Invited Paper

Information Technology Continuance Research: Current State and Future Directions*

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Contemporary research on information technology (IT) continuance is plagued by inadequate understanding of the continuance concept and inappropriate use of theories for studying this phenomenon. Following a review of the IT continuance literature, this paper identifies some of the extant misconceptions about continuance research and suggests theoretical avenues for advancing this research in a meaningful manner. Based on these insights, an extended expectation-confirmation theoretic model of IT continuance is proposed.

Keywords : Information Technology Continuance, Post-adoption, Usage, Acceptance

Ⅰ. Introduction

The last decade has seen a growing body of research on information technology (IT) continuance, and more generally on IT post-adoptive behaviors [e.g., Bhattacherjee, 2001; Bhattacherjee and Premkumar, 2004; Jasperson 2005; Ahuja and Thatcher, 2005]. IT continuance refers to sustained use of an IT by individual users over the long-term after their initial acceptance [Bhattacherjee, 2001]. This topic is important for research because the expected benefits of a given IT cannot be realized and its implementation cannot be considered successful if its usage is not sustained over the long-term by the users who are expected to benefit from its usage. More generally, continuance belongs to a family of post-adoptive behaviors that includes, among other phenomena, IT adaptation, resistance toward IT, and switching between technology alternatives.

Research in IT continuance has examined different factors and/or processes that motivate continued usage or discontinuance of IT products or services, following their initial acceptance. The dominant theoretic lens used to explain IT continuance/discontinuance behaviors has been expectation-confirmation theory (ECT) [Bhattacherjee, 2001]. Drawing from the marketing literature on service retention, this theory posits that users' *IT continuance intention* is based on two factors: their prior IT usage experience and their expectation of future benefits from continued IT usage. Prior usage experience (a backward-looking construct) is captured in the *satisfaction* construct, while expectation of future benefits (a forward-looking construct) is represented using the *perceived useful-*

ness construct, both of which have positive impacts on continuance intention. ECT also indicates that one's satisfaction with prior IT usage is positively influenced by the extent to which their initial expectations of IT usage was confirmed or disconfirmed during actual usage (*confirmation*) and perceived usefulness, and that perceived usefulness is also positively impacted by confirmation of prior expectations. The ECT-based model of IT continuance, as described by Bhattacherjee [2001] is presented in <Figure 1>.
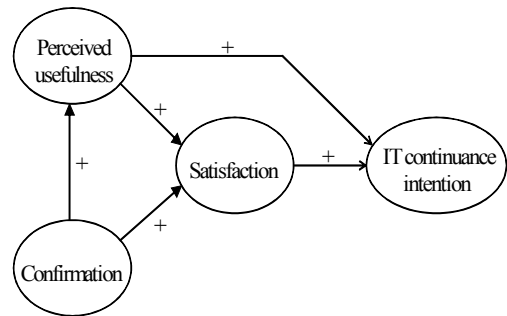
<Figure 1> An ECT-based Modelof IT Continuance

Subsequently studies have attempted to advance IT continuance research by employing other theories such as the technology acceptance model (TAM), the unified theory of technology adoption and use (UTAUT), self-perception theory, commitment-trust theory, IS success model, expectancy-value theory, theory of habits, fairness theory and learning theory, either independently, or in conjunction with ECT. We argue that many of these theories, which were originally designed to explain IT acceptance and were imported to the context of IT continuance, are inadequately suited for explaining IT continuance, given fundamental

differences between acceptance and continuance behaviors. An inadequate understanding of the continuance phenomenon has led to misapplications of theories and possible generation of spurious correlations, which continue to persist to this date in journals and conference proceedings in information systems. At the same time, there are valid ways of extending IT continuance research by expanding on the core ECT theory that is missing from the literature. The goal of this paper is to correct the commonly held misconceptions about IT continuance, suggest illustrative examples of how to extend current models of IT continuance, and thereby, help guide future research in this area.

The rest of this paper proceeds as follows. The next section describes current state of research on IT continuance though a literature review and identifies common misconceptions underlying contemporary IT continuance research. The third section presents potential extensions to the IT continuance model. The paper ends with implications for future IT continuance research.

Ⅱ. Current State of Continuance Research

For evaluating the current state of IT continuance research, we conducted a literature review of empirical papers on this topic published in the ten leading information systems journals over the last ten years. We searched the online database ABI/Inform using keywords "information technology" or "information systems" and "continuance." The ten-year timeframe was selected for this review to coincide with Bhattacherjee's [2001] ECT paper that started IT continuance research ten years ago. Our search space was restricted to the top ten journals that publish behavioral research on information systems: *MIS Quarterly, Information Systems Research, Management Science, Journal of Management Information Systems, Journal of the Association of Information Systems, European Journal on Information Systems, Information Systems Journal, Decision Support Systems, Information and Management,* and *Database for Advances in Information Systems*. Our search found 15 empirical articles that are summarized in the Appendix. One paper published before the last ten years [Karahanna, Straub, and Chervany 1999] was added to our pool, because even though this paper did not mention the term continuance, it did contrast acceptance and continuance beliefs and their respective effects as pre-adoption and post-adoption beliefs. Undoubtedly, there are many more papers on IT continuance published in other journals and especially in conference proceedings, such as the *International Conference on Information Systems*, the *European Conference on Information Systems*, and the *American Conference on Information Systems*, which were excluded from this review due to space constraints. Though our sample of papers is not comprehensive, we hope that it is fairly representative of the general body of research on IT continuance research, and can provide useful insights on how to conduct future research in this area.

Twelve of the sixteen studies examined in our literature review employed continuance intention as the primary dependent variable [e.g., Karahanna *et al.*, 1999; Bhattacherjee, 2001; Bhattacherjee and Premkumar, 2004; Ahuja and

Thatcher, 2005], while only four studies examined continuance behavior [e.g., Spiller, Vlassic, and Yetton, 2007; Limayem and Cheung, 2008; Saeed and Abdinnour-Helm, 2008; Lankton, Wilson, and Mao, 2010]. This may be attributed to the fact that the original ECT model [Bhattacherjee, 2001] theorized continuance intention as the dependent variable of interest rather than continuance behavior, and the general tendency in IT adoption and post-adoption research is to use intention as a proxy of behavior. Although intention is often a reasonable predictor of behavior, and particularly so in continuance contexts where users are already using the target IT, it should be noted that intention (a mental predisposition) is not the equivalent of behavior (an actual act) and that there may be cases where individuals may intend to act in a certain way but yet act very differently from their intentions. The goal of IT continuance research, or IT adoption or post-adoption research in general, is to predict actual behaviors and not intentions of the same, and hence, it is recommended that future research operationalize and measure IT usage behavior (even if such usage is measured in a perceptual manner) rather than end at intention.

In a related observation, only three out of the sixteen reviewed studies employed a longitudinal research design [Bhattacherjee and Premkumar, 1994; Limayem and Cheung, 2008; and Lankton et al., 2010], while the remaining thirteen studies employed cross-sectional designs. Continued IT usage is a temporal phenomenon, and can only be measured using longitudinal designs at a time after the measurement of the initial set of perceptions and in-

tentions related to IT continuance. While researchers tend to prefer cross-sectional designs and consequent omission of IT continuance behavior over longitudinal designs, by virtue of the simplicity and ease of execution of the former design, such simplicity comes at the cost of lesser understanding of and insight into the target phenomenon of interest, namely IT continuance behavior. If in fact, continuance intention deviates from continuance behavior, cross-sectional studies will be unable to detect for or explain such deviation; on the other hand, such intention-behavior divergence may offer fertile ground for theorizing and contributing new insights into the literature.

We also observed that a broad basket of theories have been employed to study IT continuance, such as the TAM [e.g., Hong, Thong, and Tam, 2006], UTAUT [e.g., Chiu and Wang, 2008], innovation diffusion theory [e.g., Karahanna et al., 1999], self-perception theory [e.g., Wu and Kuo, 2008], commitment-trust theory [e.g., Vatanasombut, Igbaria, Stylianou, and Rodgers, 2008], fairness theory [Chiu, Chiu, and Chang, 2007], theory of habits [Limayem and Cheung, 2008], and learning theory [Lankton et al., 2010], sometimes independently and sometimes in conjunction with ECT or other theories. Due to space limitations, we do not go into a detailed description of each of these theories, but merely offer a critique regarding their applicability and use in IT continuance research.

It should be noted that IT acceptance and continuance are conceptually distinct behaviors in that the former refers to users' *first-time* adoption of a *new* IT, while the latter refers to their *long-term* usage of an IT that is *already in use*.

Given their fundamentally different nature, it may be reasonably expected that factors that predict IT continuance may also differ significantly from those that predict IT acceptance. For instance, Karahanna et al. [1999] showed that perceived ease of use, which is often a significant motivator of IT acceptance decisions, has an attenuating effect over time, and its effect on IT continuance decisions is non-significant. At the same time, Bhattacherjee [2001] demonstrated that new constructs emerge during users' post-acceptance IT usage, such as their confirmation or disconfirmation of expectations and subsequent satisfaction with IT usage, which influence IT continuance intention, but have no corresponding impacts on acceptance intention. Furthermore, even if certain pre-adoption beliefs may still be salient in the post-adoption continuance context, these beliefs may themselves change over time, such that post-adoption beliefs may be very different from their pre-adoption equivalents in terms of their magnitudes and effects [Bhattacherjee and Premkumar 2004]. Hence, theories designed to explain IT acceptance, such as TAM and UTAUT, may be inconsistent with and inappropriate for explaining IT continuance.

Our literature review suggests that several studies [e.g., Chiu and Wang, 2008; Wu and Kuo, 2008; Vatanasombut et al., 2008] employed acceptance theories such as TAM and UTAUT for explaining IT continuance intention, and/or combined acceptance theories with continuance theories such as ECT within a single model. Just as acceptance theories are inappropriate for studying the continuance phenomenon, it is equally inappropriate to combine acceptance and continuance theories to predict continuance behaviors, because these theories are designed to predict two distinct and temporally separate user behaviors. Perhaps, some of the confusion may have been caused by the expectation that acceptance and continuance both represent IT usage behaviors (albeit different temporal phases of such behavior), which may have led some researchers to view continued use as an extension of users' initial acceptance behaviors and consequently follow the theoretical trajectory of IT acceptance research to study IT continuance. While we appreciate the efforts to extend ECT by drawing on other theoretical perspectives, we urge considerable discretion in choosing the right theories that can help advance continuance research in a meaningful manner rather than using theories in an ad hoc and arbitrary manner without adequate rationale. One example of such a reasonable extension of ECT was that by Limayem and Cheung [2008], where the authors included the concept of habit or automatic behavior in an ECT-based continuance model, and demonstrated how habit negatively moderates the role of continuance intention on continuance behavior. While continuance intention represents reflective, conscious, or reasoned behavior, habit represents a reflexive, subconscious, and unthinking behavior. Clearly, in the continued usage context, some users may use IT without conscious planning or forming of intentions, especially as IT usage becomes habitual or automatic, and hence the theory of habit may be viewed as adding a new dimension of automaticity to the otherwise reasoned process of continued usage.

A wide range of independent variables has

been employed to predict IT continuance intention or behavior. This includes not only the original ECT constructs such as expectation, confirmation, and satisfaction, but also TAM constructs such as perceived usefulness and ease of use [e.g., Hong *et al.*, 2006; Wu and Kuo, 2008], work-related constructs such as autonomy and overload [Ahuja and Thatcher, 2005], motivation for helping, career advancement, and personal satisfaction [Wu, Gerlach, and Young, 2007], interactional, procedural, and distributive fairness [Chiu *et al.*, 2007], service-related constructs such as service features and purpose [Spiller *et al.*, 2007], habits [Limayem and Cheung, 2008], and so forth. Many of these constructs were chosen to represent the IT product or service context where continuance was being examined. Depending on the applicability of the relevant theory, some of these constructs may or may not be relevant. As mentioned before, perceived ease of use appears to be a less relevant construct for IT continuance research, while satisfaction and habits appear to be more salient constructs. Hence, researchers' choice of new constructs for extending ECT should be based on theoretic considerations or careful observations of continuance behaviors.

Ⅲ. Extending Continuance Research

Although much of the prior research on IT continuance has been flawed by inadequate distinction between acceptance and continuance behaviors and inadequate theoretical considerations, future research may extend current models of IT continuance in several ways. An underlying premise of ECT is its view of IT continuance as an intentional, reasoned, or purposeful behavior, consistent with a long tradition of IT acceptance and usage research, which has been criticized by some [e.g., Ortiz de Guinea and Markus, 2009] as ignoring the role of emotions and habit. In light of these criticisms, we propose that IT continuance can be conceptualized as resulting from three determinants: (1) experiential outcome, (2) forward-looking expectation, and (3) habit. Experiential outcome is represented using satisfaction, which is also an emotive construct, while expected utility embodies the forward-looking expectation. Both satisfaction and expected utility represent the reasoned, rational, and conscious dimensions of continuance behavior, habit represents the unthinking, automatic, and subconscious dimension. The resulting model is shown in <Figure 2>.
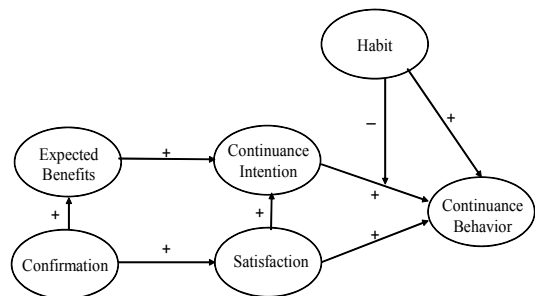
<Figure 2> An Extended ECT Model of IT Continuance

3.1 Reasoned Action

Research on social psychology, such as the theory of reasoned action (TRA) [Fishbein and Ajzen, 1975] and the theory of planned behavior (TPB) [Ajzen, 1991], has long espoused a ra-

tional model of human behavior which presumes that individual behavior is based on reasoned action resulting from and consistent with people's conscious intentions regarding that behavior. Reasoned action is also at the heart of IT acceptance models, such as TAM and UTAUT, which hypothesized IT acceptance intention as the primary predictor of acceptance behavior, and has been confirmed in a wide range of empirical studies [e.g., Venkatesh et al., 2003]. In the IT continuance context too, rational users are more likely to continue using a given IT if they intend to continue its usage in the first place.

A key question in IT continuance research is what are the predictors of user intention toward IT continuance. Social psychology theories, such as TRA and TPB, contend that intentions are derived from personal beliefs and attitudes regarding the behavior in question. In IT acceptance settings, two attitudinal beliefs are presumed to be the most salient in shaping user intentions: perceived usefulness and perceived ease of use [Davis et al., 1989]. Perceived usefulness, also called performance expectancy, is defined as the extent to which individuals believe that using a particular IT will enhance their job performance, while perceived ease of use, also called effort expectancy, is the extent to which users believe that learning how to use an IT and actually using will be relatively free of effort [Davis et al., 1989].

While both perceived usefulness and perceived ease of use have been validated as salient predictors of IT acceptance intentions, subsequent research has shown that the effect of perceived ease of use on intentions tend to

"wear out" over time, as users become increasingly familiar and acclimatized with IT usage [Karahanna et al., 1999; Bhattacherjee, 2001]. The rationale is that using a new IT for the first time requires overcoming significant learning barriers on the part of potential users, and hence IT that are viewed as being substantially difficult to use are less likely to be accepted by wary users. However, once that learning barrier is overcome, continued usage is not restricted by learning barriers, and hence, perceived ease of use is not salient to IT continuance intentions. However, perceived usefulness may continue to influence users' IT continuance intention because "it is the only belief that is demonstrated to consistently influence user intention across temporal stages of [IT] use" [Bhattacherjee, 2001, p. 355].

It is worth noting that the perceived usefulness construct was elicited at a time when IT was viewed as a utilitarian tool, intended to improve user productivity and performance in the workplace. Indeed, TAM was designed to explain usage of workplace systems in the 1980s. However, the nature and purpose of IT has changed significantly since then. While some IT is still used to improve user productivity and performance (e.g., office software), in this day and age of Internet-enabled systems, many systems such as online video games and virtual reality software (e.g., Second Life) are intended to enhance user enjoyment, and still others such as videoconferencing (e.g., Netmeeting) and collaboration systems (e.g., Microsoft Sharepoint) are aimed at improving communication and collaboration across workgroups. Furthermore, many systems today are aimed at

achieving multiple objectives, such as electronic mail (productivity and communication), Web (productivity and enjoyment), and wikis (productivity and collaboration). In light of the evolving nature of IT, and the multiple type of benefits it can accord to the user (in addition to productivity benefits), we believe it is more appropriate to employ *expected benefits* as a predictor of continuance intentions, rather than perceived usefulness (which connotes productivity benefits only).

3.2 Experiential Response

A key distinction between IT acceptance and continuance research is the emphasis of the latter on prior IT usage experience. This experience is captured using the satisfaction construct, which is an affective response based on repeated instances of prior IT usage experiences, and which addresses Ortiz de Guinea and Markus' [2009] criticism that IT continuance behaviors are overly concerned with reasoned action and less with affective or emotive responses. Satisfied users tend to continue using an IT in a relatively unthinking manner, while dissatisfied users tend to discontinue IT usage and/or switch to alternative IT [Bhattacherjee 2001]. Hence, as illustrated in <Figure 2>, satisfaction may therefore be viewed as an alternative (affective) means of shaping continuance behavior, as distinct from reasoned action means of intention.

Whether satisfaction (affective processing) or intention (reasoned processing) dominates usage behavior is a matter of the stage of usage behavior. Kim and Malhotra [2005] state, "sys-

tem usage will be driven by conscious intention when the linkage between stimuli and action is not fully developed" (p. 746). In the case of new IT acceptance, when the potential outcomes of IT usage are largely unknown, user behavior is dominated by reasoned intentions rather than by satisfaction. However, as users gain experience with IT usage and the linkage between stimuli and action becomes more fully developed, users are less likely to invest cognitive resources toward active processing of conscious intentions, and instead rely on a more efficient, affective stimuli-based response to decide on future course of action. In addition, drawing upon the reference literature on human emotion, Ortiz de Guinea and Markus [2009] also note that emotions such as satisfaction may drive IT usage directly without necessarily being mediated through behavioral intentions: "(1) that the connection between emotion and behavior can occur without a person being consciously aware of the connection, and (2) that the effect of emotion may not be *to create a particular behavioral intention*, but rather *to derail a previously formed behavioral intention* about continuing IT use" (p. 438). If satisfaction conflicts with consciously reasoned intentions, satisfaction may override intentions, such that a dissatisfied user may choose to discontinue IT usage even if IT usage is viewed as beneficial. Likewise, positive emotions from IT usage, such as pleasure derived from online computer games, may motivate users to continue playing such games, even if such games are viewed as being unproductive or taking time away from more productive activities. Hence, in the case of IT continuance, satisfaction may be expected

to assume a superordinate role in shaping IT continuance behavior over expected benefits. A limited number of empirical studies that have compared the effects of satisfaction and perceived usefulness [e.g., Bhattacherjee, 2001] support this expectation.

Recent empirical research shows that the effect of satisfaction on IT continuance behavior is not only direct but also mediated by intention [Kim *et al.*, 2007]. The rationale for the mediated effect comes from consumer behavior research in marketing upon which ECT is based [Oliver 1980]. This research, which focuses heavily on consumer repurchase intentions, argues that consumers are unlikely to develop positive intentions to repurchase a product or service if they had a poor prior experience with that product or service. In other words, satisfaction not only has a direct effect on IT continuance behavior, but also tends to bias continuance intention in a manner to conform to the satisfaction affect. For instance, dissatisfaction users are less likely to develop positive intentions of continued IT usage, while satisfied users are likely to intend continuing IT usage in the near future.

ECT posits confirmation (disconfirmation) of expectations from prior IT usage experiences as an antecedent to satisfaction [Bhattacherjee, 2001]. This theory suggests that feelings of satisfaction arise when people compare their pre-usage expectations of IT usage with their performance during actual IT usage. If perceived performance exceeds their initial expectations, then users experience positive confirmation and hence are satisfied with IT usage. However, if perceived performance falls short of expectations, then their expectations are negatively confirmed and users are dissatisfied. In keeping with this association, which is empirically supported by a growing volume of IT continuance research, confirmation is posited as an antecedent of satisfaction in our extended ECT model (see <Figure 2>). However, pre-adoption expectation, which serves as the baseline for user evaluations of confirmation, is excluded because: (1) its effects are already mediated through the confirmation construct, and (2) user expectations are temporal in nature, and may change significantly from pre-adoption to post-adoption stage as users learn from their personal IT usage experiences, and pre-adoption expectation is unlikely to be retained using the post-adoption stage [Bhattacherjee and Premkumar 2004]. Note that post-adoption expectation is already included in our extended model in the form of the expected utility construct.

The relationship between expected utility and confirmation is also worth examining. Pre-adoption expectations are generally based on second-hand information, such as vendor claims or industry reports, that are communicated to potential users via mass media or interpersonal channels. These expectations tend to be weak and unstable because they are based on hearsay rather than first-hand experience. In contrast, post-adoption expectations are based on users' own first-hand usage experience, and therefore tend to be strong, persistent, and stable. ECT suggests that the confirmation process is not only central to the formation of satisfaction, but also to the formation of post-adoption expectations, which, once formed, replace

pre-adoption expectations in framing continued IT usage intentions via a process of reasoned action. Positive confirmation is likely to enhance post-adoption expectation (called expected benefits in this paper), while negative confirmation will tend to lower post-adoption expectation. Hence, a positive relationship may be expected between confirmation and expected benefits.

3.3 Habitual Response

Prior IT usage research indicates that much of continued IT use is habitual [Limayemand Cheung 2008]. Habits can be defined as "a well-learned action sequence, originally intentional, that may be repeated as it was learned without conscious intention, when triggered by environmental cues in a stable context" [Ortiz de Guinea and Markus, 2009, p. 437]. When IT use is habitual, it ceases to be guided by conscious planning and is instead triggered by specific environmental cues in an unthinking or automatic manner. Although the habits literature provide very little guidance on what environmental cues trigger habitual responses, Ortiz de Guinea and Markus [2009] contend that the mere presence of IT or a specific task that a user is confronted with (e.g., to communicate with a colleague about writing a report) are salient cues that may trigger habitual IT usage. The relative role of habitual response vis-à-vis reasoned action at different phases of IT usage is elaborated by Japserson et al. [2005] as "During initial use of an IT feature, individuals most likely engage in active cognitive processing in determining post-adoptive intention or behavior, however, with any repetitive behav-

ior, reflective cognitive processing dissipates over time, leading to non-reflective, routinized behavior" (p. 528).

Though habits are known to influence IT continuance behavior, the nomological path by which such influence occurs has been widely debated. Some studies suggest that habit directly influence continued IT use [e.g., Limayem and Hirt, 2003; Kim and Malhotra, 2005], others suggest that its effect on continued usage is mediated by IT continuance intentions [e.g., Gefen, 2003], and still others suggest that habit moderates the impact of intentions on continued use [e.g., Kim and Malhotra, 2005; Limayem et al., 2007]. Amongst these paths, the mediated impact via intentions is least consistent with the referent literature in social psychology [e.g., Ouellette and Wood, 1998; Verplanken, 2006], which portrays habit as an alternative to reasoned action, rather than as adding to reasoned action. For instance, Wood et al. [2002] says, "People engaged in habitual actions do not consciously access habit intentions, either because they do not need to do so in order to repeat well-learned intentional responses or because the behavior was not intended to begin with" (p. 1283).

However, there is a reason to believe that habit may not only directly influence IT continuance behavior, but also moderate the relationship between continuance intention and behavior. Explaining the negative moderating role of habit, Limayem et al. [2007] explains, "If individuals are habitually performing a particular behavior (for example, using a particular IS), the predictive power of intentions is weakened. Thus the more a behavior is performed out of habit, the less cognitive planning it in-

volves" (p. 720). In light of these explanations, we propose that habit not only has a direct positive effect on IT continuance behavior, but also negatively moderates the effect of continuance intention on behavior (see <Figure 2>).

The nomological relationships described in our extended ECT model describe three alternative paths to IT continuance behavior: reasoned action, experiential response, and habitual response. Each of these paths represents a distinct theoretical tradition: intention-based models, expectation-confirmation theory, and theory of habits. These theories are complementary in that they attempt to explain the same behavior from different perspectives. Yet, they are interdependent in that there appears to be significant crossover effects between these theories, such as the moderating effect of habit on the expectation-confirmation relationship, and the relationships between satisfaction and continuance intention and between confirmation and expected benefits. Furthermore, one of the constructs from the original model (perceived usefulness) has been redesignated as expected benefits to faithfully represent the broader range of benefits accrued from IT, including performance, enjoyment, and communication benefits. Hence, we believe that the extended ECT model proposed here is a significant improvement over the original ECT model of IT continuance developed ten years back.

Ⅳ. Implications for Future Research

The extended ECT model proposed above is an illustration of how IT continuance research can be incrementally advanced in a meaningful way. Starting with the core expectation-confirmation theory, we incorporated continuance behavior into our extended model, elaborated additional influences on continuance behavior, and explored crossover effects between these different influences. While this is merely an illustration, and undoubtedly, there may be other constructs and relationships salient to explaining IT continuance, what we aim to demonstrate here is how theory-driven research can be incorporated into continuance research in a way without being inconsistent with the core assumptions and tenets of the core theory. In particular, we urge researchers to abandon the temptation of adding TAM and UTAUT constructs into ECT in an arbitrary manner, understanding that TAM/UTAUT were designed to describe a different behavior (IT acceptance) than IT continuance, which are mutually inconsistent in that users cannot possibly be accepting a new IT and continuing its long-term use at the same time.

We believe that this paper makes several contributions to the IT continuance literature. First, it clarifies, disentangles, and integrates different mechanisms or paths that are presumed to influence IT continuance behavior, and in doing so, contributes to our nascent body of knowledge in IT continuance by providing a comprehensive understanding of the emergent nature of this behavior. Second, this paper postulates an extended model of IT continuance that can not only help guide and inform future research in this area, but also serves as an illustration of how to advance IT continuance research without abandoning its roots in the core expectation-confirmation theory.

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⟨Appendix⟩

Authors (Source, Year)	Research Problem	Theory	Source of Data	Independent/Dependent/ Moderator Variables	Major Results
Karahanna, Straub, and Chervany (MISQ, 1999)	Understanding beliefs that influence pre-adoption versus post-adoption user intentions	Theory of reasoned action (TRA) and innovation diffusion theory (IDT)	Cross-sectional survey of 268 PC users in a large financial institution	**DV:** Behavioral intention about IT usage (BI) **IV:** (1) Perceived voluntariness of IT usage, (2) Attitude toward IT usage (with behavioral beliefs as antecedents: Perceived usefulness (PU), Image, Compatibility, Perceived ease of use (PEU), Visibility, Result Demonstrability and Trialability), (3) Subjective Norm (SN) (with normative beliefs as antecedents: Top management, Supervisor, peers, Friends, MIS Department and Local Computer Specialists)	(1) SN dominates prediction BI to adopt IT, but attitude predominates for BI to continue using the IT. (2) Adopter attitude influenced by trialability, PU, result demonstrability, visibility, and PEU, but post-adoption attitude is influenced by PU and Image. (3) Significant referent groups for adopters are top management, friends, supervisors, peers, and the MIS department, while that for post-adoption users are peers, local computer specialists, top management, and supervisors.
Bhattacherjee (MISQ, 2001)	Understanding predictors of IT continuance	Expectation-confirmation theory (ECT)	Cross-sectional survey of 122 online banking users	**DV:** Continuance Intention **IV:** (1) Perceived usefulness (PU) (which in turn is influenced by confirmation of expectation from prior IT use), (2)Satisfaction (which is influenced by confirmation and PU)	(1) Satisfaction is the strongest predictor of users' continuance intention, followed by PU. (2) Satisfaction is predicted primarily by users' confirmation and secondarily by PU.
Bhattacherjee (DSS, 2001)	Predicting intention to continue using business-to-consumer e-commerce services	ECT	Cross-sectional survey of 172 online brokerage users	**DV:** Continuance intention **IV:** (1) Loyalty incentives, (2) PU (with confirmation of expectations as antecedent), (3) Satisfaction (with confirmation as antecedent)	(1) Continuance intention is determined by satisfaction, PU, and the interaction between PU and loyalty incentives. (2) Confirmation is a significant predictor of satisfaction and PU.
Bhattacherjee and Premkumar (MISQ, 2004)	Understanding changes in beliefs and attitude from pre-adoption to post-adoption IT usage	ECT and TAM	Study 1: 3 time-period survey of computer-based training software usage among 54 undergraduate students Study 2: 2 time-period survey of rapid application development usage among 77 grad students	**DV:** Usage intention **IV:** (1) PU in pre-adoption and post-adoption stages (with disconfirmation as antecedents), (2) Attitude in pre-adoption and post-adoption stages (with satisfaction and PU as antecedents)	(1) PU and attitude change between pre-adoption and post-adoption stages; this change is more prevalent during pre-adoption stage than in post-adoption stage. (2) Disconfirmation and satisfaction explain a greater proportion of the variance in later PU and Attitude than that explained by the prior states of these cognitions.

Authors (Source, Year)	Research Problem	Theory	Source of Data	Independent/Dependent/ Moderator Variables	Major Results
Ahuja and Thatcher (MISQ, 2005)	Understanding effects of work environment perceptions and gender on (post-adoptive) IT innovation	Theory of Trying	Cross-sectional survey of 263 student volunteers at a large public university in the US	**DV**: Trying to innovate with IT **IV**: Work Environment Perceptions: (1) Autonomy, (2) Overload (and also their interaction) **MV**: Gender	(1) Work environment perceptions influence trying to innovate with IT. (2) Gender moderates the relationships between work environment perceptions and trying to innovate.
Hong, Thong, and Tam (DSS, 2006)	Comparing the efficacy of different models in predicting users' continued IT usage behavior	ECT, TAM, and Extended ECT (by combining ECT and TAM constructs)	Cross-sectional survey of 1826 mobile Internet users.	**DV**: IT continuance intention **IV**: (1) Satisfaction (with PU and Confirmation as antecedents), (2) PU (with Confirmation as antecedent), (3) Perceived ease of use (PEU)	(1) Extended ECT (ECT+TAM) explained most of the variance in continuance intention, followed by TAM, and then ECT. (2) TAM fit the data best, followed by ECT, and extended ECT. (3) PU has a significant impact on continuance intention in all models. (4) Impact of PEU on continuance intention is stronger than that of PU in TAM and Extended ECT.
Wu, Gerlach, and Young (I&M, 2007)	Understanding motivations that influence open source software developers' continuance intention	Expectancy-Value Theory (EVT)	Cross-sectional survey of 148 open source software participants.	**DV**: Continuance intention **IV**: (1) Motivation for helping, enhancing human capital, career advancement, and personal satisfaction, (2) Satisfaction (with Motivators as antecedents)	(1) Continuance intention is predicted by satisfaction and motivation on enhancing human capital and satisfying personal needs. (2) Motivation on helping and career advancement have positive effects on satisfaction and indirect (but not direct) positive effects on continuance intention.
Chiu, Chiu and Chang (ISJ, 2007)	Investigating motivations behind learners' intentions to continue using Web-based learning.	Delone and McLean's IS Success Model and Fairness Theory	Cross-sectional survey of 289 students of a Web-based learning service in Taiwan.	**DV**: Continuance intention **IV**: (1) Interactional fairness, (2) Procedural fairness, (3) Distributive fairness, (4) Satisfaction (with Information quality, System quality, Service quality, System use, Distributive fairness, Procedural fairness and Interactional fairness as antecedents)	(1) Continuance intention is primarily explained by Satisfaction. (2) Procedural fairness has a significant effect on continuance intention. (3) Information quality, System quality, System use, Distributive fairness and Interactional fairness have positive effects on Satisfaction.

| Authors (Source, Year)	Research Problem	Theory	Source of Data	Independent/Dependent/ Moderator Variables	Major Results
Spiller, Vlasic, and Yetton (I&M, 2007)	Understanding post-adoptive continuance and discontinuance of Internet service usage	No Theory	Cross-sectional survey of 190 continuing and discontinuing users of a medium-sized Australian ISP	**DV:** Replacement discontinuance **IV:** (1) Service features, (2) Purpose, (3) Prior behavior, (4) Demographics	(1) Three features (Reliability of service, Quick response to queries and Payment options) and Prior behavior (history, tenure) influenced customers' decisions to continue or discontinue. (2) Demographic characteristics had no effect on continuance or discontinuance, though business customers are less likely to discontinue than personal users. (3) Discontinuers gave higher weight to Cost than to Service quality.
Wu and Kuo (Database, 2008)	Understanding the influence of habitual usage and past usage on predicting power of PEU and PU on intention	TAM and Self-Perception Theory	Cross-sectional survey of 232 Google search engine users	**DV:** IT continuance intention **IV:** (1) Past usage, (2) PEU (with Past Usage as antecedent), (3) PU (with Past Usage and PEU as antecedents), (4) Habitual usage	(1) Habitual usage and Past usage have strong influence on continuance intention. (2) Predictive power of PU and PEU on continuance intention is considerably diluted by the addition of habitual or past usage, e.g., PU-Intention relationship becomes insignificant when habitual usage is employed.
Saeed and Abdinnour-Helm (I&M, 2008)	Understanding effects of IT characteristics and perceived usefulness on post adoption usage of IS	TAM and Delone and McLean's IS Success Model	Cross-sectional survey of 1032 students using Web-based IT for their academic work	**DV:** Post-adoptive IT Usage (extended and exploratory usage) **IV:** (1) System integration, (2) Information quality, (3) Perceived usefulness (with system integration and information quality as antecedents) **MV:** (1) Gender, (2) Internet experience	(1) PU is a better predictor of exploratory usage than extended usage (system integration and information quality are significant predictors of usefulness). (2) Information quality has a direct effect on extended usage and system integration has a direct effect on exploratory usage.
Limayem and Cheung (I&M, 2008)	Understanding continuance of Internet-based learning technologies	ECT and Theory of Habit	Longitudinal survey of 313 students using a Web-based teaching platform	**DV:** Continued IT use **IV:** (1) IT continuance intention (with Satisfaction and PU as antecedents), (2) Prior behavior, (3) Satisfaction (with PU and Confirmation as antecedents) **MV:** Habit	(1) Continued usage was predicted by prior behavior and satisfaction. (2) Continuance intention was predicted by Satisfaction and PU. (3) Habit negatively moderates the intention-continuance link. (4) Confirmation and PU influenced satisfaction, and Confirmation has a significant effect on PU.

Authors (Source, Year)	Research Problem	Theory	Source of Data	Independent/Dependent/ Moderator Variables	Major Results
Chiu and Wang (I&M, 2008)	Understanding continuance intention for Web-based learning	UTAUT	Cross-sectional survey of 286 part time students who took Web-based courses	DV: Continuance intention IV: (1) Intrinsic value, (2) Utility value, (3) Attainment value, (4) Computer self-efficacy, (5) Effort expectancy (with Computer self-efficacy as antecedent), (6) Performance expectancy (with Effort expectancy as antecedent) (7) Social influence, (8) Facilitating conditions, (9) Cost (social isolation, anxiety, response delays, and risk of arbitrary learning)	(1) Performance expectancy, Effort expectancy, Computer self-efficacy, Attainment value, Utility value, and Intrinsic value are significant predictors of intention to continue using Web-based learning. (2) Anxiety (cost) has a significant negative effect on continuance intention.
Vatanasombut, Igbaria, Stylianou, and Rodgers (I&M, 2008)	Understanding continuance intention in online banking	Commitment-Trust Theory, ECT, and TAM	Cross-sectional survey of 1058 online banking customers	DV: Continuance intention IV: (1) Trust (with shared value, communication and perceived security as antecedents), (2) Relationship commitment (with relationship termination cost, relationship benefit, shared value, user empowerment and trust as antecedents) Control variables: Convenience, Reputation, Cost and Quality of Banking Service.	(1) Continuance intention is influenced positively by trust, relationship commitment, perceived empowerment, and service quality, but negatively by relationship commitment. (2) Trust is influenced positively by shared value, perceived security, communication, and service quality.
Kettinger, Park, and Smith (I&M, 2009)	Understanding the effects of IS service quality on IS service reuse	SERVQUAL and ECT	Cross-sectional survey of 263 users of an IS service department	DV: Intention to reuse service IV: (1) Satisfaction (with IS service value and IS service quality as antecedents), (2) IS service value (with IS service quality as antecedent)	(1) Reuse intention is positively influenced by satisfaction and IS service value. (2) Satisfaction is positively influenced by service quality and IS service value, and IS service value positively influenced by IS service quality.
Lankton, Wilson, and Mao (I&M, 2010)	Examining the antecedents of IT habit	Learning theory	Longitudinal survey of 371 of undergraduate student using a university Internet application.	DV: Continued IT use IV: (1) Prior IT use, (2) Habit (with prior IT use, satisfaction, attention to importance, and attention to task complexity as antecedents)	(1) Habit is positively influenced by satisfaction, prior IT use, importance and negatively by task complexity (2) Habit's influence on continued IT use decreases as behavior becomes less automatic.

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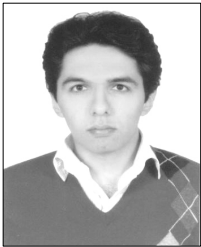
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