JITTA

JOURNAL OF INFORMATION TECHNOLOGY THEORY AND APPLICATION

ISSN: 1532-3416

Reasoning about Discontinuance of Information System Use

Jan Recker

Information Systems School, Queensland University of Technology

j.recker@qut.edu.au

Abstract:

While many studies have explored conditions and consequences of information systems adoption and use, few have focused on the final stages of the information system lifecycle. In this paper, I develop a theoretical and an initial empirical contribution to understanding individuals' intentions to discontinue the use of an information system. This understanding is important because it yields implications about maintenance, retirement, and users' switching decisions, which ultimately can affect work performance, system effectiveness, and return on technology investments. In this paper, I offer a new conceptualization of factors determining users' intentions to discontinue the use of information systems. I then report on a preliminary empirical test of the model using data from a field study of information system users in a promotional planning routine in a large retail organization. Results from the empirical analysis provide first empirical support for the theoretical model. I discuss the work's implications for theory on information systems continuance and dual-factor logic in information system use. I also provide suggestions for managers dealing with cessation of information systems and broader work routine change in organizations due to information system end-of-life decisions.

Keywords: Information System Discontinuance, Information System Use, Scenario-based Method, Dual Factor Logic, Survey.

Jan vom Brocke acted as the Senior Editor for this paper.

1 Introduction

Researchers have written much about how and why organizations choose to invest in new information systems or other technological innovations. The literature has provided a comprehensive understanding of both benefits (Seddon, Calvert, & Yang, 2010) and costs (Robey, Ross, & Boudreau, 2002) associated with implementing or maintaining information systems (Swanson & Dans, 2000). A large stream of research has explored why users adopt (Venkatesh, Morris, Davis, & Davis 2003), resist (Kim & Kankanhalli, 2009; Centefelli & Schwarz, 2011), continually use (Bhattacherjee, 2001; Kim & Malhotra, 2005), or replace (Polites & Karahanna, 2012) information systems in support of their work tasks. Indeed, it would appear that much IS research has focused on understanding how to best introduce new or replacement systems and how to maximize system use and the resulting benefits, value, and impact thereof.

Notwithstanding the fertility of this research stream to date, researchers have paid disproportionally little attention to understanding how and why one might choose to *end* their use of an information system. Even the stream of research on system replacement (Polites & Karahanna, 2012) or system switching (Bhattacherjee, Limayem, & Cheung, 2012) has devoted most attention to how and why users would decide to use a new system rather than explaining how and why they choose to discontinue using an existing system. This fact is surprising because, inevitably, organizational change often renders systems obsolete and necessitates end-of-life decisions (Kelly, Gibson, Holland, & Light, 1999). Abandoning an information system too early can result in significantly decreased return-on-investment (Robey et al., 2002), and a delayed decision can significantly obstruct operational efficiency (Berinato, 2003) and damage reputation (Overby, 2005). Also, the press is full of cases of information systems that for some reason or other have fallen out of use, such as Myspace (Helmore, 2009), Del.icio.us (Efrati, 2010), and even Facebook (Turel, 2015). While some of these cases relate to systems in use for hedonic or private purposes, systems used at work also sometimes fall into disgrace or, better, disuse. Examples include debates about stopping email usage (Mathis, 2012) or reports of organizations that adopted enterprise social networks only to find user participation withering away with time (Li, 2012). As these examples show, at some stages, individuals apparently choose to *discontinue* using information systems at work.

Furneaux and Wade (2010, 2011) have studied information system discontinuance as an organizational-level decision to abandon a particular system. Their work yielded an initial model of the organizational decision to discontinue using an information system that suggests system replacement decisions at an organizational level are determined by system capability shortcomings, limited support, and low levels of integration. They suggest as a natural and logical continuation of their work that one examine individual-level intentions to discontinue using an information system so we can understand and anticipate organizational replacement and investment decisions based on individuals' willingness to change work tasks with—or without—using an information system.

This paper provides a first theoretical model of individual-level intentions to discontinue using an information system, which I define as "an individual user's decision to stop using an information system in support of a work task". Given the absence of robust a priori theory, I draw on existing conceptualizations of information systems continued use (e.g., Venkatesh, Thong, Chan, Hu, & Brown, 2011; Polites & Karahanna, 2012) and develop a first model of individual-level information system discontinuance conceptualized as a rational choice (Scott, 2000). To clarify this understanding, consider the typology that Figure 1 shows.

Contribution:

I develop a theoretical model that focuses specifically on the different drivers between individual's intentions to use or to discontinue using an information system. Research has largely neglected the latter. I suggest that one can view discontinuance as a rational choice alternative to continuance and that different and non-overlapping motives drive both intentions. I suggest a conceptual model with seven hypotheses. I also contribute a first empirical evaluation of this new theory through a field study where continuance or discontinuance of information system use occurs in a relevant retail work routine. I show that the collected survey data supports my conceptualization. I also discuss multiple pathways for extending research on discontinuance and its consequences.

It visualizes different behaviors that occur when information systems are introduced (new), being used (same), or not used (ceased) in work tasks or routines that, thereby, remain unchanged (same) or not (new). For instance, appropriation (Orlikowski, 1992; Leonardi, 2011) describes scenarios in which users find new ways of using an existing technology and, thereby, introduce new or altered routines. Implementation concerns the adoption of a new information system to support a new or altered routine (Robey, Ross, & Boudreau, 2002). Workarounds describe scenarios in which users develop new routines to avoid using a particular system that is in place to enact a particular task (Ferneley & Sobreperez, 2006). Replacement (Polites & Karahanna, 2012) or switching (Bhattacherjee et al., 2012) concern choosing an alternative information system to carry out a task (e.g., switching from Myspace to Facebook for social networking).

By contrast, discontinuance as understood in this paper suggests that people may decide to continue carrying out a task but choose to do so *without* an information system that was in place to enact the task. I interpret this case as that they do not carry out another task when discontinuing to use an information system (which would be switching) nor do they carry out the same task with a different system (which would be a workaround). Such scenarios may not occur as often as switching, appropriations, replacements, or workarounds; however, as I show below, they do transpire and raise the question whether available theory explains such episodes.

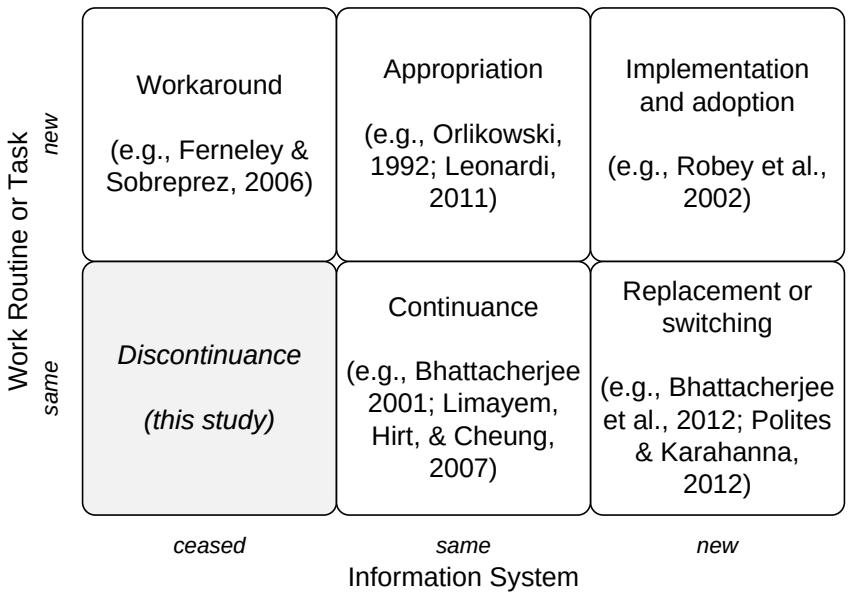

Figure 1. Differentiating Phenomena around Information Systems and Work Routines

This paper proceeds as follows. In Section 2, I review the literature and develop an understanding of discontinuance as a rational choice. In Section 3, I develop a new theory focusing on discontinuance intentions specifically. The model develops an understanding of the antecedents of a conscientious decision between the alternatives of *continuing* or *discontinuing* to use an information system based on a balancing assessment of individual costs and benefits of the choice. The model views the discontinuance decision as being influenced by both positive and negative technology performance evaluations in terms of procedural efforts and performance benefits to a work task. In Section 4, I empirically examine the model using data from a field study. The study involved a large retail organization that was considering whether it would stop using an information system for planning promotions. In Section 5, I present the findings. The field study shows both the relevance of the phenomena under examination and provides some initial empirical evidence that supports the proposed conceptualization. In Section 6, I discuss these findings and their implications, and I describe limitations in Section 7. In Section 8, I conclude the paper.

2 Prior Research

2.1 Information Systems Usage Behaviors in the Literature

Much of the research conducted in the IS field examines, in some form or other, information technology in use and the impact thereof (Paul, 2010). One can position many behaviors and decisions around technology in use that have been of interest alongside the typical stages of an information system lifecycle from adoption to operation and retirement. For example, user adoption and acceptance of technology innovations have interested IS scholars for decades (e.g., Moore & Benbasat, 1991; Venkatesh et al., 2003). Also, researchers have recognized that successful adoption does not always lead to sustained and continued usage (e.g., Bhattacherjee, 2001) and, thus, broadened the area of examination to post-adoption behaviors (e.g., Jasperson, Carter, & Zmud, 2005; Ye, Seo, Desouza, Sangareddy, & Jha 2008; Polites & Karahanna, 2012).

Appendix A summarizes the literature of the key usage behaviors under observation alongside the information systems lifecycle and provides references to selected seminal papers in the respective area. Researchers have traditionally paid much attention to behaviors during the early stages of the information system lifecycle, and their work has provided and extended our understanding of how both individuals and organizations adopt (Teo, Wei, & Benbasat 2003), implement (Markus, 1983), accept (Venkatesh et al., 2003), and use (Burton-Jones & Gallivan, 2007) information systems in organizational practice. Research has also explored behaviors and decisions that relate to operating an information system, such as how users decide to continue their use (Bhattacherjee, 2001), adapt their use (DeSanctis & Poole, 1994), change patterns of their use (de Guinea & Webster, 2013), habitualize their use (de Guinea & Markus, 2009; Polites & Karahanna, 2013), or modify or develop work routines based on how they use information systems (Leonardi & Bailey, 2008). Importantly, this work has affirmed that one can view information system usage as a function of planned behaviors and conscious decisions and conscious and subconscious perceptions in light of prior experience and behavioral patterns.

In contrast to much of the literature that Appendix A summarizes, researchers have devoted disproportionally limited attention to phenomena that relate to decisions about an information system's end of life. Early work in this vein of research examined system maintenance efforts as an attempt to prolong and maximize the lifespan of an information system (Swanson & Dans, 2000; Heales, 2002). More recent work has examined users' decision to stop using a particular system to replace the system (Polites & Karahanna, 2012) or to switch to another system (Ye et al., 2008; Bhattacherjee et al., 2012). Still, much of this research focuses on understanding how users will embrace—and eventually use—a new system without dedicating much attention to how or why they would stop and abandon the system already or previously in place.

2.2 Discontinuing Information Systems Use

Detailed knowledge of why individuals choose *not* to use an information system is limited overall, and the amount of related studies to date have predominantly addressed the implementation stages of the information system lifecycle, such as in studies of systems development project abandonment (Ewusi-Mensah & Przasnyski, 1991), resistance to implementation (Kim & Kankanhalli, 2009), failure to adopt (Lyytinen, 1988), or outright rejection of new information systems (Centefelli & Schwarz, 2011). One common theme in this stream is that the literature almost entirely focuses on situations in which users or organizations are confronted with a novel information system artifact and reject or resist the intention to use it.

A different situation, however, exists in circumstances in which information systems have been implemented and are operational and where decisions are being considered to abandon using that system (Furneaux & Wade, 2011). Such decisions are important because, at that stage of the information system lifecycle, organizations have already substantially invested into adopting, implementing, and operating that system (Kelly, Gibson, Holland, & Light, 1999), and individual users have typically invested considerable resources and time to educate themselves in how to use the system (Bostrom, Olfman, & Sein, 1990), gained considerable experience and expertise in their use (Taylor & Todd, 1995), and developed new or adapted work routines based on their system use (Leonardi, 2011). This behavior may have even become automatic over time and, thus, require little conscious effort altogether (Kim, Malhotra, & Narasimhan, 2005), which leads to forms of system use that are called confirmed (Rogers, 2003) or routinized (Cooper & Zmud, 1990).

Furneaux and Wade (2010, 2011) were the first to examine organizational-level decisions to discontinue using an information system. At that level, such a decision involves whether to retain or abandon an information system in use. They argue that existing system shortcomings, level of integration with other systems, and other organizational and environmental forces influence such decisions. Still, as they concede, many of the determinants of this organizational decision are likely to have limited relevance to individual users of a system, which, in turn, raises the question of how individuals form discontinuance decisions. At the individual level, a discontinuance decision involves deciding about one's intentions to continue or discontinue using a system. This question is important because both the intention to discontinue and the intention to continue to use an information system at an individual level has important ramifications for management decisions and planned organizational change efforts. If individual users were intent to continue to use an existing system that was then decided to be replaced, difficulties in overcoming old and developing new work routines, resistance, or even outright rejection of a new system could entail, which could significantly impede the new system's success. Likewise, if individual users were intent to discontinue a system they were mandated to continue to use, resistance and disruption behaviors may ensue, which could become a detriment to operational efficacy and lead to decreased motivation, job performance, and work ethics.

In conclusion, while the existing body of literature has significantly advanced our understanding of behaviors relevant to large parts of the information system lifecycle, a significant gap remains that limits our ability to comprehensively explain individuals' deciding to discontinue using an information system. It would appear that the focus of the research field has pushed the body of knowledge to around technology's acceptance and progress. This prevalent focus introduces positive selection bias into the recommendations that practice can draw from such research, which is similar to the perils of benchmarking against only good, successful cases rather than learning from failure (Denrell, 2005).

2.3 Theoretical Framework

I view individual-level discontinuance of information system use as a decision between either maintaining or abandoning the status quo. Rational choice theory (RCT) (Scott, 2000) offers a conceptual framework that helps one to develop an explanation how individuals behave in choice situations. RCT argues that, when individuals make decisions, they first recognize the available alternatives and then decide by balancing costs and outcomes based on individual preference functions (McCarthy, 2002). Researchers have used RCT as a frame to characterize many technology use behaviors, including individual technology acceptance (Davis, 1989) and use (e.g., Karahanna, Straub, & Chervany, 1999), which, in turn, suggests that a discontinuance decision may also be—at least partially—a rational choice.

RCT is applicable as a theoretical frame for defining individual-level information system discontinuance because it suggests this decision to be a choice between distinct alternatives (i.e., to continue to use or not to continue to use) rather than two bipolar ends of one continuum. In other words, RCT suggests that individuals decide between continuance and discontinuance. This view implies discontinuance and continuance to be dual-factored constructs (Centefelli, 2004) instead of the opposite ends of a bipolar construct (i.e., the higher and lower end of the continuance construct) (e.g., Bhattacherjee, 2001; Limayem et al., 2007).

A distinguishing feature of dual-factored constructs is that either construct in the pairing may have different but not necessarily opposite antecedents and consequences. Examples for dual-factored constructs include satisfaction and dissatisfaction (Herzberg, 1966), trust and distrust (Lewicki, McAllister, & Bies, 1998), and enablers and inhibitors of technology usage (Centefelli & Schwarz, 2011). Common to these concepts is a logic that separates a seemingly bipolar construct into two strongly related yet independent constituents. Research on these concepts has also shown that dual-factor constructs have disjoint antecedents and characteristics and that the concepts may also lead to different (not necessarily opposite) consequences. Herzberg's dual factor theory, for example, has shown that antecedents to satisfaction fall into categories of hygiene and motivator factors (e.g., Knight & Westbrook, 1999; Cheung & Lee, 2009). Lewicki et al. (1998) describe trust in terms of faith and assurance and distrust through concepts of fear and cynicism. In IS research, Centefelli and Schwarz (2011) have shown that (among other factors) inhibitors such as intrusiveness and information overload led to technology rejection and perceived usefulness and ease of use led to technology acceptance.

I argue that discontinuance in relation to continuance follows a similar logic. For instance, research has firmly established that high levels of perceived usefulness are a key determinant to one's intention to continue to use an information system (Bhattacherjee, 2001). Does this finding necessarily mean that low

levels of perceived usefulness imply that users intend to discontinue using the system? One may still perceive a system whose utility they perceive to be relatively low as a better option than not using the system altogether. Similarly, the relative advantage of a new system and dissatisfaction with an incumbent system may lead to a user's willingness to switch to a new system (Bhattacherjee et al., 2012), but one might ask whether dissatisfaction with an incumbent system without the presence of a potentially advantageous alternative system necessarily guarantee that the user prefers to discontinue using the system altogether. We can say not automatically because the sole presence of low levels of satisfaction may diminish continuance intentions (Bhattacherjee, 2001) but does not necessarily imply considering—and choosing—an alternative course of action without any system involvement.

RCT suggests instead that the discontinuance-continuance pairing is a rational choice where each alternative provides some benefit (such as high levels of utility of an existing system that would lead to an intention to continue using the system) and costs (such as the requirement to comply with a particular way of executing a task that is the system in use stipulates and which the user may prefer to avoid). In this theoretical frame, one needs to review and separate the existing logic that explains information systems continuance from a logic that explains information systems discontinuance.

My definition of the pairing continuance-discontinuance as a dual-factor concept has important implications. Most notably, it extends the prevalent view of discontinuance being the opposite of continuance of a behavior (Ye et al., 2008) by arguing that these two behaviors are obviously related yet not necessarily congruent in their logic or how they form. Similarly, this logic separates the discontinuance decision from a switching or replacement decision (Bhattacherjee et al., 2012; Polites & Karahanna, 2012). One chooses between using two competing technologies to address similar needs based on assessing the relative advantages of a new system versus the costs of switching because of existing commitments and habit in using the existing system. In essence, the decision is "to continue to use or to start using a different system". Yet, this logic does not apply in a situation where no new or at least partially new system exists that could offer any advantage over the incumbent system and where, thus, the decision is "to continue to use or to discontinue to use". Thus, enablers of the switching, replacement, or, indeed, continuance decision may exist even in the presence of enablers of a discontinuance decision.

On the basis of these arguments, I offer a first conceptual model of the individual-level information system discontinuance decision in Section 3.

3 Conceptualizing Discontinuance of Information System Use

Because individual level decisions to discontinue technology use are part of a research domain largely bereft of appropriate a priori theory (Furneaux & Wade, 2011), I first developed a conceptual framework that can help one develop novel theory to explain individual-level IS discontinuance intentions. I base the conceptual framework on rational choice theory and dual-factored concepts as important anchors to understand the formation of behavioral intentions about two alternative courses of actions based on an assessment of costs and benefits. Figure 2 visualizes the framework.

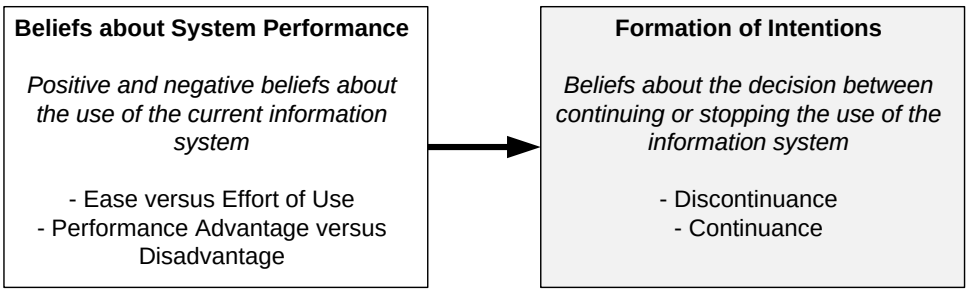

Figure 2. Conceptual Model

The conceptual framework suggests that one can explain the choice between intentions to continue using an information system and intentions to discontinue using an information system by examining one's behavioral beliefs about their using the incumbent system and, in particular, about performance gains and losses and the ease and effort required for using the system. Performance gains are perceptions about advantages that stem from the system's value (e.g., its contributions to task performance, its perceived usefulness, or its perceived value in making decisions). Performance losses are perceptions that capture

how a system may be a detriment to the routine (e.g., because it impedes the user in carrying out the work routine, it prescribes procedural compliance that is felt to be unnecessary, or it obstructs the user from making desired decisions). Ease and effort of use describe user perceptions about the interactions with the system and whether these interactions are easy to learn and carry out or complex and cumbersome to perform.

The model's arguments build on the prevalent theoretical perspectives around information system use (namely, technology acceptance and use) (Davis, 1989; Venkatesh et al., 2003); rational choice theory (Scott, 2000; McCarthy, 2002; Bulgurcu, Cavusoglu, & Benbasat, 2010) provides the overarching theoretical frame. In turn, the model describes behavioral beliefs formed by assessing the relative performance advantages and disadvantages from information system use as the antecedents to a rational choice between the alternatives of continuing or discontinuing to use an information system.

3.1 Positive and Negative Beliefs about System Performance

We can identify information system performance as the extent to which a system consistently and effectively accomplishes the tasks that one expects it to accomplish (Furneaux & Wade, 2011). IS research has long studied what determines beliefs about the performance of an existing information system. Several reviews and commentaries about this research stream exist (e.g., Lee, Kozar, & Larsen, 2003; Venkatesh et al., 2003; King & He, 2006; Benbasat & Barki, 2007). This research has firmly established that two key concepts are relevant when evaluating information system use as a rational behavior: perceived usefulness and perceived ease of use. Perceived usefulness describes perceptions about the utility and benefits an individual believes will accrue from using a system. Perceived ease of use describes a user's experienced efforts required to use the system (Davis, 1989; Centefelli & Schwarz, 2011).

Past research firmly suggests that performance beliefs in form of perceptions of usefulness and ease of use will influence individuals' decisions to continue using a system. Performance factors are important drivers of maintenance and end-of-life decisions (Swanson & Dans, 2000; Venkatesh & Morris, 2000), and researchers have highlighted them as main reasons for the successful impact of an information system (Gable, Sedera, & Chan, 2008; Petter, DeLone, & McLean, 2008).

Specifically, congruent to existing research and findings on technology acceptance and use (Venkatesh et al., 2003), I expect perceived ease of use to positively influence perceived usefulness. The rationale is that perceived ease of use suggests that system users can achieve performance gains faster, which, in turn, elevates perceptions about the system's usefulness. As such, I hypothesize:

Hypothesis 1: Perceived ease of use is positively associated with perceived usefulness.

Furthermore, as researchers have previously documented (Bhattacherjee, 2001; Venkatesh et al., 2011), one's beliefs about enhanced performance stemming from using and one's positive beliefs about the efforts required to use an information system will determine one's intention to continue to use the information system because users who perceive a system to be useful will more likely believe that continuing to use it will lead to continued performance achievements. Similarly, the more a user perceives a system to be easy to work with, the greater the user's sense of efficacy and personal control regarding the user's ability to carry out work tasks, which, in turn, leads to elevated intentions to continue the use of that system. As such, I hypothesize:

Hypothesis 2: Perceived ease of use is positively associated with intentions to continue to use the information system.

Hypothesis 3: Perceived usefulness is positively associated with intentions to continue to use the information system.

In contrast to these positive performance beliefs, lack of performance can be a main reason for an organization to abandon a system (Furneaux & Wade, 2011) and relative performance gains of a different system can motivate a user to switch to that system (Bhattacherjee, Limayem, & Cheung, 2012).

Thus, the nature of the discontinuance-continuance pairing following a dual factor logic suggests that perceived usefulness and perceived ease of use as means to capture positive performance beliefs stemming from using an information systems may have conceptual counterparts that expresses users' beliefs about the disadvantages and negative consequences (such as inconvenience and additional effort) from information system use.

Simply put, a "good" information system will have positive consequences onto the work task in which one uses it by, for instance, increasing productivity, effectiveness, throughput, or output (Gable, Sedera, & Chan, 2008). In turn, perceptions of system usefulness tend to lead to intentions to continue information system use (Bhattacherjee, 2001; Venkatesh et al., 2011). Conversely, a "bad" information system will have negative consequences (e.g., by slowing down the users, introducing errors due to lack of information accuracy, etc.). Thus, individuals will actually perceive an unavailing system as a detriment to their task performance. Also, while one can alter or even create some work routines because of affordances provided by technology (Leonardi, 2011), rigid technologies often impose a particular system routine that users need to comply with, which, in turn, creates additional effort in executing a work routine in the way the technology stipulates. Researchers have noted such opposing evaluations in, for example, the context of security policies that provide usefulness in terms of compliance management but also denote an impediment to users in terms of their task performance (Bulgurcu, Cavusoglu, & Benbasat, 2010; Siponen & Vance, 2010).

Thus, I argue that users distinguish between performance advantages (i.e., positive consequences from using an information system) and disadvantages (i.e., negative consequences from using an information system). In turn, perceived ease of use and usefulness have two related counterparts that I argue are related to one's forming intentions to discontinue using a system. I define work impediment as the individual perception of system use as a detriment to work task performance. Similarly, I argue that users also assess to the use of a systems in terms of the perceived costs of complying with the procedures of a system-dependent work routine. Compliance with a particular behavior can have perceived benefits, such as safety, accomplishment, or fulfillment, but it is also associated with perceived costs such as inconvenience, additional effort, and/or productivity losses (Bulgurcu et al., 2010). Thus, I define costs of system compliance as an individual's assessing an information system in terms of what perceived unfavorable consequences may arise from the individual's being required to comply with a system-defined work routine.

When users perceive the costs of system compliance to be high, they will also have elevated perceptions of the system being a work impediment because individuals perceive procedural costs such as inconvenience and additional effort in complying with system-enforced routines as a barrier to productivity, which, in turn, elevates their perceptions that using the system will be a determinant to the work routine and, consequently, the output that one can achieve with that routine. As such, I hypothesize:

Hypothesis 4: Perceived costs of system compliance are positively associated with perceived work impediment.

An individual's beliefs about the negative consequences of using an information system will influence the individual's intentions to discontinue using the system. If an individual perceives a system as negatively related to a work task (e.g., because it slows down the worker, because it proves to be an ineffective means of acquiring or disseminating information, etc.), then the individual will form stronger beliefs about not continuing to use that system rather than about continuing to do so. That is, if users perceive the system to impede the work routine in which they use it, then users are likely to believe that they can better organize and execute the work task without involving the system. As such, I hypothesize:

Hypothesis 5: Perceived costs of system compliance are positively associated with intentions to discontinue using the information system.

Hypothesis 6: Perceived work impediment are positively associated with intentions to discontinue using the information system.

3.2 Forming Beliefs about Continuance and Discontinuance of Information System Use

Dual factor theory suggests that users typically have some levels of intentions about both information system continuance and discontinuance. Similar to other individual behaviors that may have something good and bad about them—Centefelli and Schwarz (2011) refer to smoking as an example—users typically have both positive and negative experiences about using a system. For instance, a system one uses in a work task may be overly cumbersome to use but still assist one to effectively perform the task. In turn, the user may experience some levels of intentions to continue to use the system (in light of the performance gains) but also some levels of intentions to discontinue to use it (in light of the effort required to use it). However, rational choice theory suggests that continuance and discontinuance intentions are two alternatives between which users will choose based on their assessing their individual preferences

and the system's costs and benefits. In turn, the relative preference of one alternative (for instance, intentions to continue system use) will diminish preference for the other (for instance, intentions to discontinue system use). As such, I hypothesize:

Hypothesis 7: Intentions to continue to use the information system are negatively associated with intentions to discontinue to use the information system.

Figure 3 shows the hypothesized model.

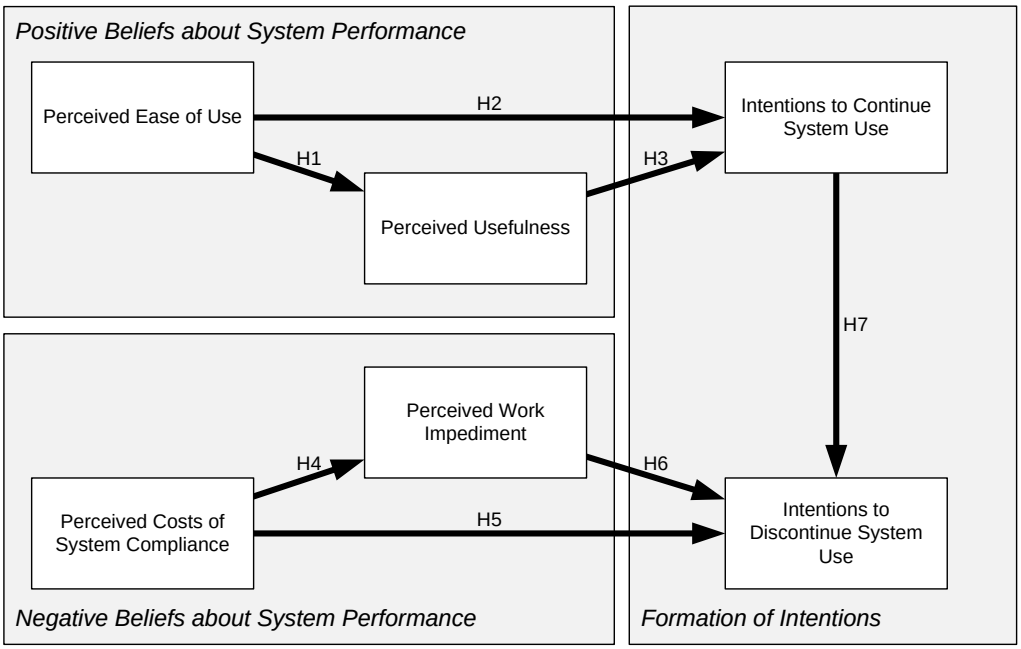

Figure 3. Theoretical Model of Discontinuance Intentions

4 An Initial Empirical Evaluation of the Model

4.1 Preliminary Considerations

To study discontinuance, one needs to find a study context with an organizational work routine in which an information system is currently in use to complete an individual work task *and* with an option to complete the work routine without the existing or a different and new system used in the individual task component. These factors are important for one to adequately study intentions to discontinue information system use rather than intentions to replace that system (Polites & Karahanna, 2012) or intentions to switch to another system to provide similar features to a user in need of certain system functionality (Ye et al., 2008; Bhattacherjee, Limayem, & Cheung, 2012). In turn, many scenarios of system use studied in the literature (e.g., use of different Web browsers (Ye et al., 2008) or collaboration systems (Polites & Karahanna, 2012)) are not suitable in this context because they would provide the affordance of switching or replacement to the user, which would bias our focus here on the essential dichotomy between continuance and discontinuance.

4.2 Context of our Initial Empirical Evaluation

One example of a suitable organizational task setting that allows studying the dichotomy between system use continuance and discontinuance in a controlled setting exists in retail organizations' promotional planning routines. I was fortunate enough to gain access to users and systems involved in one such routine at global top-20 retail organization in Australia. Promotional planning constitutes a daily work routine for many organizations including manufacturers, logistics providers, and, in particular, retailers (Cooper, Baron, Levy, Swisher, & Gogos, 1999). It involves planning, administering, and executing promotional events related to typically over 30,000 individual stock items from a set of overall typically around 150,000 stock items in a retailer's item master file. Promotional events typically have a set lifespan, such as a day, week, or month, and roughly half of all promotions lasting longer than one week (van Donselaar, Gaur, van Woensel,

Broekmeulen, & Fransoo, 2010). The case organization regularly runs promotions with a typical lifespan of about two weeks in each of their 909 retail outlets across Australia.

One key technological innovation in promotion-planning work routines has been the emergence of automated promotion-planning systems and automated inventory-replenishment systems that provide order quantity forecasts for single store outlets (e.g., Cooper et al., 1999). These systems can enact the promotion planning process *with and without* intervention from promotion planning managers at the store level. Due to sub-optimal forecast accuracy, system inadequacies, or incentive misalignment (van Donselaar et al., 2010), store managers typically retain some control of the system so they can review and, if needed, alter the system-product order quantities prior to the system's generating replenishment orders to a relevant (e.g., regional) distribution center. One executes this manual use task via a promotional-planning system operating at the store level, and the manual task provides an opportunity for store managers to intervene in the automated routine. These interventions can sometimes improve on the automated routine if and when they incorporate order variations due to factors ignored by the system such as weather or local demand structures (van Donselaar et al., 2010), but manual intervention can also lead to increase of either out-of-stock or overstock situations, which, in turn, can lead to a loss of sales or increased inventory and labor costs (e.g., Cooper et al., 1999; Angerer, 2006).

My field study was set at a point in time where the case organization considered the implementation of an automated, centralized promotion planning system. At the time I collected data, the current work routine involved a central planning system that provided forecasted demand quantities for each store in the retail network. Promotional planning managers in each store were notified on the release of new forecasts and asked to review and, if needed, modify the forecasted quantities both prior to a promotion and during an active promotion. Figure 4 provides a simplified illustration of the promotion planning routine in the case organization, the relevant system use task, and the alternative new work routine the case organization considered.

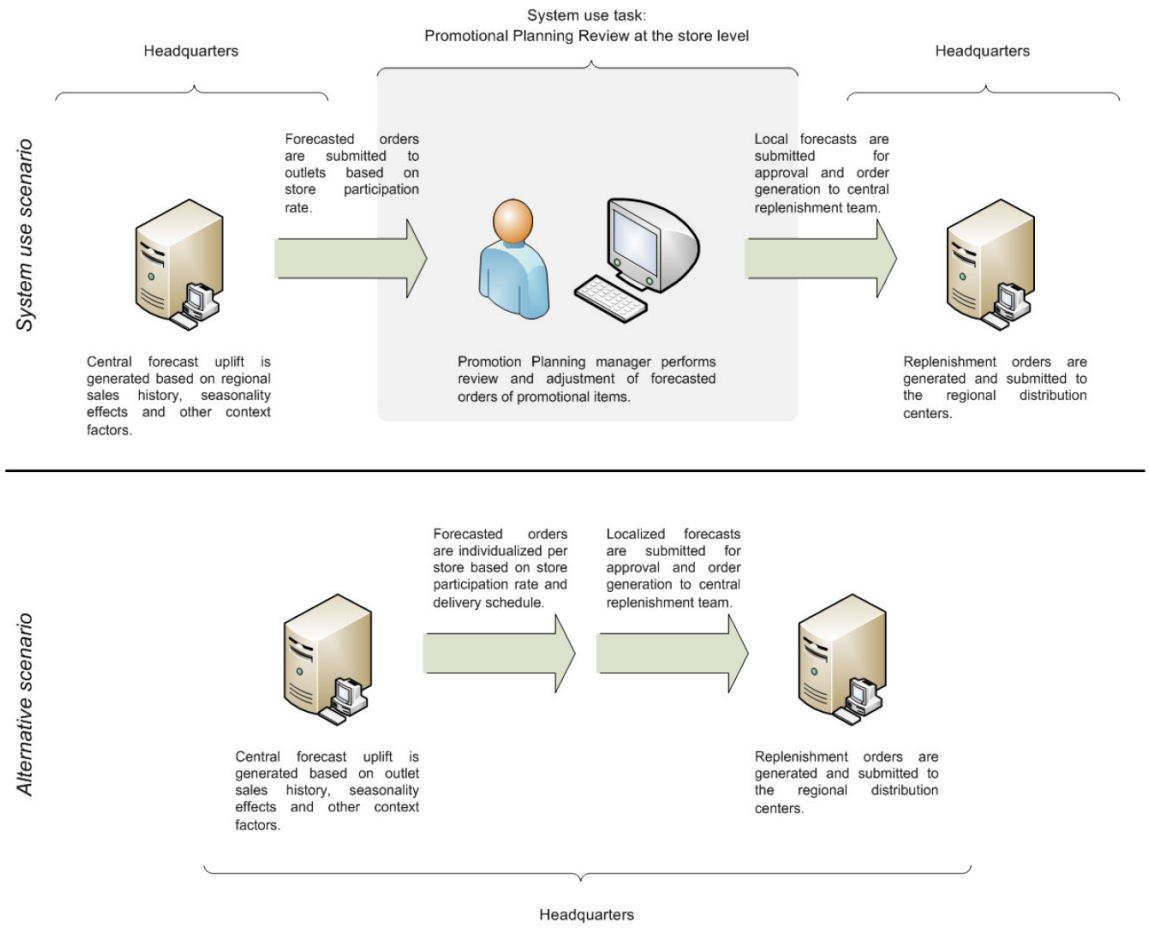

Figure 4. Visualization of the Work Routine Studied with and without the Use of an Information System for Promotional Planning

The envisaged alternative procedure for the promotional-planning work routine involves using a central forecasting system that can provide demand forecasts for each store, such that reviews and interventions at the store level are no longer required. From the perspective of the work routine, the change to individuals operating in promotion planning at the store level would be the "switching off" of the system and the corresponding system use task. That is, the system use task would simply cease to exist in the new routine. Figure 4 highlights (in grey) this focus of my field study, which is considered with the system use task by individual managers in each of the stores.

Important to the context of the study was the fact that, at the time I collected data, the decision to move to the alternative work routine and to discontinue the store-level promotion planning information system use task was not yet made, not mandated at an organizational level, and not communicated to the store personnel. Instead, the organization gave promotion planning managers at the store level the freedom to choose the system (for the task of reviewing and adjusting forecasted demand quantities) or not using the system and, thus, not intervening in the promotional-planning and replenishment work routine.

4.3 Design

I collected data following a scenario-based method. Scenarios are descriptions of possible futures states and provide a form or tool to study a possible and plausible future based on the creation—and to create an awareness—of which future states and behaviors are possible (Sheng, Fui-Hoon Nah, & Siau, 2008). Scenarios are common in studies that simulate different user tasks or where one needs to provide and compare different study contexts (e.g., Bria et al., 2001; Chen, Sharman, Chakravarti, Rao, & Upadhyaya, 2008; Xu, Teo, Tan, & Agarwal, 2010). Using a scenario-based survey is useful here because, with it, I could study an emerging phenomenon (individuals' forming intentions to discontinue using an information system) without being constrained by the study's timing, state-of-the-art technology, or the behavior under study (Sheng et al., 2008) such as with a study at a point in time where an organizational-level discontinuance decision is being or has been made (e.g., Furneaux & Wade, 2011).

This method also entails limitations because scenario-based methods suffer from limited ecological and predictive validity (Gray & Hovav, 2008) because the responses to a scenario are, by definition, hypothetical in nature. I deemed this limitation acceptable for examining my resrarch model because it primarily focuses on explaining a future intention (to discontinue system use) based on current beliefs and system use perceptions (which are not biased from using scenarios).

I used two scenarios in the data-collection instrument. First, I captured perceptions about the current use of the information systems in the promotional-planning routine (see top half of Figure 4), that is, the current, "real" scenario. At this stage, I collected how respondents evaluated their current system in terms of how they perceived its usefulness and ease of use and the system's costs and degree to which it impeded their work. Additionally, I also queried users on whether they intended to continue using the current system. Then, in a subsequent part of the survey, I presented the respondents with an alternative scenario in which I asked them to provide statements about their perceptions of relevant behaviors (i.e., their intentions to discontinue using the current system given the alternative scenario provided). The survey description for the alternative scenario (see bottom half of Figure 4) read as follows:

> *Imagine there would be a new procedure for organizing promotion planning centrally, which would involve an option for you not to use the current Promotion Planning system. Given this scenario, please indicate your agreement to the following statements.*

I collected data by using the official store communication channels to invite promotion-planning managers to participate in the study by completing an online survey. Online surveys are advantageous over paper-based surveys in several ways (e.g., lower costs, faster responses, automated data entry) and have become widely used in IS research. I informed participants about type and nature of the study, but I did not offer them incentives for participating. I contacted participants through a dedicated communications channel administered by the central headquarter of the case organization, but they could not participate if they did not wish to. The communication channel featured mechanisms to contact only personnel in relevant roles.

Overall, I received 513 responses from across a total of 909 stores in the network. I eliminated 71 responses from the data set due to a large percentage of missing data (empty cells > 10% of total responses), which resulted in 442 usable responses (an effective response rate of 48.6%). Respondents' reported age ranged from 20 to 64 years (median = 37 years). Seventeen percent (17.2%) of the respondents were female. The respondents' had, on average, 8.5 years' experience in promotional

planning with a standard deviation of 6.1 years. Respondents spent, on average, about 7.3 hours a week using the promotional-planning system with a standard deviation of 4.7 hours per week.

4.4 Construct Measurement

I reflectively measured the six main constructs of my research model using multiple-item Likert scales. I measured perceived ease of use and perceived usefulness using Venkatesh, Thong, and Xu's (2012) scales, which capture perceived effort of learning, past/current usage, and system utility and performance evaluations for work tasks, work productivity, and the job overall. I adapted the scale for perceived work impediment from Bulgurcu et al. (2010). The scale measures perceived negative impact of system use on work tasks as an obstacle to productivity, efficiency, and response time and as a work impediment overall. I based the scale for perceived costs of system compliance on Bulgurcu et al.'s (2010) validated scale for measuring costs of information security policy compliance. The new scale measured respondents' assessment of the impact of system use on the organizational routine of promotional planning in terms of time consumption, effort investment, and costs.

I measured intentions to continue to use the system using the three-item scale that Venkatesh et al. (2011) used, which I adopted to the context of my study and which captures respondents' overall intent to continue to use the system, the rational planning of continuance, and the intent to continue using the system in the near future. Intentions to discontinue use of the system was a new construct defined in structural analogy to intentions to continue use of the system and measured intents to abandon system use overall, in the near future, and as a rational decision in the form of a plan to stop using the system. Appendix B overviews the measures I used.

5 Data Analysis

5.1 Scale Validation

First, I assessed the adequacy and validity of the measurement scales. I modeled each scale item as a reflective indicator of its theorized latent construct, and the measurement model included all seven latent constructs. I allowed the constructs to co-vary in the measurement model. I analyzed the data using LISREL Version 8.80 (Jöreskog & Sörbom, 2001).

Considering the approximate benchmarks that Im and Grover (2004) suggest, goodness of fit statistics for the measurement model (GFI = 0.91, NFI = 0.97, NNFI = 0.98, CFI = 0.98, SRMR = 0.05, RMSEA = 0.06, $\chi 2 = 436.71$, df = 155) suggested good fit of the measurement model to the data set. Table 1 and Table 2 report relevant statistics to assess reliability, convergent, and discriminant validity.

Im and Grover (2004) note that scales' uni-dimensionality as determined by Chronbach's α should be larger than 0.7, which was the case for my scales. Composite reliability scores for the scales ranged from 0.90 to 0.93.

All scale items had factor loadings exceeding 0.70 except for PU1 with a loading of 0.52. All loadings were significant at $p < 0.001$. Further, AVE for all scales well exceeded 0.50. Hence, Fornell and Larcker's (1981) three conditions of convergent validity were met in my sample with one noted deviation in PU1. Still, I decided to retain the measurement item to make my results comparable to prior studies with the same measures (e.g., Venkatesh et al., 2012).

Discriminant validity is assured when the AVE for each construct exceeds the squared correlation between that and any other construct in the factor correlation matrix. The largest squared correlation existed between WI and CC (0.71), while the smallest obtained AVE value was 0.84 (PU). These results suggest that the test of discriminant validity was met.

Table 1. Item Descriptive Statistics and Loadings

Item	Mean	St.dev	Loading	t-statistic
PU1	5.72	0.98	0.53	14.31
PU2	4.63	1.53	0.93	4.78
PU3	4.53	1.57	0.88	8.17
WI1	3.99	1.68	0.92	12.82
WI2	3.98	1.67	0.98	7.31
WI3	3.98	1.68	0.97	9.21
WI4	4.17	1.70	0.81	14.19
ICU1	3.38	1.61	0.93	13.60
ICU2	3.35	1.60	0.98	8.07
ICU3	3.32	1.60	0.99	4.00
IDU1	4.89	1.54	0.90	12.24
IDU2	4.91	1.56	0.97	6.08
IDU3	4.86	1.55	0.93	10.72
PEOU1	5.18	1.20	0.70	12.83
PEOU2	5.08	1.42	0.77	11.64
PEOU3	5.29	1.19	0.87	8.24
PEOU4	5.53	0.99	0.77	11.81
CC1	5.34	1.50	0.74	13.24
CC2	4.60	1.72	0.89	9.38
CC3	4.28	1.70	0.89	9.38

Table 2. Construct Descriptive Statistics, Scale Properties and Correlations

	Mean	St.dev	α	ρc	AVE	PU	WI	ICU	IDU	PEOU	CC
PU	4.95	1.18	0.81	0.90	0.84	1.00					
WI	4.03	1.58	0.96	0.93	0.95	-0.54	1.00				
ICU	3.35	1.57	0.98	0.91	0.98	0.24	-0.17	1.00			
IDU	4.89	1.48	0.95	0.91	0.95	-0.24	0.32	-0.78	1.00		
PEOU	5.27	1.00	0.85	0.92	0.86	0.54	-0.28	0.06	-0.05	1.00	
CC	4.74	1.47	0.88	0.92	0.88	-0.51	0.84	-0.24	0.36	-0.32	1.00

5.2 Structural Model Estimation

Next, I estimated the structural model to examine the research model in terms of the significance and effect sizes for each hypothesized path and the explained variance for each dependent variable. Figure 5 shows the structural model results.

Goodness of fit statistics for the structural model (GFI = 0.89, AGFI = 0.86, NFI = 0.96, NNFI = 0.97, CFI = 0.97, SRMR = 0.11, RMSEA = 0.07, χ^2 = 549.24, df = 162) suggested good fit of the model to the data. Some residual error existed in the model that resulted from the noted loading problem of measurement item PU1. Also, the significance of the χ^2 test may suggest that re-specifying the model could further improve fit to the data (Evermann & Tate, 2011). Considering the χ^2 test and SRMR together with the goodness of fit statistics, however, one can consider the results to be acceptable (Im & Grover, 2004).

The squared multiple correlation (SMC) values in Figure 5 show that the model explained 63 percent of the variance in intentions to discontinue the use of the information system and 6 percent of the variance in intentions to continue information system use. The low SMC value for intentions to continue information system use resulted from the fact that the model emphasizes contributors to the discontinuance decision

and deliberately does not include other factors shown to be relevant to explaining information system continuance literature (e.g., Bhattacherjee, 2001; Limayem et al., 2007; Venkatesh et al., 2011). I excluded such factors because I sought only to empirically evaluate the conceptual model rather than achieve the highest possible explanatory power for the dependent variables.

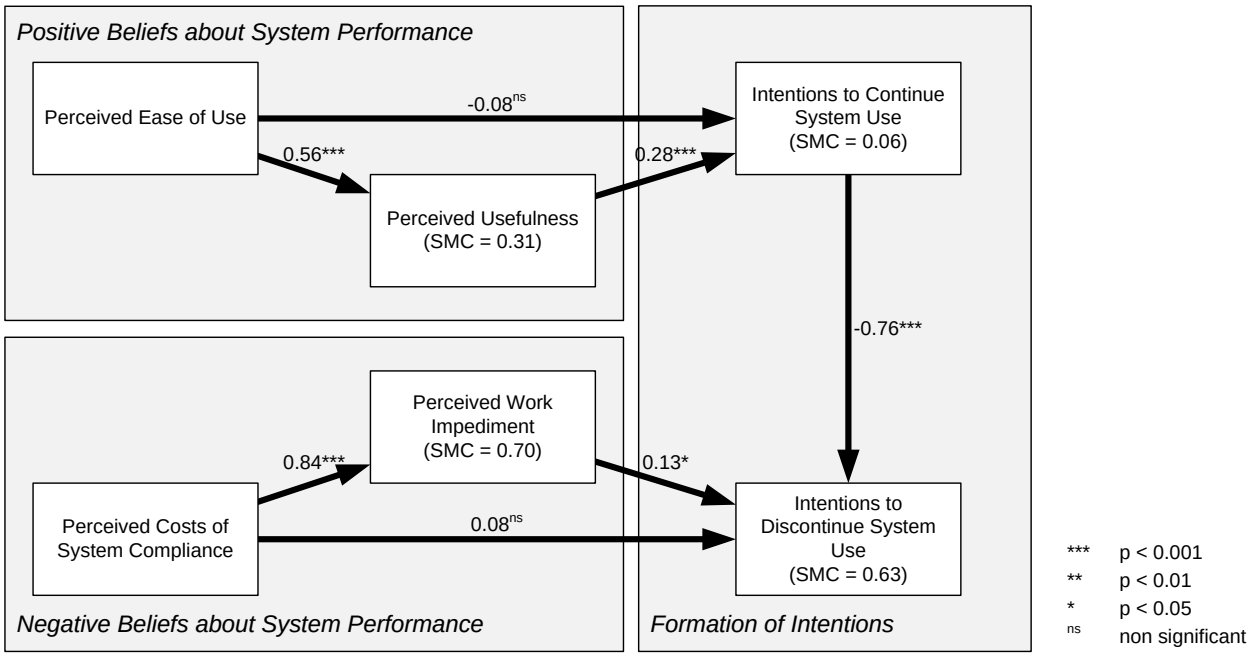

Figure 5. Structural Model

The structural model results lend good support to the hypotheses in the research model. Five out of seven hypothesized paths were significant at least at $p < 0.05$ (except for H1 and H5). Intentions to discontinue system use were significantly associated with intentions to continue system use ($\beta = -0.76$, $p < 0.001$) and perceived work impediment ($\beta = 0.13$, $p < 0.05$). Perceived costs of system compliance were also positively associated with intentions to discontinue system use but not significantly so ($\beta = 0.08$, $p = 0.12$). Conversely, intentions to continue system use were significantly associated with perceived usefulness ($\beta = 0.28$, $p < 0.001$) but not perceived ease of use ($\beta = -0.08$, $p = 0.10$). The effects of perceived ease of use on intentions to continue system use were mediated by perceived usefulness ($\beta = 0.56$, $p < 0.001$), and, similarly, the effects of perceived costs of system compliance on intentions to discontinue system use were mediated by perceived work impediment ($\beta = 0.84$, $p < 0.001$).

6 Discussion

6.1 Summary of Findings

My theoretical model suggests that two different categories of beliefs are relevant when examining individuals' forming beliefs about continuing to use versus not continuing to use an information system. My empirical findings support this view and suggest that one can view intentions to discontinue using an information system as a partially opposite yet also unique alternative to continuing its use. My empirical evaluation shows that this dual-factor logic is evident by the two examined key direct determinants (perceived usefulness or perceived work impediment) included in my research model either having a significant effect on continuance or discontinuance but not both. One's assessing an information system as an impediment to a work task leads to one's forming beliefs to discontinue system use, but the absence of work impediment perceptions do not necessarily lead to intentions to continue using the system. As expected, I found the opposite constellation for beliefs about perceived usefulness. The results show that individuals will likely continue to use a system they perceive to be useful. Thus, the results confirm that perceived usefulness remains a direct antecedent to intentions to continue system use (Bhattacherjee, 2001; Venkatesh et al., 2011). However, when users do not perceive a system to be useful, they may experience lowered intentions to continue using the system, but that does not necessarily (in fact, marginally at best) lead to an inclination to actually continue to use it.

The results also show that the effects of perceptions of procedural efforts of using a system (such as perceived ease of use and perceived costs of system compliance) on the discontinuance-continuance choice are mediated by perceptions of system performance (namely, perceived usefulness or perceived work impediment). An explanation for these findings could be the "wearing-out" effect about effort inhibitions through longstanding and continuous use of a system (Szajna, 1996), which suggests that considerations of efforts of system use are not relevant when considering the consequences of system use as a means to improve or impede task performance. Consequently, the results also suggest that effort and complexity of use considerations are largely irrelevant when users consider discontinuing to use a system.

6.2 Implications for Research

The findings have several implications. I extend the prevalent nomological net describing system adoption and use with a perspective that also considers individuals' choice to stop system use, and I offer a first conceptual and empirical examination of individual-level information system discontinuance that differentiates different determinants of this seemingly bipolar decision.

The model's dominant thesis is that we can see the choice about whether to discontinue using an information system as one that we cannot simply characterize through the opposing values of the determinants of information system continuance. Indeed, my empirical analysis showed that beliefs exist that uniquely and additionally influence individuals' forming beliefs to discontinue using an information system. Thus, through the model, I extend our knowledge toward a more holistic and balanced understanding of both positive and negative beliefs as they relate to using information systems (Centefelli, 2004).

The model of discontinuance I propose is intentionally simplified, abstract, and concise (Weber, 2012) because this paper focuses on imparting initial comprehension rather than a more all-encompassing (and potentially more complex) explanation. Thus, the compromise I made favors cognitive economy through parsimony at the expense of precision and explanatory power (Weber, 2012). My model suggests that we should extend our understanding of the widely studied relationships between system performance beliefs and user intentions to continue system use with considerations about negative performance evaluations and their impact in the formation of an alternative intention (the decision to discontinue using an information system) that only partially overlap with continuance intentions.

The empirical findings suggest that at least two categories of performance beliefs lead to one's forming intentions that can inform a decision between two use alternatives. First, positive views about effort and performance experiences lead to one's forming continued-use intentions. Second, at the same time, users may develop negative views about procedural efforts (here: perceptions of costs that stem from a need to comply to system routines in a work task) and evaluation of a negative performance impact from system use as a work impediment. These negative views do not contribute to the formation of continued use intentions but instead inform an alternative: discontinuing to use an information system.

One could interpret this research as cautioning against continued use intentions' too dominant a role. While researchers have established that these intentions can inform post-adoption behaviors such as switching or replacement or, indeed, further use, my model and the initial findings suggest that there is also an alternative intention that users can develop and that these discontinuance intentions are rooted in alternative beliefs about the system in use. Consequently, the antecedents and intentions of system use discontinuance may likely also impact consequential behaviors such as increasing or decreasing system usage, replacing the system in use, or switching to a different technology. The thesis of this research suggests that such effects will likely be present in addition to the influence of those factors that I demonstrated to relate to IS continuance intentions.

A logical continuation of this work could consider the formation and consequences of discontinuance intentions over time from the point one formed intentions to discontinue (my focus) to actual discontinuance decisions and post-discontinuance behaviors. For example, an interesting avenue to explore concerns how individuals look back and reflect on a past information system work task after a period of change and development of an altered or new work task or routine. Perceptions of regret or alternatively relief in post-discontinuance reflections might influence consequential behaviors and work-task performance.

Similarly, opportunities exist to examine how discontinuance intentions inform early expectations about the inevitable change to a work routine that follows one's choice to discontinue using a system. Given that

expectations and their (dis)confirmation through actual usage experience influence individual's continued usage behaviors (Bhattacherjee, 2001), we need to understand how pre-usage expectations for some system might result from behaviors and beliefs that stem from an earlier system-enabled work task that involved the eventual discontinuance of system use and the resulting choices the user made. Discontinuing an information system-enabled task, however, can also impact individuals' perceptions of task identity (Sims, Szilagyi, & Keller, 1976). Disruptions to these beliefs can alter organizational commitment (Steers, 1977), motivations, and performance (Hackman & Lawler, 1971). The consequences of choosing to discontinue using an information system, therefore, warrant further examination.

6.3 Implications for Practice

This study provides initial understanding about the determinants of individual users' willingness to cease system use when considering personal investments and costs as expressed in their view of the technology. These insights can significantly assist organizational change-management programs and inform future technology investment and organizational-implementation initiatives. Specifically, the study identifies some of the reasons why individual users might conscientiously decide to stop using information systems to support a work task. This knowledge can aid managers in preparing individual users in organizational-change efforts that involve or follow the cessation of an information system. Such downstream interventions might inform cognitive components of individual behaviors, such as realizing that an information system actually impedes work performance. One might improve change decisions and consequences by providing evidence and rational arguments for how the future state will actually denote an improvement to work tasks even if it entails changes to individual task settings that individuals are used to. The task-identity literature (Hackman & Lawler, 1971; Sims et al., 1976) testifies that individualized change-preparation strategies can be crucial to maintaining commitment and performance even if the change, broadly speaking, is "for the better".

This study also has implications for upstream interventions. The paper shows how individuals form behavioral intentions and choose between continuance and discontinuance based on their assessing costs (e.g., their perceptions about the effort in using a system and the costs of complying with it) and performance benefits (such as the system's usefulness for or impediment to a work task). This knowledge is fundamental to understanding whether users would much rather not use the system at all. This knowledge can aid managers concerned with maintaining and improving the technological infrastructure for organizational processes because it can be an early (or late) indicator of the demand for change and may guide such effort in an evolutionary rather than revolutionary way. Finally, this knowledge also aids managers of the work force independent from any technological consideration in that individuals' using an information system that they would rather not use might be a detriment to employee motivation, satisfaction, or, ultimately, performance.

7 Limitations

This paper has several limitations. First, regarding the phenomenon being studied: an individual may not always be able to decide to discontinue using an information system. Still, while retirement decisions are often made at an executive level for critical or large-scale information systems, there are typically plenty of other utilitarian and also hedonic information systems (such as email or word processing systems, the choice of collaboration or file-sharing software, and most open source software) whose use or non-use is up to the individual user's discretion. Also, we need to understand individual-level discontinuance intentions even if the individual decision is overruled by a managerial mandate for reasons of motivation, performance, efficacy, and so on (Furneaux & Wade, 2011).of

Second, conceptually, my theoretical model deliberately entails a theoretical idealization and simplified model of a more complex real scenario about an end-to-end organizational routine (Weber, 2012) to impart initial comprehension rather than an all-encompassing and potentially more complex explanation. Thus, the compromise I made favors cognitive economy at the expense of precision and explanatory power (Weber 2012). I recognize that considerations about whether or not to discontinue using a system may also be influenced by higher-order values or directives, such as performance targets, cost responsibilities, or social influence. Still, to be able to examine an initial model of individual-level information system discontinuance, I deliberately omitted some of the contextual factors surrounding the discontinuance decision. In turn, the scope of this work presents an opportunity for future research to connect the reported individual-level study together with Furneaux and Wade's (2011) organizational-level work to perform a multi-level analysis of system discontinuance behavior. Also, the opportunity I had to

study information system discontinuance decisions with professional users in the field rather than with student samples (Compeau, Marcolin, Kelley, & Higgins, 2012) to some extent mitigates the model's more narrow focus on internal validity considerations.

Third, theoretically, my model builds on rational choice theory. Human choice and decisions are often not as rational as this theory assumes. For instance, individuals often do not follow algorithmic decision strategies (such as one based on a careful balancing of utility and costs of information system use) but, consciously or unconsciously, use decision heuristics that may ignore part of the information at hand (e.g., Gigerenzer & Gaissmaier, 2011). My model does not fully incorporate such heuristics. It would, however, allow for one to evaluate heuristics in, for example, study settings where decision anchors (rational or otherwise) are provided to users prior to making their evaluation and discontinuance decision.

Fourth, methodologically, using scenario-based methods implies simplifying the real-world context in which the envisaged future state behaviors and decisions would actually manifest. A longitudinal design across pre-discontinuance and post-discontinuance stages can provide more valid findings about actual behaviors and decisions. Yet, in the context of working with the case organization for this study, I could not alter the routines in such a way as to study discontinuance in any other way. Also, research about likely or possible future states nonetheless provides valid results about how individuals develop intentions about behavioral decisions such as continuing or discontinuing to use an information system, which leads to insights into the development of attitudes, expectations, and overall reactions to such decisions whether they are made at an individual or managerial level.

Fifth, empirically, I note that my two dependent variables (ICU and IDU) share reasonably high correlations, which suggests that the conceptual distinction I make is not as strong in the empirical data set I obtained. These correlations are at least partially a function of the empirical research design that involved using scenario-based methods in which I asked respondents to imagine a discontinuance scenario, which, in their imagination, may or may not have differed substantially from the reality they were accustomed to. A second likely reason is in my selective and restricted set of antecedents that I considered. Following dual-factor logic, it is likely that further antecedents exist that exert differing influences on the two variables and that would serve to provide a better empirical distinction than I achieve here. A third reason for the empirical results not being as strong as one would hope to support my theory could be vested in constraints of the field study I undertook. Working with a real organization, real users, and real systems necessitates some compromises in control over internal or conclusion validity. Still, the study shows that the thesis of my model remains valid and that the thesis has strong ecological validity in that discontinuance intentions in fact occur and are important to consider.

8 Conclusion

This paper extends our understanding of information system use at a stage of the lifecycle where decisions loom to cease using a system. My conceptual model provides a foundation for further study in this important nomological net in ongoing efforts to disentangle choices to abandon, replace, switch, or improve information systems in the workplace. My empirical results, while only preliminary in nature, serve to show 1) how discontinuance occurs in the workplace and 2) how my model serves to explain these intentions. With more empirical work and further theoretical development, these joint efforts can lead to an improved ability to manage information systems retirement decisions both from a technological and socio-organizational perspective.

Acknowledgments

I thank the case organization for allowing me access to the work routine I studied. I am also indebted to Thomas Kohlborn who helped me collect data. I am grateful for reviewers at ICIS 2014 who provided feedback on an earlier version of the paper in which I developed the theoretical model. Last but not least, I am grateful to the review team for providing constructive feedback that improved this paper.

References

Ahuja, M. K., & Thatcher, J. B. (2005). Moving beyond intentions and toward the theory of trying: Effects of work environment and gender on post-adoption information technology use. *MIS Quarterly, 29*(3), 427-459.

Angerer, A. (2006). *The impact of automatic store replenishment on retail: Technologies and concepts for the out-of-stocks problem*. Wiesbaden, Germany: Deutscher Universitätsverlag.

Beaudry, A., & Pinsonneault, A. (2005). Understanding user responses to information technology: A coping model of user adaptation. *MIS Quarterly, 29(*3), 493-524.

Benbasat, I., & Barki, H. (2007). Quo vadis TAM? *Journal of the Association for Information Systems, 8*(4), 211-218.

Berinato, S. (2003). All systems down. *CIO Magazine*. Retrieved from http://www.cio.com.au/article/65115/all_systems_down/

Bhattacherjee, A. (2001). Understanding information systems continuance: An expectation-confirmation model. *MIS Quarterly, 25*(3), 351-370.

Bhattacherjee, A., Limayem, M., & Cheung, C. M. K. (2012). User switching of information technology: A theoretical synthesis and empirical test. *Information & Management, 49*(7-8), 327-333.

Bostrom, R. P., Olfman, L., & Sein, M. K. (199). The importance of learning style in end-user training. *MIS Quarterly, 14*(1), 101-119.

Boudreau, M.-C., & Robey, D. (2005). Enacting integrated information technology: A human agency perspective. *Organization Science, 16*(1), 3-18.

Bria, A., Gessler, F., Queseth, O., Stridh, R., Unbehaun, M., Wu, J., & Zander, J. (2001). 4th-generation wireless Infrastructures: Scenarios and research challenges. *IEEE Personal Communications, 8*(6), 25-31.

Bulgurcu, B., Cavusoglu, H., & Benbasat, I. (2010). Information security policy compliance: An empirical study of rationality-based beliefs and information security awareness. *MIS Quarterly, 34*(3), 523-548.

Burton-Jones, A., & Gallivan, M. J. (2007). Toward a deeper understanding of system usage in organizations: A multilevel perspective. *MIS Quarterly, 31*(4), 657-679.

Burton-Jones, A., & Straub, D. W. (2006). Reconceptualizing system usage: An approach and empirical test. *Information Systems Research, 17*(3), 228-246.

Centefelli, R. T. (2004). Inhibitors and enablers as dual factor concepts in technology usage. *Journal of the Association for Information Systems, 5*(11), 472-492.

Centefelli, R. T., & Schwarz, A. (2011). Identifying and testing the inhibitors of technology usage intentions. *Information Systems Research, 22*(4), 808-823.

Chen, R., Sharman, R., Chakravarti, N., Rao, H. R., & Upadhyaya, S. J. (2008). Emergency response information system interoperability: Development of chemical incident response data model. *Journal of the Association for Information Systems, 9*(3), 200-230.

Cheung, C. M. K., & Lee, M. K. O. (2009). User satisfaction with an Internet-based portal: An asymmetric and nonlinear approach. *Journal of the American Society for Information Science and Technology, 60*(1), 111-122.

Compeau, D. R., Marcolin, B. L., Kelley, H., & Higgins, C. A. (2012). Generalizability of information systems research using student subjects—a reflection on our practices and recommendations for future research. *Information Systems Research, 23*(4), 1093-1109.

Cooper, L. G., Baron, P., Levy, W., Swisher, M., & Gogos, P. (1999). PromoCast: A new forecasting method for promotion planning. *Marketing Science, 18*(3), pp. 301-316.

Cooper, R. B., & Zmud, R. W. (1990). Information technology implementation research: A technological diffusion approach. *Management Science, 36*(2), 123-139.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319-340.

de Guinea, A. O., & Markus, M. L. (2009). Why break the habit of a lifetime? Rethinking the roles of intention, habit, and emotion in continuing information technology use. *MIS Quarterly, 33*(3), 433-444.

de Guinea, A.O., & Webster, J. (2013). An investigation of information systems use patterns: Technological events as triggers, the effect of time, and consequences for performance. *MIS Quarterly, 37*(4), 1165-1188.

Denrell, J. (2005). Selection bias and the perils of benchmarking. *Harvard Business Review, 83*(4), 114-119.

DeSanctis, G., & Poole, M. S. (1994). Capturing the complexity in advanced technology use: Adaptive structuration theory. *Organization Science, 5*(2), 121-147.

Doll, W. J., & Torkzadeh, G. (1998). Developing a multidimensional measure of system-use in an organizational context. *Information & Management, 33*(4), 171-185.

Efrati, A. (2010). Corporate watch: Yahoo plans to shut AltaVista, other sites. *The Wall Street Journal*.

Evermann, J., & Tate, M. (2011). Fitting covariance models for theory generation. *Journal of the Association for Information Systems, 12*(9), 632-661.

Ewusi-Mensah, K., & Przasnyski, Z. H. (1991). On information systems project abandonment: An exploratory study of organizational practices. *MIS Quarterly, 15*(1), 67-86.

Ferneley, E. H., & Sobreperez, P. (2006). Resist, comply or workaround? An examination of different facets of user engagement with information systems. *European Journal of Information Systems, 15*(4), 345-356.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equations with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39-50.

Furneaux, B., & Wade, M. R. (2010). The end of the information system life: A model of IS discontinuance. *The DATA BASE for Advances in Information Systems, 41*(2), 45-69.

Furneaux, B., & Wade, M. R. (2011). An exploration of organizational level information systems discontinuance intentions. *MIS Quarterly, 35*(3), 573-598.

Gable, G. G., Sedera, D., & Chan, T. (2008). Re-conceptualizing information system success: The IS-impact measurement model. *Journal of the Association for Information Systems, 9*(7), 377-408.

Gigerenzer, G., & Gaissmaier, W. (2011). Heuristic decision making. *Annual Review of Psychology, 62*, 451-482.

Gray, P., & Hovav, A. (2008). From hindsight to foresight: Applying futures research techniques in information systems. *Communications of the Association for Information Systems, 22*, 211-234.

Hackman, J. R., & Lawler, E. E. (1971). Employee reactions to job characteristics. *Journal of Applied Psychology, 55*(3), 259-286.

Heales, J. (2002). A model of factors affecting an information system's change in state. *Journal of Software Maintenance and Evolution: Research and Practice, 14*(6), 409-427.

Helmore, E. (2009). Is this the end of MySpace? *Independent.* Retrieved from http://www.independent.co.uk/life-style/gadgets-and-tech/features/is-this-the-end-of-myspace-1755614.html

Herzberg, F. (1966). *Work and the nature of man*. Cleveland, Ohio: World Publishing.

Im, K. S., & Grover, V. (2004). The use of structural equation modeling in IS research: Review and recommendations. In A. E. Whitman & A. B. Woszczynski (Eds.), *The handbook of information systems research* (pp. 44-65). Hershey, PA: Idea Group.

Jasperson, J., Carter, P. E., & Zmud, R. W. (2005). A comprehensive conceptualization of post-adoptive behaviors associated with information technology enabled work systems. *MIS Quarterly, 29*(3), 525-557.

Jöreskog, K. G., & Sörbom, D. (2001). *LISREL 8: User's reference guide*. Lincolnwood, IL: Scientific Software International.

Karahanna, E., Straub, D. W., & Chervany, N. L. (1999). Information technology adoption across time: A cross-sectional comparison of pre-adoption and post-adoption beliefs. *MIS Quarterly, 23*(2), 183-213.

Kelly, S., Gibson, N., Holland, C. P., & Light, B. (1999). Focus issue on legacy information systems and business process change: A business perspective of legacy information systems. *Communications of the Association for Information Systems, 2*, 1-27.

Kim, H.-W., & Kankanhalli, A. (2009). Investigating user resistance to information systems implementation: A status quo bias perspective. *MIS Quarterly, 33*(3), 567-582.

Kim, S. S., & Malhotra, N. K. (2005). A longitudinal model of continued IS use: An integrative view of four mechanisms underlying postadoption phenomena. *Management Science, 51*(5), 741-755.

Kim, S. S., Malhotra, N. K., & Narasimhan, S. (2005). Research note: Two competing perspectives on automatic use: A theoretical and empirical comparison. *Information Systems Research, 16*(4), 418-432.

King, W. R., & He, J. (2006). A meta-analysis of the technology acceptance model. *Information & Management, 43*(6), 740-755.

Knight, P. J., & Westbrook, J. (1999). Comparing employees in traditional job structures vs telecommuting jobs using Herzberg's hygienes and motivators. *Engineering Management Journal, 11*(1), 15-20.

Lee, Y., Kozar, K. A., & Larsen, K. R. T. (2003). The technology acceptance model: Past, present, and future. *Communications of the Association for Information Systems, 12*, 752-780.

Leonardi, P. M. (2011). When flexible routines meet flexible technologies: Affordance, constraint, and the imbrication of human and material agencies. *MIS Quarterly, 35*(1), 147-167.

Leonardi, P. M., & Bailey, D. E. (2008). Transformational technologies and the creation of new work practices: Making implicit knowledge explicit in task-based offshoring. *MIS Quarterly, 32*(2), 411-436.

Lewicki, R. J., McAllister, D. J., & Bies, R. J. (1998). Trust and distrust: New relationships and realities. *Academy of Management Review, 23*(3), 438-458.

Li, C. (2012). Making the business case for enterprise social networks. *Altimeter.* Retrieved from http://www.altimetergroup.com/2012/02/making-the-business-case-for-enterprise-social-networks/

Liang, H., Saraf, N., Hu, Q., & Xue, Y. (2001). Assimilation of enterprise systems: The effect of institutional pressures and the mediating role of top management. *MIS Quarterly, 31*(1), 59-87.

Limayem, M., Hirt, S. G., & Cheung, C. M. K. (2007). How habit limits the predictive power of intention: The case of information systems continuance. *MIS Quarterly, 31*(4), 705-737.

Lyytinen, K. (1988). Expectation failure concept and systems analysts' view of information system failure: Results of an exploratory study. *Information & Management, 14*(1), 45-56.

Majchrzak, A., Rice, R. E., Malhotra, A., & Ba, S. (2000). Technology adaptation: The case of a computer-supported inter-organizational virtual team. *MIS Quarterly, 24*(4), 569-600.

Markus, M. L. (1983). Power, politics, and MIS implementation. *Communications of the ACM, 26*(6), 430-444.

Mathis, J. (2012). Stop using email for everything. *Macworld.* Retrieved from http://www.macworld.com/article/1167041/stop_using_email_for_everything.html

McCarthy, B. (2002). New economics of sociological criminology. *Annual Review of Sociology, 28*(1), 417-442.

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

Orlikowski, W. J. (1992). The duality of technology: Rethinking the concept of technology in organizations. *Organization Science, 3*(3), 398-427.

Overby, C. (2005). Comair's christmas disaster: Bound To fail. *CIO Magazine.* Retrieved from http://www.cio.com/article/2438920/risk-management/comair-s-christmas-disaster--bound-to-fail.html

Paul, R. J. (2010). What an information system is, and why is it important to know this. *Journal of Computing and Information Technology, 18*(2), 95-99.

Petter, S., DeLone, W. H., & McLean, E. R. (2008). Measuring information systems success: Models, dimensions, measures, and interrelationships. *European Journal of Information Systems, 17*(3), 236-263.

Polites, G. L., & Karahanna, E. (2012). Shackled to the status quo: The inhibiting effects of incumbent system habit, switching costs, and inertia on new system acceptance. *MIS Quarterly, 36*(1), 21-42.

Polites, G. L., & Karahanna, E. (2013). The embeddedness of information systems habits in organizational and individual level routines: Development and disruption. *MIS Quarterly, 37*(1), 221-246.

Purvis, R. L., Sambamurthy, V., & Zmud, R. W. (2001). The assimilation of knowledge platforms in organizations: An empirical investigation. *Organization Science, 12*(2), 117-135.

Robey, D., Ross, J. W., & Boudreau, M.-C. (2002). Learning to implement enterprise systems: An exploratory study of the dialectics of change. *Journal of Management Information Systems, 19*(1), 17-46.

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York, NY: Free Press.

Saga, V. L., & Zmud, R. W. (1994). The nature and determinants of IT acceptance, routinization and infusion. In L. Levine (Ed.), *Diffusion, transfer and implementation of information technology* (pp. 67-86). Amsterdam, The Netherlands: North-Holland.

Saraf, N., Liang, H., Xue, Y., & Hu, Q. (2013). How does organisational absorptive capacity matter in the assimilation of enterprise information systems? *Information Systems Journal, 23*(3), 245-267.

Scott, J. (2000). Rational choice theory. In G. Browning, A. Halcli, & F. Webster (Eds.), *Understanding contemporary society: Theories of the present* (126-138). Thousand Oaks, CA: Sage.

Seddon, P. B., Calvert, C., & Yang, S. (2010). A multi-year model of key factors affecting organizational benefits from enterprise systems. *MIS Quarterly, 34*(2), 305-328.

Sheng, H., Fui-Hoon Nah, F., & Siau, K. (2008). An experimental study on ubiquitous commerce adoption: Impact of personalization and privacy concerns. *Journal of the Association for Information Systems, 9*(6), 344-376.

Sims, H. P., Jr., Szilagyi, A. D., & Keller, R. T. (1976). The measurement of job characteristics. *Academy of Management Journal, 19*(2), 195-212.

Siponen, M. T., & Vance, A. (2010). Neutralization: New insights into the problem of employee systems security policy violations. *MIS Quarterly, 34*(3), 487-502.

Steers, R. M. (1977). Antecedents and outcomes of organizational commitment. *Administrative Science Quarterly, 22*(1), 46-56.

Swanson, E. B., & Beath, C. M. (1990). Departmentalization in software development and maintenance. *Communications of the ACM, 33*(6), 658-667.

Swanson, E. B., & Dans, E. (2000). System life expectancy and the maintenance effort: Exploring their equilibration. *MIS Quarterly, 24*(2), 277-297.

Szajna, B. (1996). Empirical evaluation of the revised technology acceptance model. *Management Science, 42*(1), 85-92.

Taylor, S., & Todd, P. A. (1995). Assessing IT usage: The role of prior experience. *MIS Quarterly, 19*(4), 561-570.

Teo, H.-H., Wei, K. K., & Benbasat, I. (2003). Predicting intention to adopt interorganizational linkages: An institutional perspective. *MIS Quarterly, 27*(1), 19-49.

Turel, O. (2015). Quitting the use of a habituated hedonic information system: A theoretical model and empirical examination of Facebook users. *European Journal of Information Systems, 24*(4), 431-446.

van Donselaar, K. H., Gaur, V., van Woensel, T., Broekmeulen, R. A. C. M., & Fransoo, J. C. (2010). Ordering behavior in retail stores and implications for automated replenishment. *Management Science, 56*(5), 766-784.

Venkatesh, V., & Brown, S. A. (2001). A longitudinal investigation of personal computers in homes: Adoption determinants and emerging challenges. *MIS Quarterly, 25*(1), 71-102.

Venkatesh, V., & Morris, M. G. (2000). Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. *MIS Quarterly, 24*(1), 115-139.

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

Venkatesh, V., Thong, J. Y. L., Chan, F. K. Y., Hu, P. J., & Brown, S. A. (2011). Extending the two-stage information systems continuance model: Incorporating UTAUT predictors and the role of context. *Information Systems Journal, 21*(6), 527-555.

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS Quarterly, 36*(1), 157-178.

Weber, R. (2012). Evaluating and developing theories in the information systems discipline. *Journal of the Association for Information Systems, 13*(1), 1-30.

Xu, H., Teo, H.-H., Tan, B. C. Y., & Agarwal, R. (2010). The role of push-pull technology in privacy calculus: The case of location-based services. *Journal of Management Information Systems, 26*(3), 135-174.

Ye, C., Seo, D., Desouza, K. C., Sangareddy, S. P., & Jha, S. (2008). Influences of IT substitutes and user experience on post-adoption user switching: An empirical investigation. *Journal of the American Society for Information Science and Technology, 59*(13), 2115-2132.

Appendix A: Literature Review

Table A1. Selected information System Pre- and Post-adoption Behaviors in the Literature

Phenomenon	System lifecycle stage	Primary level of analysis	Description	Key literature
System adoption	Adoption	Organizational	The organization's decision to either adopt or reject a new information system for diffusion in a user community.	Rogers (2003), Teo et al. (2003), Boudreau & Robey (2005)
System implementation	Adoption	Organizational	The organization's effort directed towards diffusing appropriate information systems in a user community.	Markus (1983), Cooper & Zmud (1990), Robey, Ross, & Boudreau (2002)
System acceptance	Adoption	Individual	The demonstrable willingness of an individual user to start using an information system for the task it is designed to support.	Davis (1989), Venkatesh et al. (2003)
System rejection	Adoption	Individual	The individual user's conscious decision to avoid an information system.	Venkatesh & Brown (2001), Centefelli & Schwarz (2011)
System resistance	Adoption/ operation	Individual	The individual user's opposition of the change associated with a new system implementation.	Kim & Kankanhalli (2009)
System use	Operation	Individual	The individual user's employment of one or more features of a system to perform a work task.	Doll & Torkzadeh (1998), Burton-Jones & Straub (2006), Burton-Jones & Gallivan (2007)
Continued system use	Operation	Individual	The individual user's conscious or habitual decision to continue using an information system for a work task.	Bhattacherjee (2001), Limayem (2007), de Guinea & Markus (2009)
System infusion	Operation	Organizational	Using an information system's features in a complete and sophisticated way.	Saga & Zmud (1994), Ahuja & Thatcher (2005)
System assimilation	Operation	Organizational	The diffusion and routinization of the use of information systems across the organizational projects or work processes and in the activities of those projects and processes.	Liang, Saraf, Hu, & Xue (2001), Purvis, Sambamurthy, & Zmud (2001), Saraf, Liang, Xue, & Hu (2013)
System adaptation	Operation	Individual	The structuring of technologies in use through the processes with which users manipulate and reshape their technologies to accomplish work.	Majchrzak, Rice, Malhotra, & Ba (2000), Beaudry & Pinsonneault (2005), de Guinea & Webster (2013)
Routinization	Operation	Organizational, individual	The development of specific repeated, often habitual, sometimes automatic, goal-oriented task sequences performed by a single employee or an organizational cohort.	Kim et al. (2005), Leonardi (2011), de Guinea & Webster (2013), Polites & Karahanna (2013)
System maintenance	Operation/ retirement	Organizational	The organization's efforts to correct, adapt, and perfect information systems to extend their useful lives	Swanson & Beath (1990), Heales (2002)
System switching	Retirement	Individual	The complete or partial replacement of the use of one information system product or service with a substitute that serves similar needs.	Ye et al. (2008), Bhattacherjee et al. (2012), Polites & Karahanna (2012)
System discontinuance	Retirement	Organizational	The organization's decision to cease using an information system.	Furneaux & Wade (2010), (2011)
System discontinuance	*Retirement*	*Individual*	*The individual user's decision to stop using an information system in support of a work task.*	*This study*

Appendix B: Measurement Instrument

Table B1. Selected Information System Pre- and Post-adoption Behaviors in the Literature

Construct	Item	Description
Perceived ease of use (based on Venkatesh et al., 2012)	PEOU1	It has been easy for me to become skillful at using the promotions-planning system.
	PEOU2	I find the promotions-planning system easy to use.
	PEOU3	Learning to use the promotions-planning system has been easy for me.
	PEOU4	My interaction with the promotions-planning system is clear and understandable.
Perceived usefulness (based on Venkatesh et al., 2012)	PU1	I find the promotions planning-system useful for my job.
	PU2	Using the promotions planning-system helps me accomplish work tasks more quickly.
	PU3	Using the promotions-planning system increases my productivity.
Perceived work impediment (based on Bulgurcu et al., 2010)	The current way that we manage promotions planning through the promotions-planning system …	
	WI1	…holds me back from doing my actual work.
	WI2	…hinders my productivity at work.
	WI3	…impedes my efficiency at work.
	WI4	…slows down my response time to my colleagues, customers, managers, etc.
Perceived costs of system compliance (based on Bulgurcu et al., 2010)	The current way that we manage promotions planning through the promotions-planning system …	
	CC1	…is time consuming.
	CC2	…is burdensome.
	CC3	…is costly.
Intentions to continue use of the system (based on Venkatesh et al., 2011)	ICU1	My intention would be to continue using the current system to organize planning of promotional items.
	ICU2	I would plan to continue using the current system to organize planning of promotional items as soon as possible.
	ICU3	I would continue using the current system to organize planning of promotional items.
Intentions to discontinue use of the system (developed for this study)	IDU1	My intention would be to stop using the current system to organize planning of promotional items.
	IDU2	I would plan to stop using the current system to organize planning of promotional items as soon as possible.
	IDU3	I would stop using the current system to organize planning of promotional items.

About the Authors

Jan Recker is Full Professor of Information Systems and Retail Innovation at Queensland University of Technology. His research focuses on processes-oriented systems analysis and design, green IS and IT-enabled innovation. He has published in journals such as *MIS Quarterly*, *Journal of the Association for Information Systems*, *Information & Management*, *Journal of Information Technology*, and *European Journal of Information Systems*. He is Editor-in-Chief for the *Communications of the Association for Information Systems* and an Associate Editor for the *MIS Quarterly*.

JITTA

JOURNAL OF INFORMATION TECHNOLOGY THEORY AND APPLICATION

JITTA is a Publication of the Association for Information Systems
ISSN: 1532-3416