Individual	13	0.262	-0.022	-0.32	0.38	
Enjoyment-Usage in **Dual-Purposed** Context		8	0.240				
Extrinsic Motivators-BI in Utilitarian Context	**H5a** Collective	137	0.609	0.225	7.59	<0.01	Yes
Intrinsic Motivators-BI in Utilitarian Context		48	0.384				
Usefulness-BI in Utilitarian Context	**H5a** Individual	111	0.644	0.211	6.06	<0.01	
Enjoyment-BI in Utilitarian Context		27	0.433				
Extrinsic Motivators-Usage in Utilitarian Context	**H5b** Collective	76	0.394	0.147	3.00	<0.01	Yes
Intrinsic Motivators-Usage in Utilitarian Context		18	0.247				
Usefulness-Usage in Utilitarian Context	**H5b** Individual	65	0.417	0.155	2.87	<0.01	
Enjoyment-Usage in Utilitarian Context		13	0.262				
Extrinsic Motivators-BI in Hedonic Context	**H6a** Collective	58	0.546	0.027	0.75	0.23	No
Intrinsic Motivators-BI in Hedonic Context		33	0.573				
Usefulness-BI in Hedonic Context	**H6a** Individual	53	0.561	0.051	1.20	0.12	
Enjoyment-BI in Hedonic Context		21	0.612				
Extrinsic Motivators-Usage in Hedonic Context	**H6b** Collective	19	0.363	0.046	0.62	0.27	Partially
Intrinsic Motivators-Usage in Hedonic Context		15	0.409				
Usefulness-Usage in Hedonic Context	**H6b** Individual	15	0.363	0.145	1.50	<0.10	
Enjoyment-Usage in Hedonic Context		8	0.508				

5. Discussion

As we hypothesize, the results of this study generally suggest that extrinsic motivators are more prominent drivers of using utilitarian systems, whereas intrinsic motivators play a more important role in predicting hedonic system-use behavior. These results thus furnish strong evidence that the predictive power of both extrinsic and intrinsic motivators changes across different system-use environments. To advance our theoretical knowledge, we highlight important insights into the findings and discuss implications, contributions, and limitations of this study below.

5.1. Insights into the Findings

This study enriches the theoretical basis for IT acceptance by providing an in-depth discussion of the motivation theory and applying it to examine determinants of using utilitarian, hedonic, and dual-purposed information systems. The results indicate that the theory effectively and accurately elucidates the variation of the predictive power of the motivators across the three IT contexts. More specifically, in answer to the first research question, the theory and results suggest that, when IT applications vary from utilitarian to hedonic, the primary predictors will shift from extrinsic to intrinsic motivators. The results thus prove our contention that, when IT varies, the predictive power shifts.

Also, answering the second research question of this study, the results suggest that extrinsic motivators are generally more important predictors in the context of utilitarian systems than in the context of hedonic systems, whereas intrinsic motivators are more critical in both contexts of hedonic and dual-purposed systems than in the context of utilitarian systems. These findings strongly suggest that extrinsic motivators are distinct from intrinsic motivators in terms of their predictive power in different system-use contexts.

This study's results also answer the third research question. Our comprehensive, unbiased search of the literature identifies six extrinsic motivators. Perceived usefulness is definitely the most commonly studied construct, with 197 observations for usefulness-intention correlation (minus the 2 outlier studies) and 93 for usefulness-usage correlation. The aggregate analysis (Table 3) also shows that perceived usefulness is most highly correlated with behavioral intention (r = 0.61), whereas job relevance is most highly correlated with usage (r = 0.46). These findings suggest that, among the six extrinsic motivators, perceived usefulness and job relevance may be most important. Noticeably, the two variables have one key quality in common: they both measure some task-related properties of an information system. This suggests that utilitarian system-use behaviors are mainly driven by the perceived relevance and usefulness of the system to one's task performance.

Among the five identified intrinsic motivators, enjoyment is certainly the most widely used variable. Its correlations with behavioral intention and with usage have been found in 65 and 24 individual studies (Table 3), respectively. Moreover, while pleasure is the intrinsic motivator most highly correlated with usage (r = 0.46), enjoyment is most highly correlated with behavioral intention (r = 0.52), which suggests that enjoyment and pleasure may be most important in their category. Noticeably, the two variables are similar and both reflect some aspects of positive emotional experiences (Csikszentmihalyi 1990). Taken together, we may reasonably argue that hedonic system-use behaviors are mostly motivated by one's desire to repeat positive emotional experiences.

By applying the motivation theory to system-use behavior, we find that the most salient determinants of behavioral intention and usage differ in the contexts of utilitarian, hedonic, or dual-purposed systems. Such findings suggest the necessity of developing context-dependent models for technology acceptance. Specifically, if researchers are studying utilitarian IT, they should focus on extrinsic motivators and develop their research model surrounding perceived usefulness, job relevance, and image. Alternatively, if their target information system is hedonic, they should incorporate intrinsic motivators such as enjoyment and pleasure as major determinants into their theoretical framework. Finally, they should employ both extrinsic and intrinsic motivators as primary predictors if their target information system is dual-purposed, or if the type is yet to be determined.

5.2. Implications for Researchers

Prior research mainly relies on TAM, the theory of reasoned action (TRA) (Ajzen & Fishbein, 1980), and the theory of planned behavior (TPB) (Ajzen, 1985) to identify key determinants of IT acceptance and usage. This research suggests that theories other than TAM, TRA, and TPB are necessary and useful to discover additional variables that may be more critical in predicting system-use behaviors. Moreover, new theories usually offer a unique perspective for investigating behaviors and thus may provide an excellent opportunity to deepen our understanding of the research topic. Consequently, we encourage future work to find additional relevant theories and apply them to IT adoption.

This study's results suggest that productivity-oriented information systems are valuable because of their utilitarian nature (i.e., improving productivity or performance), whereas the intended usefulness of a hedonic system lies in its entertaining qualities (i.e., creating pleasurable user experiences). Future studies should thus investigate whether that is truly the case. A convenient path for such future research is to apply the prominent extrinsic and intrinsic motivators identified in this study to both utilitarian and hedonic systems. As such, researchers can compare the predictive power of these motivators in the two distinct system-use contexts, and hence illuminate the validity of our findings.

As Section 2(also see Table 3) notes, for behavioral intention studies, the most salient extrinsic and intrinsic motivators are perceived usefulness (r = 0.61) and enjoyment (r = 0.52), respectively; whereas, for usage studies, two such motivators are job relevance (r = 0.46) and pleasure (r = 0.46). These results suggest that the most salient extrinsic and intrinsic motivators may vary with the change of the dependent variable in a research model. This interesting finding goes against our expectation that the most salient determinants should be consistent across intention and usage studies. In this sense, future research is needed to look into this issue.

Note that three of the five non-supported hypotheses—H1b, H2b, and H4b—are related to usage. The extant literature suggests that these unexpected results may be attributed to the limitations of conceptualization and measure of usage in some past studies. As Burton-Jones and Straub (2006 note, the system usage construct has so far received scant theoretical treatment, which has resulted in a lack of consensus on how to conceptualize it. They further point out that, with such a limitation, prior studies inevitably report unexpected, mixed, and/or weak results on the relationships between usage and some other constructs. For this reason, more future research should be conducted on usage and on its links with extrinsic and intrinsic motivators.

In addition, the findings fail to support Hypothesis 2a. A likely explanation may well be that, in the context of dual-purposed systems, extrinsic and intrinsic motivators evenly share predictive power; they nearly "average out". Thus, extrinsic motivators in such a context may not necessarily have stronger predictive power than they have in the context of hedonic systems. Noticeably, the results for the non-supported Hypotheses 2b and 4b favor this explanation. Hypothesis 6a is also not supported because, even though intrinsic-motivator-intention correlation is higher than extrinsic-motivator-intention correlation in the context of hedonic systems, the difference is statistically non-significant. One possible explanation may be that some hedonic systems might also hold some sizeable utilitarian value that makes extrinsic motivators still useful in predicting behavioral intention. Undoubtedly, these unexpected but interesting findings warrant future research into the predictive power of all the extrinsic and intrinsic motivators in the three system-use contexts.

In the IT acceptance and usage literature, other important predictor variables exist. For example, as a key TAM construct, perceived ease of use has long been recognized as an important predictor of system-use behavior. Likewise, in the Internet-based business environment, trust has been considered a critical determinant of online shopping continuance intention (Pavlou & Gefen, 2004). Future studies can examine the significance of these other variables in the three IT contexts and compare the results. Moreover, it would also be beneficial, both theoretically and practically, to compare the predictive power of these other variables with that of the most salient extrinsic and intrinsic motivators identified in this study in each of the three system-use contexts.

5.3. Implications for Practitioners

This study's findings have implications for practitioners. We find that extrinsic motivation is key to engaging individuals in using utilitarian IT, whereas intrinsic motivation is their strongest incentive for using hedonic IT. When a hedonic system is employed for utilitarian purposes, individuals are more likely to be motivated to accept and use it for that purpose because, in such a system-use scenario, both extrinsic and intrinsic motivations can drive the behavior. In fact, many organizations are leveraging hedonic IT to create new business models for generating revenues and engaging consumers. For example, Google employs individual blogs to make its online ads reach more potential customers. IBM has established a virtual business center in Second Life to support sales, marketing, and collaboration. These examples, along with the findings of this research, indicate that managers may exploit hedonic systems to improve productivity and performance.

5.4. Contributions and Limitations

By addressing the three proposed research questions, the current study makes primary contributions to the extant literature in several ways. First, this paper contributes to the theoretical foundation of IT adoption by applying the motivation theory to system-use behavior. Second, this paper employs a meta-analysis approach to integrate the findings of previous research and is one of the first to conduct a context-based comparative analysis of extrinsic and intrinsic motivators. Third, this paper confirms that extrinsic motivators are more important in the context of utilitarian systems than in the context of hedonic systems, and that intrinsic motivators play a stronger role in the contexts of hedonic and dual-purposed systems than in the context of utilitarian systems. Fourth, this paper contributes by confirming or partially confirming the predictions that, in the context of utilitarian systems, extrinsic motivators are more important than intrinsic motivators, whereas, in the context of hedonic systems, intrinsic motivators are more critical than are extrinsic motivators. Fifth, this paper finds that the predictive power of extrinsic and intrinsic motivators varies with IT applications, which substantiates the necessity of developing context-dependent models for technology acceptance. Finally, this paper also finds that, for behavioral intention studies, usefulness and enjoyment are the most salient extrinsic and intrinsic motivators, respectively, whereas, for usage studies, job relevance and pleasure are the strongest motivators. This finding suggests that the most salient extrinsic and intrinsic motivators may vary with the change of the dependent variable in a research model. In short, these major contributions, which Table 5 summarizes, may help reorient IS scholars toward potentially more fruitful avenues for studying user behavior.

Table 5. Contributions

1	Apply the motivation theory to system-use behavior.
2	Use a meta-analysis approach to integrate the findings of the field and test the hypotheses.
3	Analyze all extrinsic and intrinsic motivators in the contexts of utilitarian, hedonic, and dual-purposed systems.
4	Confirm the prediction that extrinsic motivators play a more important role in the context of utilitarian systems than in the context of hedonic systems.
5	Confirm the prediction that intrinsic motivators play a more important role in the contexts of hedonic and dual-purposed systems than in the context of utilitarian systems.
6	Confirm the prediction that in the context of utilitarian systems, extrinsic motivators play a more important role than do intrinsic motivators.
7	Partially confirm the prediction that in the context of hedonic systems, intrinsic motivators play a more important role than do extrinsic motivators.
8	Provide evidence that the predictive power of extrinsic and intrinsic motivators varies with IT applications, thus substantiating the necessity of developing context-dependent models for technology acceptance.
9	Find that the most salient extrinsic and intrinsic motivators may vary with the change of the dependent variable in a research model.

This study's findings and implications should be considered in light of its limitations. The results on perceived usefulness are based on a sample of 292 individual studies, and the results on enjoyment are based on a sample of 89 individual studies (see Table 1). Compared with the sample sizes for these two most-salient motivators, the sample sizes for some other important motivators (e.g., job relevance) are relatively small. Although such moderately small sample sizes are usual for hypothesis-testing meta-analysis studies like this, the sample size may nevertheless affect some of our finding's generalizability.

10. Conclusion

This research applies the motivation theory to investigate the effects of extrinsic and intrinsic motivators on system-use behavior in utilitarian, hedonic, and dual-purposed contexts. By analyzing data collected from prior studies, we find that, in the context of utilitarian IT, extrinsic motivators are more important than intrinsic motivators, whereas, in the context of hedonic IT, intrinsic motivators play a more critical role than extrinsic motivators. This finding suggests that the most prominent determinants of system-use behavior shift from extrinsic to intrinsic motivators when target technology varies from utilitarian to hedonic, which substantiates our explanation for why perceived usefulness is a less important predictor than enjoyment in a hedonic system-use setting. Our findings also suggest the necessity of developing context-dependent models for system-use behavior.

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Appendices

Appendix A. Data from Individual Studies Included in This Meta-Analysis

Table A-1. Data from Individual Studies Included in This Meta-Analysis

Source	Technology	Sample Size	Correlations between Behavioral Intention and Each of the Following Motivators										
			UF	JR	IM	AM	RW	PM	EN	FL	PF	PS	AR
Agarwal & Karahanna 2000 (J)	DP-Website	288	0.684	NA	NA	NA	NA	NA	0.590	0.489	0.293	NA	NA
Agarwal & Prasad 1999 (J)	UT-Job-related computer applications	230	0.600	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aladwani 2002 (J)	HE-Online shopping system	387	0.472	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Al-Gahtani 2008 (J)	UT-Job-related computer applications	1190	0.496	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Al-Somali, Gholami, & Clegg 2009 (J)	UT-Web-based banking technology	202	0.891	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
An 2005 (D)	UT-Website of Health Promotion Development Center	200	0.706	NA	NA	NA	NA	NA	NA	NA	0.637	NA	NA
Ayouby & Croteau 2009 (C)	DP-Internet	136	0.502	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bhattacherjee 2001 (J)	UT-Web-based banking technology	122	0.620	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bhattacherjee & Hikmet 2008 (J)	UT-Job-related computer applications	332	0.426	NA	NA	NA	NA	NA	0.326	NA	NA	NA	NA
Brown & Licker 2003 (J)	UT-Internet as a learning tool	94	0.523	0.332	NA	NA	NA	NA	0.274	NA	NA	NA	NA
Brown & Licker 2003 (J)	UT-Internet as a learning tool	175	0.612	0.479	NA	NA	NA	NA	0.555	NA	NA	NA	NA
Brown & Venkatesh 2005 (J)	DP-Personal computer	746	NA	NA	0.223	NA	NA	NA	0.229	NA	NA	NA	NA
Bruner & Kumar 2005 (J)	DP-Mobile device for social and work related purpose	212	0.233	NA	NA	NA	NA	NA	0.239	NA	NA	NA	NA
Busch 1995 (D)	UT-Technical information exchange system	249	0.683	0.477	NA	NA	NA	NA	NA	NA	NA	NA	NA
Celik 2008 (J)	UT-Web-based banking technology	161	0.734	NA	NA	NA	NA	NA	NA	NA	0.259	NA	NA
Chang 2008 (J)	HE-Online auction systems	213	0.846	NA	NA	NA	NA	NA	NA	NA	0.811	NA	NA
Chang 2008 (J)	HE-Online auction systems	175	0.644	NA	NA	NA	NA	NA	NA	NA	0.589	NA	NA
Chang, Li, Hung, & Hwang 2005 (J)	UT-Internet tax filing system	141	0.646	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chea & Luo 2007 (C)	DP-Online service	97	0.626	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chen, Fan, & Farn 2007 (J)	UT-Electronic toll collection system	255	0.660	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cheung, Lee, & Chen 2001 (C)	UT-Web-based course management system	554	0.540	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cheung & Sachs 2006	UT-Web-based course management system	57	0.824	NA	NA	NA	NA	NA	0.822	NA	NA	NA	NA
Chiu & Wang 2008 (J)	UT-Web-based course management system	286	0.604	0.415	NA	NA	NA	NA	0.706	NA	NA	NA	NA
Cho, Kwon, & Lee 2007 (C)	HE-Ringback tone service	204	0.291	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table A-1. Data from Individual Studies Included in This Meta-Analysis (cont.)

Source	Technology	Sample Size	Correlations between Behavioral Intention and Each of the Following Motivators										
			UF	JR	IM	AM	RW	PM	EN	FL	PF	PS	AR
Cho, Kwon, & Lee 2007 (C)	HE-Ringback tone service	209	0.318	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cho 2006 (J)	UT-Online legal service system	187	0.477	0.516	NA	NA	NA	NA	NA	NA	NA	NA	NA
Croteau & Vieru 2002 (C)	UT-Telemedicine technology	127	0.803	NA	0.586	NA	NA	NA	NA	NA	NA	NA	NA
Cyr, Hassanein, Head, & Ivanov 2007 (J)	HE-Online shopping website	185	0.563	NA	NA	NA	NA	NA	0.653	NA	NA	NA	NA
Cyr, Head & Ivanov 2006 (J)	HE-Mobile commerce	60	0.631	NA	NA	NA	NA	NA	0.668	NA	NA	NA	NA
Dasgupta & Gupta 2005 (C)	DP-Internet in government organization	102	0.373	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Davis 1989 (J)	UT-IBM PC-based graphics systems	80	0.859	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Davis, Bagozzi, & Warshaw 1989 (J)	UT-Word processing system	107	0.728	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Devaraj, Easley, & Crant 2008 (J)	UT-Collaborative system	180	0.775	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Djamasbi, Fruhling, & Loiacono 2009 (J)	UT-Telemedicine technology	39	0.755	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Elliott & Fu 2008 (J)	HE-Portable media player	312	0.517	NA	0.346	NA	NA	NA	0.588	NA	NA	NA	NA
Fagan, Neill, & Wooldridge 2008 (J)	UT-Job-related computer applications	172	0.527	NA	NA	NA	NA	NA	0.428	NA	NA	NA	NA
Featherman & Fuller 2002 (C)	UT-e-billpay service	167	0.787	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Featherman 2002 (D)	UT-Online financial transaction processing system	215	0.741	NA	0.524	NA	NA	NA	NA	NA	NA	NA	NA
Fu, Farn, & Chao 2006 (J)	**UT-2D barcode tax filing system**	**31596**	**0.833**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Fu, Farn, & Chao 2006 (J)	**UT-Internet tax filing system**	**26989**	**0.857**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Gallion 2000 (D)	UT-Data production system	57	0.528	0.484	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gefen & Straub 2003 (J)	HE-Online shopping system	161	0.529	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gefen, Karahanna, & Straub 2003 (J)	HE-Online shopping system	139	0.193	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gefen, Karahanna, & Straub 2003 (J)	HE-Online shopping system	178	0.414	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gefen, Karahanna, & Straub 2003 (J)	HE-Online shopping system	213	0.838	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gefen, Straub, & Boudreau 2000 (J).	HE-Online travel website	160	0.493	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gong, Xu, & Yu 2004 (J)	UT-Web-based course management system	280	0.868	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Guthrie 2001 (C)	UT-Web-based course management system	49	0.332	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Guthrie 2001 (C)	UT-Web-based course management system	49	0.764	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Guthrie 2001 (C)	UT-Web-based course management system	49	0.421	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ha & Stoel 2009 (J)	HE-Online shopping website	298	0.681	NA	NA	NA	NA	NA	0.519	NA	NA	NA	NA

Table A-1. Data from Individual Studies Included in This Meta-Analysis (cont.)

Source	Technology	Sample Size	Correlations between Behavioral Intention and Each of the Following Motivators										
			UF	JR	IM	AM	RW	PM	EN	FL	PF	PS	AR
Hasan 2006 (J)	UT-Unix-based text editing application	83	0.826	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hasan 2007 (J)	UT-Unix-based text editing application	96	0.466	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hausman & Siekpe 2009 (J)	HE-Online shopping website	154	0.445	0.427	NA	NA	NA	NA	0.561	0.423	NA	NA	NA
Holsapple & Wu 2008 (J)	HE-Online gaming system	253	0.411	NA	NA	NA	NA	NA	0.829	NA	NA	NA	NA
Hong, Thong, Moon, & Tam 2008 (J)	DP-Mobile Internet service	811	0.524	NA	NA	NA	NA	NA	0.536	NA	NA	NA	NA
Hong, Thong, & Tam 2006 (J)	DP-Mobile Internet service	1826	0.805	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hong, Thong, Wong, & Tam 2001 (J)	UT-Digital library	585	0.819	0.613	NA	NA	NA	NA	NA	NA	NA	NA	NA
Horton, Buck, Waterson, & Clegg 2001 (J)	UT-Organizational intranet	386	0.422	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Horton, Buck, Waterson, & Clegg 2001 (J)	UT-Organizational intranet	65	0.573	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hsieh, Rai, & Keil 2008 (J)	HE-Internet TV	144	0.518	NA	NA	NA	NA	NA	0.518	NA	NA	NA	NA
Hsieh, Rai, & Keil 2008 (J)	HE-Internet TV	307	0.663	NA	NA	NA	NA	NA	0.666	NA	NA	NA	NA
Hsu & Lu 2004 (J)	HE-Online gaming system	233	0.291	NA	NA	NA	NA	NA	NA	0.331	NA	NA	NA
Hsu & Lin 2008 (J)	DP-Blog	212	0.452	0.526	0.456	0.635	NA	NA	0.816	NA	NA	NA	NA
Hsu & Lu 2007 (J)	HE-Online gaming system	356	NA	NA	NA	NA	NA	NA	0.587	NA	NA	NA	NA
Huang & Liaw 2005 (J)	UT-Online survey system	279	0.720	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hwang 2005 (J)	UT-ERP system	101	0.556	NA	NA	NA	NA	NA	0.476	NA	NA	NA	NA
Ifinedo 2008 (C)	UT-E-business technology	162	0.578	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Igbaria 1993 (J)	UT-Job-related computer applications	251	0.408	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Igbaria 1993 (J)	UT-Job-related computer applications	225	0.392	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ilie, Slyke, Parikh, & Courtney2009 (J)	UT-Telemedicine technology	199	0.811	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Jiang & Benbasat 2007 (J)	HE-Online shopping website	176	NA	NA	NA	NA	NA	NA	0.724	NA	NA	NA	NA
Jones, Sundaram, & Chin 2002 (J)	UT-Sales force automation system	164	0.804	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Jung, Perez-Mira, & Wiley-Patton 2009 (J)	HE-Mobile TV	208	0.762	0.469	NA	NA	NA	NA	NA	0.526	NA	NA	NA
Kang, Hong, & Lee 2009 (J)	HE-Social networking website	349	0.584	NA	0.500	NA	NA	NA	0.570	NA	NA	NA	NA
Kim, Choi, & Han 2009 (J)	DP-Mobile Internet service	149	0.455	NA	NA	NA	NA	NA	0.299	NA	NA	NA	NA
Kim, Choi, & Han 2009 (J)	DP-Mobile Internet service	393	0.571	NA	NA	NA	NA	NA	0.510	NA	NA	NA	NA
Kim, Park, & Oh 2008 (J)	HE-Short messaging for social interaction	195	0.756	NA	NA	NA	NA	NA	0.546	NA	NA	NA	NA
Kim, Chan, & Chan 2007 (J)	DP-Mobile Internet service	218	0.593	NA	NA	NA	NA	NA	NA	NA	NA	0.604	0.484
Kim, Chan, & Gupta 2007 (J)	DP-Mobile Internet service	161	0.385	NA	NA	NA	NA	NA	0.428	NA	NA	NA	NA

Table A-1. Data from Individual Studies Included in This Meta-Analysis (cont.)

Source	Technology	Sample Size	Correlations between Behavioral Intention and Each of the Following Motivators										
			UF	JR	IM	AM	RW	PM	EN	FL	PF	PS	AR
Kim, Kim, & Shin 2006 (J)	HE-Online shopping system	495	0.594	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Kim 2005 (D)	UT-Web-based subscription databases	121	0.894	0.839	NA	NA	NA	NA	NA	NA	NA	NA	NA
Kim, Fiore, & Lee 2007 (J)	HE-Online shopping website	206	NA	NA	NA	NA	NA	NA	0.625	NA	NA	NA	NA
Kim, Ma, & Park 2009 (J)	HE-Online shopping system	341	0.303	NA	NA	NA	NA	NA	0.298	NA	NA	NA	NA
Kim 2008 (J)	DP-Mobile wireless technology for social and work related purpose	286	0.615	0.107	NA	NA	NA	NA	NA	NA	NA	NA	NA
Kim, Chun, & Song 2009 (J)	UT-Database system	46	0.490	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Kim, Chun, & Song 2009 (J)	UT-Database system	55	0.583	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Klein 2007 (J)	UT-Telemedicine technology	143	0.236	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Koufaris 2002 (J)	HE-Online shopping website	280	0.645	NA	NA	NA	NA	NA	0.638	0.495	NA	NA	NA
Kulviwat 2004 (D)	DP-Mobile device for social and work related purpose	230	0.533	0.458	NA	NA	NA	NA	NA	NA	NA	0.411	0.257
Kumar, Mohan, & Holowczak 2008 (J)	UT-Firewall security technology	130	0.427	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Kuo & Lee 2009 (J)	UT-knowledge management system	151	0.746	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Kuo & Yen 2009 (J)	DP-Mobile technology for social and work related interaction	269	0.591	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Kwahk 2006 (C)	DP-ERP system	446	0.818	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lee & Xia 2008 (C)	HE-Online gambling system	212	0.554	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lee, Ahn, & Han 2006 (C)	HE-Online shopping system	1040	0.540	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lee, Fiore, & Kim 2006 (J)	HE-Online shopping website	206	0.692	NA	NA	NA	NA	NA	0.591	NA	NA	NA	NA
Lee, Dehkordi-Vakil, & Kaul 2008 (J)	UT-Corporate career website	233	0.713	NA	NA	NA	NA	NA	0.445	NA	NA	NA	NA
Lee, Kang, & Kim 2007 (J)	UT-Negotiation support system	174	0.545	NA	NA	NA	NA	NA	NA	NA	0.458	NA	NA
Lee 2009 (J)	HE-Online gaming system	628	0.554	NA	NA	NA	NA	NA	0.790	0.572	NA	NA	NA
Lee, Cheung, & Chen 2005 (J)	UT-Web-based course management system	544	0.517	NA	NA	NA	NA	NA	0.521	NA	NA	NA	NA
Lee, Cheung, & Chen 2007 (J)	HE-Multimedia messaging service for social purpose	207	0.813	NA	NA	NA	NA	NA	0.656	NA	NA	NA	NA
Lee 2001 (D)	UT-Web-based course management system	259	0.716	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lee & Kozar 2008 (J)	UT-Anti-spyware software	294	0.810	NA	0.776	NA	NA	NA	NA	NA	NA	NA	NA
Li, Chau, & Lou 2005 (J)	DP-Instant messaging for social and work related interaction	273	0.795	NA	NA	0.334	NA	NA	0.809	NA	NA	NA	NA
Li, Day, Lou, & Coombs 2004 (J)	UT-Lotus notes	90	0.634	NA	NA	0.581	NA	NA	NA	NA	NA	NA	NA

Table A-1. Data from Individual Studies Included in This Meta-Analysis (cont.)

Source	Technology	Sample Size	Correlations between Behavioral Intention and Each of the Following Motivators										
			UF	JR	IM	AM	RW	PM	EN	FL	PF	PS	AR
Liaw 2007 (J)	UT-Job-related computer applications	164	0.789	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Liaw & Huang 2003 (J)	DP-Search engine	114	0.734	NA	NA	NA	NA	NA	0.798	NA	NA	NA	NA
Liaw, Huang, & Chen 2007 (J)	UT-Web-based course management system	30	0.831	NA	NA	NA	NA	NA	0.643	NA	NA	NA	NA
Lin & Lu 2000 (J)	HE-Online news website	139	0.848	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Liu 2005 (D)	UT-Job-related computer applications	200	0.671	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Liu, Liao, &Pratt 2009 (J)	UT-Web-based course management system	102	0.601	NA	NA	NA	NA	NA	NA	0.499	NA	NA	NA
Lou, Luo, & Strong 2000 (J)	UT-Lotus notes	192	0.916	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lou, Luo, & Strong 2000 (J)	UT-Lotus notes	193	0.921	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lu, Lai, & Cheng 2007 (J)	UT-Online shipping service system	85	0.289	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lu, Hsu, & Hsu 2005 (J)	UT-Online antivirus applications	1259	0.788	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lu, Chou, & Ling 2009 (J)	UT-Self check-in system of airline companies	337	0.572	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lu, Liu, Yu, & Yao 2003 (C)	DP-Mobile Internet service	128	0.405	NA	0.207	NA	NA	NA	NA	NA	NA	NA	NA
Lu, Yao, & Yu 2005 (J)	DP-Mobile Internet service	357	0.773	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lu, Zhou, & Wang 2009 (J)	DP-Instant messaging for social and work related interaction	250	0.745	NA	NA	NA	NA	NA	0.569	0.500	NA	NA	NA
Luarn & Lin 2005 (J)	UT-Mobile banking technology	180	0.800	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Luo 2005 (D)	HE-Online newpaper	147	0.667	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Luo 2005 (D)	HE-Online newpaper	242	0.575	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magni & Pennarola 2008 (J)	UT-Data and information retrieval system	189	0.406	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Martinez-Torres et al. 2008 (J).	UT-Web-based course management system	220	0.619	0.429	NA	NA	NA	NA	0.350	NA	NA	NA	NA
Martins & Kellermanns 2004 (J)	UT-Web-based course management system	243	0.530	NA	NA	NA	0.240	NA	NA	NA	NA	NA	NA
McCoy 2002 (D)	UT-Web-based course management system	265	0.826	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Money & Turner 2004 (C)	UT-Knowledge management system	35	0.668	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Morosan & Jeong 2008 (J)	HE-Online shopping system	465	0.400	NA	NA	NA	NA	NA	NA	NA	0.667	NA	NA
Morosan & Jeong 2008 (J)	HE-Online shopping system	449	0.429	NA	NA	NA	NA	NA	NA	NA	0.577	NA	NA
Muthitacharoen et al. 2006 (J)	HE-Online shopping system	435	0.818	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nguyen & Barrett 2006 (J)	UT-Internet Technology in Export Firms	144	0.668	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Oh, Kim, Lee, Shim, Park, & Jung 2009(J)	HE-Online shopping system	278	0.305	NA	NA	NA	NA	NA	NA	NA	0.392	NA	NA
Pavlou 2003 (J)	HE-Online shopping system	102	0.677	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table A-1. Data from Individual Studies Included in This Meta-Analysis (cont.)

Source	Technology	Sample Size	Correlations between Behavioral Intention and Each of the Following Motivators										
			UF	JR	IM	AM	RW	PM	EN	FL	PF	PS	AR
Pavlou 2003 (J)	HE-Online shopping system	155	0.721	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pavlou 2001 (C)	HE-Online shopping system	52	0.861	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pavlou & Fygenson 2006 (J)	HE-Online shopping system	312	0.362	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Plouffe, Hulland, & Vandenbosch 2001 (J)	UT-Smart card-based payment system	172	0.583	0.638	0.524	NA	NA	NA	NA	NA	NA	NA	NA
Premkumar, Ramamurthy, & Liu 2008 (J)	DP-Instant messaging for social and work relate interaction	349	0.396	NA	0.156	0.266	NA	NA	0.612	NA	NA	NA	NA
Qureshi, Zafar, & Khan 2008 (J)	UT-Web-based banking technology	235	0.831	NA	NA	NA	NA	NA	0.388	NA	NA	NA	NA
Rabjohn, Cheung, & Lee 2008 (C)	HE-Online community	154	0.688	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Riemenschneider, Harrison, & Mykytyn 2003 (J)	UT-Organization website technology	156	0.526	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rigopoulos & Askounis 2007 (J)	UT-Transaction processing system	125	0.740	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Robinson, Marshall, & Stamps 2005 (J)	UT-Job-related computer applications	218	0.705	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Roca, Chiu, & Martinez 2006 (J)	UT-Web-based course management system	172	0.802	NA	NA	NA	NA	NA	NA	0.568	NA	NA	NA
Roca & Gagne 2008 (J)	UT-Web-based course management system	174	0.436	NA	NA	NA	NA	NA	NA	NA	0.502	NA	NA
Ryu, Kim, & Lee 2008 (J)	HE-Video-sharing website	290	0.778	NA	NA	NA	NA	NA	0.789	NA	NA	NA	NA
Saade & Bahli 2005 (J)	UT-Web-based course management system	102	0.548	NA	NA	NA	NA	NA	NA	0.406	NA	NA	NA
Saade 2007 (J)	UT-Web-based course management system	105	NA	NA	NA	NA	NA	NA	0.761	NA	NA	NA	NA
Sanchez-Franco & Roldan 2005 (J)	DP-Internet	221	0.521	NA	NA	NA	NA	NA	NA	0.574	NA	NA	NA
Sanchez-Franco & Roldan 2005 (J)	DP-Internet	119	0.581	NA	NA	NA	NA	NA	NA	0.476	NA	NA	NA
Sarker 2006 (C)	UT-Business drawing application	261	0.622	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Seligman 2001 (D)	UT-Computer-based patient record system	98	0.746	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Serenko 2008 (J)	DP-Interface agent	75	0.610	NA	NA	NA	NA	NA	0.785	NA	0.319	NA	NA
Serenko, Bontis, & Detlor 2007 (J)	UT-MS Office applications	261	0.861	NA	NA	NA	NA	NA	0.896	NA	-0.129	NA	NA
Sharma & Deng 2002 (C)	DP-Mobile device for social and work related purpose	214	0.684	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Shin 2009 (J)	HE-IPTV	320	0.487	NA	NA	NA	NA	NA	NA	NA	0.334	NA	NA
Shin 2009 (J)	HE-Digital multimedia broadcasting—on-demand TV	527	0.337	NA	NA	NA	NA	NA	0.457	NA	NA	NA	NA
Shin 2007 (J)	DP-Mobile Internet service	515	0.532	NA	NA	NA	NA	NA	0.263	NA	NA	NA	NA
Shivers-Blackwell & Charles 2006 (J)	UT-ERP system	238	0.421	0.438	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table A-1. Data from Individual Studies Included in This Meta-Analysis (cont.)

Source	Technology	Sample Size	Correlations between Behavioral Intention and Each of the Following Motivators										
			UF	JR	IM	AM	RW	PM	EN	FL	PF	PS	AR
Singh, Fassott, Chao, & Hoffmann 2006 (J)	HE-Online shopping system	40	0.581	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Singh, Fassott, Chao, & Hoffmann 2006 (J)	HE-Online shopping system	110	0.520	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Singh, Fassott, Chao, & Hoffmann 2006 (J)	HE-Online shopping system	100	0.483	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sledgianowski & Kulviwat 2008 (C)	HE-Social networking website	322	0.291	NA	NA	NA	NA	NA	NA	NA	0.343	NA	NA
Srite & Karahanna 2006 (J)	DP-Personal Computer	181	0.573	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Srite & Karahanna 2006 (J)	DP-Personal Computer	116	0.579	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Stafford & Stern 2002 (J)	HE-Online auction websites	329	0.868	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sun & Zhang 2008 (J)	DP-Search engine	161	0.655	NA	NA	NA	NA	NA	0.448	NA	0.143	NA	NA
Sun & Zhang 2006 (J)	UT-Educational website	194	0.572	NA	NA	NA	NA	NA	0.180	NA	NA	NA	NA
Sussman & Siegal 2003 (J)	UT-Email system in an accounting firm	59	0.660	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Szajna 1996 (J)	DP-Email system for social and work related purpose	61	0.530	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tassabehji, Wallace, & Srivastava 2008 (C)	UT-Mobile device for work related purpose	112	0.849	0.729	NA	NA	NA	NA	NA	NA	NA	NA	NA
Teo, Chan, Wei, & Zhang 2003 (J)	UT-Virtual learning community	69	0.784	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Teo 2009 (J)	UT-Job-related computer applications	475	0.432	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thong, Hong, & Tam 2006(J)	DP-Mobile Internet service	811	0.493	NA	NA	NA	NA	NA	0.526	NA	NA	NA	NA
Toral, Barrero, & Martinez-Torres 2007 (J)	UT-Web-based course management system	142	0.588	NA	NA	NA	NA	NA	0.328	0.119	0.245	NA	NA
Tung, Chang, & Chou 2008 (J)	UT-Electronic logistics information system	252	0.786	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Turel, Serenko, & Bontis 2007 (J)	HE-Short messaging for social purpose	222	NA	NA	0.174	NA	NA	NA	0.588	NA	NA	NA	NA
Van Dolen, Dabholkar, & Ruyter 2007 (J)	UT-Business-oriented online communication system	106	NA	NA	NA	NA	NA	NA	0.451	NA	NA	NA	NA
Van Dolen, Dabholkar, & Ruyter 2007 (J)	UT-Business-oriented online communication system	106	NA	NA	NA	NA	NA	NA	0.347	NA	NA	NA	NA
Venkatesh 2000 (J)	UT-Online help desk system	58	0.562	NA	NA	NA	NA	NA	0.110	NA	0.289	NA	NA
Venkatesh 2000 (J)	UT-Property management system	145	0.608	NA	NA	NA	NA	NA	0.209	NA	0.137	NA	NA
Venkatesh 2000 (J)	UT-Windows 95 operating system	43	0.619	NA	NA	NA	NA	NA	0.197	NA	0.234	NA	NA
Venkatesh & Davis 2000 (J)	UT-Job-related proprietary system and Windows operating system	77	0.517	0.252	0.307	NA	NA	NA	NA	NA	NA	NA	NA
Venkatesh & Davis 2000 (J)	UT-Customer account management and stock management systems	79	0.506	0.271	0.284	NA	NA	NA	NA	NA	NA	NA	NA

Table A-1. Data from Individual Studies Included in This Meta-Analysis (cont.)

Source	Technology	Sample Size	Correlations between Behavioral Intention and Each of the Following Motivators										
			UF	JR	IM	AM	RW	PM	EN	FL	PF	PS	AR
Venkatesh & Morris 2000 (J)	UT-Data and information retrieval system	342	0.542	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Venkatesh & Bala 2009 (J)	UT-Job-related computer applications	156	0.638	0.281	0.244	NA	NA	NA	0.187	NA	0.198	NA	NA
Venkatesh & Speier 2009 (J)	UT-Job-related computer applications	316	0.565	NA	NA	NA	NA	NA	0.493	NA	NA	NA	NA
Venkatesh, Speier, & Morris 2002 (J)	UT-Virtual workplace system	69	0.575	NA	NA	NA	NA	NA	0.464	NA	NA	NA	NA
Venkatesh, Speier, & Morris 2002 (J)	UT-Virtual workplace system	146	0.530	NA	NA	NA	NA	NA	0.453	NA	NA	NA	NA
Vieru 2000 (D)	UT-Telemedicine technology	127	0.723	NA	0.461	NA	NA	NA	NA	NA	NA	NA	NA
Wakefield & Whitten 2006 (J)	DP-Blackberry PDA for social and work related purpose	185	0.611	NA	NA	NA	NA	NA	0.712	0.657	0.661	NA	NA
Walker 2004 (D)	UT-Web-based course management system	143	0.603	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wang & Benbasat 2004 (C)	HE-Recommendation agents	120	0.581	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wang 2002 (J)	UT-Tax filing systems	260	0.692	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wang, Wang, Lin, & Tang 2003 (J)	UT-Web-based banking technology	123	0.779	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wang, Lin, & Luarn 2006 (J)	DP-Mobile technology for social and work related interaction	258	0.800	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wilson, Mao, & Lankton 2005 (C)	UT-University website system	201	0.405	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wixom & Todd 2005 (J)	UT-Data warehousing software	465	0.900	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Yang, Park, & Park 2007 (J)	HE-Online shopping system	243	0.206	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Yi & Hwang 2003 (J)	UT-Web-based course management system	109	0.572	NA	NA	NA	NA	NA	0.481	NA	NA	NA	NA
Yi, Jachson, Park, & Probst 2006 (J)	UT-Mobile device for work related purpose	222	0.732	NA	0.321	NA	NA	NA	NA	NA	NA	NA	NA
Zhang & Li 2004 (C)	UT-Web-based course management system	226	0.706	NA	NA	NA	NA	NA	NA	NA	NA	0.391	0.358
Zhang & Li 2004 (C)	UT-Web-based course management system	196	0.596	NA	NA	NA	NA	NA	NA	NA	NA	0.486	0.350
Zhang, Li, & Sun 2006 (C)	UT-Educational website	194	0.572	NA	NA	NA	NA	NA	0.203	0.227	NA	0.271	0.242
Zhang, Prybutok, & Koh 2006 (J)	HE-online shopping system	294	0.691	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zhang 2004 (D)	UT-Online research community	82	0.699	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

D = Dissertation, J = Journal, C = Conference proceeding, UT = Utilitarian IT, HE = Hedonic IT, DP = Dual-purposed IT, UF = Perceived Usefulness, JR = Job relevance, IM = Image, AM = Affiliation motivation, RW = Reward, PM = Punishment, EN = Enjoyment, FL = Flow, PF = Playfulness, PS = Pleasure, AR = Arousal, NA = Not available.

The references to the studies are available from the authors on request.

Table A-2. Data from Individual Studies Included in This Meta-Analysis

Source	Technology	Sample Size	Correlations between Usage and Each of the Following Motivators										
			UF	JR	IM	AM	RW	PM	EN	FL	PF	PS	AR
Adams, Nelson, & Todd 1992 (J)	UT-Organizational Email system	116	0.359	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Adams, Nelson, & Todd 1992 (J)	UT-WordPerfect	64	0.279	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Adams, Nelson, & Todd 1992 (J)	UT-Lotus 1-2-3	67	0.427	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Adams, Nelson, & Todd 1992 (J)	UT-Harvard graphics	54	0.349	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Al-Gahtani 2008 (J)	UT-Job-related computer applications	1190	0.229	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Al-Khaldi & Al-Jabri 1998 (J)	DP-Personal Computer	234	0.429	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
An 2005 (D)	UT-Website of Health Promotion Development Center	200	0.338	NA	NA	NA	NA	NA	NA	NA	0.288	NA	NA
Anandarajan, Igbaria, & Anakwe 2002 (J)	UT-Job-related computer applications	143	0.294	NA	NA	NA	NA	NA	0.237	NA	NA	NA	NA
Anandarajan, Igbaria, & Anakwe 2000 (J)	UT-Computer applications in banking industry	88	0.278	NA	NA	NA	NA	NA	0.196	NA	NA	NA	NA
Bajaj & Nidumolu 1998 (J)	UT-Debugger tool	100	-0.215	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Burton-Jones & Hubona 2005 (J)	UT-Organizational cc:mail	96	0.415	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Burton-Jones & Hubona 2005 (J)	UT-MS Word	95	0.233	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Burton-Jones & Hubona 2006 (J)	UT-Organizational Email for work related purpose	122	0.358	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Burton-Jones & Hubona 2006 (J)	UT-Word processing system	118	0.358	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chakraborty, Hu, & Cui 2008 (J)	UT-MS Access	428	0.364	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chen 2000 (D)	HE-Online shopping system	45	0.415	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cheung & Sachs 2006 (J)	UT-Web-based course management system	57	0.330	NA	NA	NA	NA	NA	0.388	NA	NA	NA	NA
Chi 1996 (D)	UT-Organizational Email for work related purpose	634	0.687	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Davis 1989 (J)	UT-Organizational PROFS email system and XEDIT file editor	184	0.640	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Davis, Bagozzi, & Warshaw 1989 (J)	UT-Word processing system	107	0.821	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Devaraj, Easley, & Crant 2008 (J)	UT-Collaborative system	180	0.197	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ferguson 1997 (J)	UT-Job-related computer applications	157	0.231	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ferguson & Nevell 1996 (J)	UT-Accounting software	122	NA	NA	NA	NA	NA	NA	0.230	NA	NA	NA	NA
Gahtani 2001 (J)	UT-Spreadsheets	324	0.488	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Guthrie 2001 (C)	UT-Web-based course management system	49	0.207	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Guthrie 2001 (C)	UT-Web-based course management system	49	0.371	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Guthrie 2001 (C)	UT-Web-based course management system	49	0.306	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table A-2. Data from Individual Studies Included in This Meta-Analysis (cont.)

Source	Technology	Sample Size	Correlations between Usage and Each of the Following Motivators										
			UF	JR	IM	AM	RW	PM	EN	FL	PF	PS	AR
Habelow 2000 (D)	UT-Electronic performance support system	106	0.633	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hill 2001 (D)	UT-Cost management system	70	0.678	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Horton, Buck, Waterson, & Clegg 2001 (J)	UT-Organizational intranet	386	0.366	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Horton, Buck, Waterson, & Clegg 2001 (J)	UT-Organizational intranet	65	0.242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Huang, Song, Chen, & Cheng 2007 (C)	DP-Instant messaging and portal for social and work related purpose	177	0.438	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Huang, Song, Chen, & Cheng 2007 (C)	DP-Instant messaging and portal for social and work related purpose	177	0.507	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Igbaria 1993 (J)	UT-Job-related computer applications	251	0.564	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Igbaria 1993 (J)	UT-Job-related computer applications	225	0.587	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Igbaria & Iivari 1995 (J)	UT-Job-related computer applications	450	0.474	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Igbaria & Zviran 1996 (J)	UT-Job-related computer applications	379	0.296	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Igbaria, Guimaraes, & Davis 1995 (J)	UT-Job-related computer applications	214	0.479	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Igbaria, Iivari, & Maragahh 1995 (J)	UT-Job-related computer applications	450	0.415	NA	NA	NA	NA	NA	0.135	NA	NA	NA	NA
Igbaria, Parasuraman, & Baroudi 1996 (J)	UT-Job-related computer applications	471	0.458	NA	NA	NA	NA	NA	0.343	NA	NA	NA	NA
Igbaria, Zinatelli, Cragg, & Cavaye 1997 (J)	UT-Job-related computer applications	358	0.481	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iivari & Maansaari 1997 (C)	UT-Computer aided software engineering	63	0.511	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Kang, Kim, & Lee 2009 (C)	HE-Social networking website	428	0.615	NA	0.508	NA	NA	NA	NA	NA	NA	0.532	0.295
Kang, Kim, & Lee 2009 (C)	HE-Social networking website	154	0.599	NA	0.333	NA	NA	NA	NA	NA	NA	0.263	0.212
Kang, Hong, & Lee 2009 (J)	HE-Social networking website	349	0.276	NA	0.422	NA	NA	NA	0.473	NA	NA	NA	NA
Karahanna & Limayem 2000 (J)	UT-Organizational Email system for work related purpose	211	0.173	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Karahanna, Agarwal, & Angst 2006 (J)	UT-Customer relationship management system	278	0.476	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Keil, Beranek, & Konsynski 1995 (J)	UT-Expert support system	177	0.432	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Keil, Beranek, & Konsynski 1995 (J)	UT-Expert support system	129	0.442	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Kim 1996 (D)	UT-Executive information system	97	0.412	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Kim 2008 (J)	DP-Mobile wireless technology for social and work related purpose	286	0.361	0.647	NA	NA	NA	NA	NA	NA	NA	NA	NA
Kim, Lee, & Law 2008 (J)	UT-Hotel front office system	239	0.458	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table A-2. Data from Individual Studies Included in This Meta-Analysis (cont.)

Source	Technology	Sample Size	Correlations between Usage and Each of the Following Motivators										
			UF	JR	IM	AM	RW	PM	EN	FL	PF	PS	AR
Klein 2007 (J)	UT- Telemedicine technology	143	0.220	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lapczynski 2004 (D)	UT-Organizational Mobile device	134	0.526	0.719	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lee 2009 (J)	HE-Online gaming system	628	0.522	NA	NA	NA	NA	NA	0.503	0.562	NA	NA	NA
Lee & Kim 2009 (J)	UT-Organizational intranet	333	0.446	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Leong 2001 (D)	UT-MS Access	114	0.683	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lim, Lim, & Heinrichs 2008 (J)	HE-Online shopping website	219	0.573	NA	NA	NA	NA	NA	0.484	NA	NA	NA	NA
Loh & Ong 1998 (J)	HE-Online stock trading system	84	0.304	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lu & Gustafson 1994 (J)	UT- Telemedicine technology	40	0.291	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lu, Zhou, & Wang 2009 (J)	DP-Instant messaging for social and work related interaction	250	0.428	NA	NA	NA	NA	NA	0.115	0.135	NA	NA	NA
Luo 2005 (D)	HE-Online newspaper	147	0.365	NA	NA	NA	NA	NA	0.731	NA	NA	NA	NA
Luo 2005 (D)	HE-Online newspaper	242	0.476	NA	NA	NA	NA	NA	0.601	NA	NA	NA	NA
Martinez-Torres et al. 2008 (J)	UT-Web-based course management system	220	0.226	0.365	NA	NA	NA	NA	0.237	NA	NA	NA	NA
Martins & Kellermanns 2004 (J)	UT-Web-based course management system	243	0.268	NA	NA	NA	0.087	NA	NA	NA	NA	NA	NA
Mccloskey 2003 (J)	HE-Online shopping system	138	-0.347	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Money & Turner 2004 (C)	UT-Knowledge management system	35	0.617	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pavlou & Fygenson 2006 (J)	HE-Online shopping system	312	0.144	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Porter & Donthu 2006 (J)	DP-Internet	539	0.535	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Premkumar, Ramamurthy, & Liu 2008 (J)	DP-Instant messaging for social and work related interaction	349	0.293	NA	0.273	0.079	NA	NA	0.373	NA	NA	NA	NA
Rigopoulos & Askounis 2007 (J)	UT-Transaction processing system	125	0.594	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rouibah 2008 (J)	HE-Instant messaging for social interaction	191	0.266	NA	NA	NA	NA	NA	0.443	NA	NA	NA	NA
Sambamurthy & Chin 1994 (J)	UT-Group decision support systems	168	0.980	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sanchez-Franco & Roldan 2005 (J)	DP-Internet	221	0.605	NA	NA	NA	NA	NA	NA	0.557	NA	NA	NA
Sanchez-Franco & Roldan 2005 (J)	DP-Internet	119	0.616	NA	NA	NA	NA	NA	NA	0.359	NA	NA	NA
Schepers, Wetzels, & Ruyter 2005 (J)	UT-New technology for customer service	226	0.700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selim 2003 (J)	UT-Web-based course management system	403	0.692	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Serenko 2008 (J)	HE-Interface agent	75	0.406	NA	NA	NA	NA	NA	0.384	NA	0.088	NA	NA
Sharma & Deng 2002 (C)	DP-Mobile device for social and work related interaction	214	0.527	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sledgianowski & Kulviwat 2008 (C)	HE-Social networking website	322	0.136	NA	NA	NA	NA	NA	NA	NA	0.118	NA	NA

Table A-2. Data from Individual Studies Included in This Meta-Analysis (cont.)

Source	Technology	Sample Size	Correlations between Usage and Each of the Following Motivators										
			UF	JR	IM	AM	RW	PM	EN	FL	PF	PS	AR
Sundarraj & Wu 2005 (J)	UT-Web-based banking technology	55	0.384	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Szajna 1996 (J)	DP-Email system for social and work related interaction	61	0.228	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Teo, Lim, & Lai 1999 (J)	DP-Internet	1370	0.329	NA	NA	NA	NA	NA	0.232	NA	NA	NA	NA
Thompson, Higgins, & Howell 1994 (J)	UT-Job-related computer applications	258	0.590	0.359	NA	NA	NA	NA	0.260	NA	NA	NA	NA
Tong, Teo, & Tan 2008 (C)	UT-Electronic Medical Record System	121	0.534	0.442	0.063	NA	-0.176	0.275	NA	NA	NA	NA	NA
Toral, Barrero, & Martinez-Torres 2007 (J)	UT-Web-based course management system	142	0.328	NA	NA	NA	NA	NA	0.382	0.126	0.305	NA	NA
Trevino, Webster, & Stein 2000 (J)	UT-Organizational communication technology	132	NA	NA	NA	NA	NA	NA	NA	0.142	NA	NA	NA
Turel, Serenko, & Bontis 2007 (J)	HE-Short messaging services for social purpose	222	NA	NA	0.197	NA	NA	NA	0.442	NA	NA	NA	NA
Venkatesh & Bala 2009 (J)	UT-Job-related computer applications	156	0.539	0.236	0.271	NA	NA	NA	0.185	NA	0.175	NA	NA
Venkatesh, Speier, & Morris 2002 (J)	UT-Virtual workplace system	69	0.419	NA	NA	NA	NA	NA	0.377	NA	NA	NA	NA
Venkatesh, Speier, & Morris 2002 (J)	UT-Virtual workplace system	146	0.377	NA	NA	NA	NA	NA	0.377	NA	NA	NA	NA
Yang & Choi 2001 (C)	UT-Spreadsheet	211	0.353	NA	0.197	NA	NA	NA	NA	NA	NA	NA	NA
Yang & Choi 2001 (C)	DP-Internet	206	0.258	NA	0.054	NA	NA	NA	NA	NA	NA	NA	NA
Yi & Hwang 2003 (J)	UT-Web-based course management system	109	0.031	NA	NA	NA	NA	NA	0.061	NA	NA	NA	NA
Yi, Wu, & Tung 2005 (J)	UT-Statistical software	88	0.361	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zhang, Prybutok, & Koh 2006 (J)	HE-Online shopping system	294	0.690	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes: D = Dissertation, J = Journal, C = Conference proceeding, UT = Utilitarian IT, HE = Hedonic IT, DP = Dual-purposed IT, UF = Perceived Usefulness, JR = Job relevance, IM = Image, AM = Affiliation motivation, RW = Reward, PM = Punishment, EN = Enjoyment, FL = Flow, PF = Playfulness, PS = Pleasure, AR = Arousal, NA = Not available.

The references to the studies are available from the authors on request.

Appendix B. Two Examples of Classifying a System-Use Context

In the first example study (Davis, 1989), the two target information systems are PRQFS electronic mail and the XEDIT file editor, and the end users sampled are employees in IBM Canada's Toronto Development Laboratory. Therefore, the systems are employed in a workplace setting and the functional purposes of the systems are to improve productivity and to enhance employee job performance. Consequently, the system-use context here has been classified as utilitarian.

In the second example study (Kang et al., 2009), the target information system is a Facebook-like website called Cyworld, and the end users sampled are undergraduate students in South Korea. Therefore, the system is mostly used in a home or leisure environment for having fun in general or for social networking in particular. As a result, the context of using this website has been classified as hedonic. Below are the descriptions of the two system-use contexts literally extracted from the two original example studies.

Description of System-Use Context in the First Example Study

"A field study was conducted to assess the reliability, convergent validity, discriminant validity, and factorial validity of the 10-item scales resulting from the pretest. A sample of 120 users within IBM Canada's Toronto Development Laboratory were given a questionnaire asking them to rate the usefulness and ease of use of two systems available there: PRQFS electronic mail and the XEDIT file editor. The computing environment consisted of IBM mainframes accessible through 327X terminals. The PROFS electronic mail system is a simple but limited messaging facility for brief messages (See Panko, 1988). The XEDIT editor is widely available on IBM systems and offers both full-screen and command-driven editing capabilities.

Subjects had an average of six months' experience with the two systems studied. Among the sample, 10 percent were managers, 35 percent were administrative staff, and 55 percent were professional staff (which included a broad mix of market analysts, product development analysts, programmers, financial analysts and research scientists)."

Description of System-Use Context in the Second Example Study

"We conducted a field survey of online users who use the Cyworld website, which is similar to the US based MySpace website. The website has attracted more than twenty million users over the last six years. As much as 90 percent of South Koreans in their 20s are reported to be registered users of the website (Ihlwan, 2005). The sale of virtual items worth nearly $300,000 a day makes up most of the Cyworld revenue (Schonfeld, 2006).

We selected Cyworld for several reasons. First, it should be recalled that users employ Cyworld's mini-home pages to present their self-image to others. Furthermore, the website is in intense rivalry with other competitors. For example, the US based Cyworld has to compete with MySpace, Facebook, Friendster, and other social network sites. Therefore, the Cyworld website is a relevant IT artifact for verifying our research model. Second, Cyworld operates its site in the United States, China, Japan, Taiwan as well as South Korea. Therefore, cross-cultural comparisons, which can help increase generalizability of our research results, can be performed in the future. Finally, interest in Internet social networking websites has recently emerged across online users, businesses, and researchers (Boyd & Ellison, 2008). MySpace had more page views than Google in 2005 (Rosenbush, 2005). However, few studies have attempted to explore users' continued usage behavior of these websites.

Questionnaires were administered to 400 undergraduate students. The survey stated that responses would be kept confidential. Respondents were asked to complete the questionnaire with regard to their last usage experience of the website. In order to increase the response rate, data was gathered from the students during their class hours."

Appendix C. Failsafe N

For any relationship of interest, failsafe *N* refers to the number of additional studies (with non-significant results) needed to render the results for that relationship non-significant at a predefined level ($p \leq 0.05$ in this study) (Williams & Livingstone, 1994). To obtain failsafe *N*, we apply the formula $N = k(\overline{r_k} / \overline{r_c} - 1)$, where *k* is the number of studies included in a meta-analysis, $\overline{r_k}$ is the mean of the correlations, and $\overline{r_c}$ is the predefined value and is determined by the formula $t = \overline{r_c} / \sqrt{(1 - \overline{r_c}^2) / (n - 2)}$, where *t* = 1.96 when *p* is set at less than or equal to 0.05 and *n* is the average sample size (Hunter and Schmidt, 1990). By employing the mean of the average sample sizes (230)[5], $\overline{r_c}$ of this study can be estimated at 0.13. The failsafe *N*'s range from 1 to 727, with an average of 98. This large average failsafe *N* provides confidence in the robustness of this meta-analysis with respect to the possible exclusion of studies with non-significant results.

[5] The mean is derived by averaging the numbers in the column of Average Sample Size in Table 3.

Appendix D. Correlation Analysis Results

Table D-1 presents the correlation analysis results for Hypotheses 1a-b. Whether or not we consider the two outlier studies, the weighted average of the six pooled extrinsic-motivator-intention correlations is higher in the context of utilitarian systems (r = 0.620/0.773) than in the context of hedonic ones (r = 0.532). This is also the case with the six pooled extrinsic-motivator-usage correlations (0.406 vs. 0.398). All three possible paired comparisons illustrate that extrinsic motivators (i.e., usefulness, job relevance, and image) have stronger effects on intention in the context of utilitarian systems than in the context of hedonic ones. This is also the case with the effect of usefulness on usage (0.427 vs. 0.398) but not with the effect of image on usage (0.187 vs. 0.399). Therefore, the results of the two possible comparisons regarding usage are mixed.

Table D-1. Correlation Analysis Results for Hypotheses 1a-b

Dependent variable	Type of system-use contexts	Weighted average of combining the six correlations	Weighted average correlations between each of the following **extrinsic motivators** and the dependent variable					
			Usefulness	Job relevance	Image	Affiliation motivation	Reward	Punishment
Behavioral intention	**Utilitarian**	0.620 (0.773)	0.647 (0.790)	0.502	0.490	0.581	0.240	NA
	Hedonic	0.532	0.545	0.451	0.363	NA	NA	NA
Usage	**Utilitarian**	0.406	0.427	0.404	0.187	NA	0.000	0.275
	Hedonic	0.398	0.398	NA	0.399	NA	NA	NA

Table D-2 shows the correlation analysis results for Hypotheses 2a-b. Extrinsic motivators have a stronger combined effect on behavioral intention (0.539 vs. 0.532) but not on usage (0.375 vs. 0.398) in the context of dual-purpose systems than in the context of hedonic ones. While the results for usefulness (0.611 vs. 0.545) are consistent with H2a, the results for job relevance (0.340 vs. 0.451) and image (0.240 vs. 0.363) are not. H2a posits that an extrinsic motivator has a stronger effect on behavioral intention in the context of dual-purposed systems than in the context of hedonic ones. The results for usefulness (0.406 vs. 0.398) are consistent with H2b (for usage), but the results for image (0.192 vs. 0.399) are not.

Table D-2. Correlation Analysis Results for Hypotheses 2a-b

Dependent variable	Type of system-use contexts	Weighted average of combining the six correlations	Weighted average correlations between each of the following **extrinsic motivators** and the dependent variable					
			Usefulness	Job relevance	Image	Affiliation motivation	Reward	Punishment
Behavioral intention	**Dual-purposed**	0.539	0.611	0.340	0.240	0.382	NA	NA
	Hedonic	0.532	0.545	0.451	0.363	NA	NA	NA
Usage	**Dual-purposed**	0.375	0.406	0.647	0.192	0.079	NA	NA
	Hedonic	0.398	0.398	NA	0.399	NA	NA	NA

Table D-3 shows the correlation analysis results for Hypotheses 3a-b. Consistent with predictions, intrinsic motivators have a stronger combined effect on both behavioral intention and usage in the context of hedonic systems (0.573 and 0.440) than in the context of utilitarian ones (0.393 and 0.243). All three possible paired comparisons show that intrinsic motivators (i.e., enjoyment, flow, and playfulness) have a stronger effect on intention in the context of hedonic systems than in the context of utilitarian ones. While two (enjoyment and flow) of the three possible paired comparisons are consistent with H3b, the third (playfulness) is not.

Table D-3. Correlation Analysis Results for Hypotheses 3a-b

Dependent variable	Type of system-use contexts	Weighted average of combining the five correlations	Weighted average correlations between each of the following **intrinsic motivators** and the dependent variable				
			Enjoyment	Flow	Playfulness	Pleasure	Arousal
Behavioral intention	**Utilitarian**	0.393	0.448	0.352	0.274	0.383	0.319
	Hedonic	0.573	0.611	0.499	0.527	NA	NA
Usage	**Utilitarian**	0.243	0.253	0.134	0.258	NA	NA
	Hedonic	0.440	0.507	0.562	0.112	0.461	0.273

Table D-4 shows the correlation analysis results for Hypotheses 4a-b. Consistent with predictions, intrinsic motivators have a stronger combined effect on both behavioral intention and usage in the context of dual-purposed systems (0.480 and 0.264) than in the context of utilitarian ones (0.393 and 0.243). The results for all five intrinsic motivators (i.e., enjoyment, flow, playfulness, pleasure, and arousal) are consistent with H4a. While the results for flow (0.338 vs. 0.134) are consistent with H4b, the results for enjoyment (0.242 vs. 0.253) are not.

Table D-4. Correlation Analysis Results for Hypotheses 4a-b

Dependent variable	Type of system-use contexts	Weighted average of combining the five correlations	Weighted average correlations between each of the following **intrinsic motivators** and the dependent variable				
			Enjoyment	Flow	Playfulness	Pleasure	Arousal
Behavioral intention	**Utilitarian**	0.393	0.448	0.352	0.274	0.383	0.319
	Dual-purposed	0.480	0.492	0.537	0.358	0.505	0.367
Usage	**Utilitarian**	0.243	0.253	0.134	0.258	NA	NA
	Dual-purposed	0.264	0.242	0.338	NA	NA	NA

Table D-5 presents the correlation analysis results for Hypotheses 5a-b. In the context of utilitarian systems, extrinsic motivators have a stronger combined effect on both behavioral intention (0.620/0.773 vs. 0.393) and usage (0.406 vs. 0.243) than intrinsic motivators. Unsurprisingly, usefulness influences behavioral intention (r = 0.647/0.790) and usage (r = 0.427) much more strongly than enjoyment does (0.448 and 0.253). Furthermore, it is important to note that, in the context of utilitarian systems, four of the five available extrinsic-motivator-intention correlations (0.647/0.790, 0.502, 0.49, and 0.581) are larger than the highest intrinsic-motivator-intention correlation (0.448); the three highest extrinsic-motivator-usage correlations (0.427, 0.404, and 0.275) are all larger than the highest intrinsic-motivator-usage correlation (0.258). This provides additional evidence that, in the context of utilitarian systems, extrinsic motivators are more important determinants than are intrinsic motivators.

Table D-5. Correlation Analysis Results for Hypotheses 5a-b

Type of system-use contexts	Weighted average of combining the six or five correlations	Weighted average correlations between each of the following extrinsic or intrinsic motivators and **behavioral intention**					
		Usefulness	Job relevance	Image	Affiliation motivation	Reward	Punishment
Utilitarian	0.620 (0.773)	0.647 (0.790)	0.502	0.490	0.581	0.240	NA
		Enjoyment	Flow	Playfulness	Pleasure	Arousal	NA
	0.393	0.448	0.352	0.274	0.383	0.319	NA
Type of system-use contexts	Weighted average of combining the six or five correlations	Weighted Average Correlations between Each of the Following Extrinsic or Intrinsic Motivators and **Usage**					
		Usefulness	Job relevance	Punishment	Image	Reward	Affiliation motivation
Utilitarian	0.406	0.427	0.404	0.275	0.187	0.000	NA
		Enjoyment	Flow	Playfulness	Pleasure	Arousal	NA
	0.243	0.253	0.134	0.258	NA	NA	NA

Table D-6 presents the correlation analysis results for Hypotheses 6a-b. In the context of hedonic systems, intrinsic motivators have a stronger combined effect on both behavioral intention (0.573 vs. 0.532) and usage (0.440 vs. 0.398) than do extrinsic motivators. Enjoyment plays a more important role than usefulness (0.611 vs. 0.545 and 0.507 vs. 0.398). More to the point, the three highest intrinsic-motivator-usage correlations (0.562, 0.507, and 0.461) are all larger than the highest extrinsic-motivator-usage correlation (0.399); the three intrinsic-motivator-intention correlations (0.611, 0.527, and 0.499) are all larger than the second highest extrinsic-motivator-intention correlation (0.451). These results thus add extra support to our view that, in the context of hedonic systems, intrinsic motivators play a more critical role than extrinsic motivators do.

Table D-6. Correlation Analysis Results for Hypotheses 6a-b

Type of system-use contexts	Weighted average of combining the six or five correlations	Weighted average correlations between each of the following extrinsic or intrinsic motivators and **behavioral intention**					
		Usefulness	Job Relevance	Image	Affiliation Motivation	Reward	Punishment
Hedonic	0.532	0.545	0.451	0.363	NA	NA	NA
		Enjoyment	Flow	Playfulness	Pleasure	Arousal	NA
	0.573	0.611	0.499	0.527	NA	NA	NA
Type of system-use contexts	Weighted average of combining the six or five correlations	Weighted average correlations between each of the following extrinsic or intrinsic motivators and **usage**					
		Usefulness	Image	Affiliation motivation	Job relevance	Reward	Punishment
Hedonic	0.398	0.398	0.399	NA	NA	NA	NA
		Enjoyment	Flow	Playfulness	Pleasure	Arousal	NA
	0.440	0.507	0.562	0.112	0.461	0.273	NA

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