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A Framework and Guidelines for Context-Specific Theorizing in Information Systems Research

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This paper discusses the value of context in theory development in information systems (IS) research. We examine how prior research has incorporated context in theorizing and develop a framework to classify existing approaches to contextualization. In addition, we expound on a decomposition approach to contextualization and put forth a set of guidelines for developing context-specific models. We illustrate the application of the guidelines by constructing and comparing various context-specific variations of the technology acceptance model (TAM)—i.e., the decomposed TAM that incorporates interaction effects between context-specific factors, the extended TAM with context-specific antecedents, and the integrated TAM that incorporates mediated moderation and moderated mediation effects of context-specific factors. We tested the models on 972 individuals in two technology usage contexts: a digital library and an agile Web portal. The results show that the decomposed TAM provides a better understanding of the contexts by revealing the direct and interaction effects of context-specific factors on behavioral intention that are not mediated by the TAM constructs of perceived usefulness and perceived ease of use. This work contributes to the ongoing discussion about the importance of context in theory development and provides guidance for context-specific theorizing in IS research.

Keywords: theory development; contextualization; context-specific model; general model; technology adoption; technology acceptance model
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1. Introduction

Over the past years, numerous appeals for the development of theory specifically for the field of information systems (IS) have appeared in the literature (e.g., Chiasson and Davidson 2005, Orlikowski and Iacono 2001, Watson 2001, Weber 2003). Although the need for theory development in IS is widely recognized, there is little consensus on how theory development should proceed. On the one hand, generalizability and parsimony are important considerations in theory development (Gregor 2006, Lee and Baskerville 2003, Weber 2003). Gregor (2006) suggested that abstraction and generalization about the phenomenon, interactions, and causation are at the core of a theory. The generalizability of an IS theory to different settings is important both for research and for managing and solving practical problems in organizations (Lee and Baskerville 2003). Weber (2003) noted that parsimonious theories are more favorable, provided that they have reasonable levels of predictive and explanatory power. On the other hand, there have been increasing calls for more richness and practical relevance in IS research (Benbasat and Zmud 1999, Chiasson and Davidson 2005, Orlikowski and Iacono 2001, Plouffe et al. 2001, Rosemann and Vessey 2008). Hevner et al. (2004) argued that the behavioral-science research paradigm is passive with respect to technology, often ignoring or "under-theorizing" the artifact

itself. Orman (2002) argued that many of the equivocal results in IS behavioral-science studies can be explained by the failure to differentiate the capabilities and purposes of the technology in different studies. One way to develop richer theories that provide actionable advice is to take the context into greater consideration to generate insights about the phenomena associated with information technologies (IT), individuals, and organizations (Weber 2003).

The significance of context in theory development has received much attention in the management literature (e.g., Bamberger 2008; Johns 2001, 2006; Mowday and Sutton 1993; Rousseau and Fried 2001; Whetten 2009). Context is defined as "situational opportunities and constraints that affect the occurrence and meaning of organizational behavior as well as functional relationships between variables" (Johns 2006, p. 386). Although researchers have often discussed the role of context in influencing their findings, significant challenges remain in integrating context into theory (see Bamberger 2008, Johns 2006). Johns (2006) noted that although previous researchers frequently study contextual features, such as job design, role relationships, and reward systems, these contextual features are often studied in a piecemeal fashion, in isolation from each other. When certain aspects of a context, such as job design, are the focus of a study, other salient contextual features, such as the reward system, are often unmeasured and unmentioned (Johns 2006). As a result of such disjointed consideration, the influence of context is often unrecognized or underappreciated, thus driving the need for a more refined and systematic language for expressing context in theory development (see Johns 2006 for a review). The importance of context in theorizing is also emphasized in Alvesson and Karreman's (2007) discussion of theory development. They noted that "no theory is always wrong or always right—all are more or less relevant and helpful in different situations" (Alvesson and Karreman 2007, p. 1272) and suggested that researchers should familiarize themselves with the setting under study, so as to make better use of empirical material as input for theorizing.

In IS research, context refers to the characteristics and usage contexts of the technology artifact (Benbasat and Zmud 2003, Orlikowski and Iacono 2001). In line with the notion that context should play a more central role in theory development, IS research has incorporated more contextual features into some important general models. For example, the technology acceptance model (TAM; Davis 1989) has been contextualized to study user adoption of hedonic systems (Van der Heijden 2004) and online recommendation agents (Wang and Benbasat 2005). The unified theory of acceptance and use of technology (UTAUT; Venkatesh et al. 2003) has been contextualized to study user adoption and use of collaboration technologies (Brown et al. 2010). The IS success model has been contextualized to study the success of e-commerce systems (DeLone and McLean 2004) and knowledge management systems (Kulkarni et al. 2007). The IS service quality model has also been refined and replicated in numerous contexts (Berthon et al. 2002, Jiang et al. 2002).

There is, however, little consensus on how to contextualize general models in IS research. Although prior research has identified context-specific factors to account for the specificity of usage contexts, these factors have been incorporated into general models in an inconsistent manner. For example, in individual technology adoption research, previous studies have incorporated context-specific factors into general models as either direct predictors of intention (e.g., Hong and Tam 2006, Van der Heijden 2004); or indirect predictors of intention mediated through the core constructs in general models (e.g., Brown et al. 2010, Pavlou and Fygenson 2006); or both (e.g., Wang and Benbasat 2005). Similarly, in IS continuance and IS success research, context-specific factors have been modeled as either antecedents of the core constructs or usage-related outcomes (e.g., Kulkarni et al. 2007, Lee and Kwon 2011, Molla and Licker 2001); or constituent dimensions of the core constructs (e.g., He and Wei 2009); or moderators of the relationships in general models (e.g., Jang 2010, Lin 2011). Further, as in the management literature, previous contextualization efforts in IS research were often made in a piecemeal fashion. Although previous studies have examined different contextual features, such as technology characteristics (e.g., Van der Heijden 2004); user characteristics (e.g., Jang 2010, Lee and Kwon 2011, Lin 2011); task type (e.g., Fang et al. 2005); and organizational factors (e.g., Kulkarni et al. 2007); few have collectively examined how factors pertaining to multiple aspects of the contexts—i.e., technology, user, and usage context—can shape beliefs and behaviors (e.g., Brown et al. 2010, Pavlou and Fygenson 2006). Thus, despite the existing efforts to contextualize general theories in IS research, there is still a need for a more systematic approach to contextualization. Against this backdrop, this paper has the following objectives:

1. To discuss the value of context in theory development.

2. To examine how IS research has incorporated context into extant models.

3. To propose a set of guidelines for developing context-specific models.

4. To illustrate the proposed guidelines by constructing and comparing various context-specific models for two different contexts of technology adoption.

The rest of the paper is organized as follows. In the next section, we discuss the significance of context in theory development in general and the trade-offs associated with contextualization. We then describe general directions for contextualizing theories in IS research. We examine how prior research on individual technology adoption, IS continuance, and IS success[1] has incorporated context into theorizing and develop a framework to classify the different approaches to contextualization in the extant literature. Next, we propose a decomposition approach with a set of guidelines for developing context-specific models. We illustrate the proposed guidelines by constructing context-specific models for two different individual technology adoption contexts. We empirically compare the decomposed TAM against alternative context-specific models, followed by a discussion of the implications of this research. Finally, we conclude with limitations of the study and directions for future research.

2. Value of Context in Theory Development

2.1. Context and Contextualization

In the management literature, context has been defined by several researchers. Johns (2006, p. 386) defined context as "situational opportunities and constraints that affect the occurrence and meaning of organizational behavior as well as functional relationships between variables." Cappelli and Sherer (1991, p. 56) defined context as "the surroundings associated with phenomena which help to illuminate that phenomena, typically factors associated with units of analysis above those expressly under investigation." Mowday and Sutton (1993, p. 198) defined context as "stimuli and phenomena that surround and thus exist in the environment external to the individual, most often at a different level of analysis." Early research has considered context to be a sensitizing device that makes us more aware of the potential situational and temporal boundary conditions to our theories, but the recent view is that context is a critical driver of cognition, attitudes, and behavior, or a moderator of relationships among such lower-level phenomena (Bamberger 2008). In sum, context effects can be broadly defined as "the set of factors surrounding a phenomenon that exert some direct or indirect influence on it—also characterized as explanatory factors associated with higher levels of analysis than those expressly under investigation" (Whetten 2009, p. 31).

[1] As an initial effort to provide guidance for context theorizing in IS research, we focus on these relatively mature streams of research, where there exist exemplars of various contextualization efforts.

Whetten (2009) examined the interface between context and theory and discussed several ways to contextualize extant theories to explicitly account for relevant contextual conditions, making the theories more context sensitive. The first way is to control for context distinguishing effects related to the phenomenon (Y) but not the explanation variables (X) (i.e., the contextual effect is measured and factored into the $X \rightarrow Y$ statistical analysis) when a theory is borrowed from one context as a new explanation of a phenomenon in another context. As Whetten et al. (2009) noted, theory borrowing without accounting for the contextual differences may lead to a misapplication of the theory, hollowing the theory of its original explanatory power. It is thus important to account for context distinguishing features in the research design. For example, in a study of information and communication technology implementation, Venkatesh et al. (2010) replicated the job characteristics model (JCM; Hackman and Oldham 1980), which was developed based on theory and data from Western contexts, in the new context of a service organization in a developing country, i.e., a bank in India. They found that the various job characteristics in JCM—i.e., skill variety, task identity, task significance, autonomy, and feedback—predict job outcomes in the pre-implementation period but not the post-implementation periods. They further employed a qualitative approach to identify several important contextual factors pertinent to developing countries—i.e., environmental barriers, learning difficulty, culture shock, and employee valuation—that cause the decrease in predictive validity of JCM. Hence, this approach helps to maintain consistency in the $X \rightarrow Y$ explanation across contexts and improve the practice of theory borrowing by discovering boundary conditions of existing theories (Whetten 2009, Whetten et al. 2009).

The second way is to formulate context-sensitive versions of the explanation variables (X), making their meaning functionally equivalent across multiple contexts (Whetten 2009). This is especially important for establishing construct validity in cross-context research in which a construct is applied and used in multiple contexts. Researchers must ensure that the selected concepts are properly translated and their meanings are adapted to each context (Tsui 2006). For example, Farh et al. (2004) refined the nine dimensions of organizational citizenship behavior (OCB) normally reported in Western studies to account for the contextual conditions in China by excluding three of the standard dimensions, changing the relative importance of four other dimensions and adding an extra dimension (i.e., social welfare participation). This refinement resulted in a more robust conception of OCB that is able to account for

an organizational member's desire to promote social welfare in any cultural context. Such a formulation of context-sensitive versions of explanation variables (X) constitutes an important theory improvement opportunity (Whetten 2009).

The third way to contextualize a theory is to incorporate a contextual effect (Z) that is related to both X and Y into the theory as a contextual moderator ($X \times Z$) (Whetten 2009). The effects of the contextual moderator are typically characterized as cross-level effects in which a stimulus or phenomenon at one level or unit of analysis has an impact at another level or unit of analysis (Johns 2001, 2006; Klein et al. 1999). Theories explaining these effects are referred to as context theories that specify "how surrounding phenomena or temporal conditions directly influence lower-level phenomena, condition relations between one or more variables at different levels of analysis, or are influenced by the phenomena nested within them" (Bamberger 2008, p. 841). Context theorizing requires a researcher to build situational and/or temporal conditions directly into the theory and explicate the mechanisms that either link these situational and temporal conditions to embedded phenomena, or govern the conditioning of relationships between phenomena by these situational and temporal conditions (Bamberger 2008). For example, Lam et al. (2002) examined the relationship between organizational justice and employee work outcomes in a cross-national study. They proposed that two context differentiating cultural values—i.e., individualism and power distance—moderate the previous relationship. They found that power distance, but not individualism or country, moderated the relationships between perceived justice and job satisfaction, performance, and absenteeism. The findings help explain the inconsistent effects of organizational justice reported in previous studies conducted in different contexts. Hence, incorporating a contextual moderator into the theory can make our understanding of the relationship between X and Y more context sensitive (Whetten 2009).

2.2. Trade-Offs Associated with Contextualization

There are many benefits to integrating context directly into theory development. First, contextualization involves "linking observations to a set of relevant facts, events, or points of view that make possible research and theory that form part of a larger whole" (Rousseau and Fried 2001, p. 1). Such "situation linking" makes the models more accurate and the interpretation of results more robust (Bamberger 2008). It helps to better convey the applications of our research and allows potential customers of such research to better assess the applicability of the findings, eventually enhancing the relevance of research to practice (Johns 2006). Second, theories incorporating contextual elements are often better able to explain anomalous findings, such as "sign reversals" in relationships among core variables (Bamberger 2008, Johns 2006). For example, Tett et al. (1999) suggested that the bidirectionality of relationships (i.e., coexistence of positive and negative relationships) between personality and job performance is attributable to the occupational context. They argued that different occupations define good job performance differently and this contributes to the inconsistent findings. Third, the process of deep contextualization helps to identify how context enhances or modifies understanding of a common phenomenon across contexts and also discover context-free regularities (Tsui 2007). By treating context as endogenous to theories, researchers may discover general theories to explain and understand individual and organizational behavior in any context (Tsui 2007). Thus, contextualization may serve as the starting point of new universal theories.

Although contextualization is considered an important means to advance theory development, its limitations should be noted. First, contextualization may defer the development and testing of broad-range (as opposed to middle-range, situation-specific) theories to the time when a sufficient amount of contextual information has been collected to allow for the development and testing of context-contingent theory (Bamberger 2008). However, contextualization tends to be qualitative and contextual data are often difficult to code and quantify. As a result, researchers are often unable to assess which contextual factors contribute to the differences across studies, making it difficult to conduct theory-grounded meta-analyses to test such context-contingent theory (Bamberger 2008, Johns 2006). Second, there are an infinite number of situational features to consider in any given context (Bamberger 2008). Many context effects are subtle in that their associated stimuli are not apparent to actors, whereas some salient situational features can countervail each other, limiting their actual impact on organizational behavior (Johns 2006). Thus, when contextualizing a theory, the decision regarding which situational features to consider is not trivial, and yet such a decision should be grounded in theory (Bamberger 2008). Finally, contextualization requires researchers to forgo parsimony and generalizability in order to capture and incorporate contextual factors into theory development. Given the common belief that parsimony, robustness, and generalizability characterize superior theory (Eisenhardt and Graebner 2007), some researchers intentionally ignore contextual factors in their research (Whetten 2009). However, Rousseau and Fried (2001) suggested that simplicity and parsimony are not the same when simplicity is achieved by misrepresenting the complexity of the

underlying phenomena and that demands for simple models do not always fit with the messy reality of contemporary work and organizational life. Further, Whetten (2009) noted that it is a mistaken belief that context-free knowledge has greater scientific merit than contextualized knowledge and suggested that failure to account for relevant contextual effects will result in incomplete and inconclusive findings.

In sum, despite the limitations discussed above, prior research clearly indicates a need for contextualization (e.g., Bamberger 2008, Johns 2006, Tsui 2007, Whetten 2009). Contextualization can improve our understanding of research phenomena at virtually any stage in theory development, specifically by linking existing versus new theories with well-known versus emerging phenomena (Zahra 2007).

3. Significance of Context in Information Systems Research

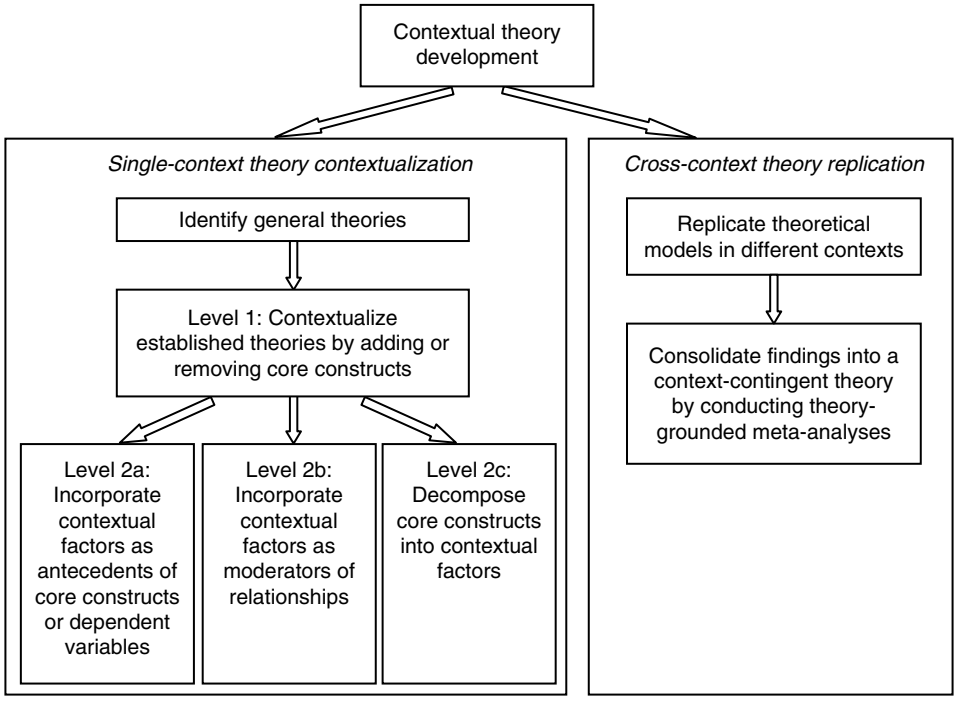
The notion of contextualization in the management literature is applicable to IS research, except that IS research has an extra component in theorizing—i.e., the technology artifact. Orlikowski and Iacono (2001) argued that given the context specificity of technology artifacts, there is no single conceptualization of technology that will work for all usage contexts. Thus, the characteristics of the technology artifacts are at the core of context-specific theorizing in IS research. Further, situational characteristics that have direct impacts on IT usage, i.e., the usage context of the technology and the characteristics of the users, are of great importance to IS researchers (Hevner et al. 2004). For example, Boiney (1998, p. 343) suggested that "the same technology will not provide the same results with each group and in each setting." Similarly, Gopal and Prasad (2000, p. 512) noted that "technology cannot be studied outside its social context and that inconsistent results may be directly related to our lack of attention to this fact."

Next, we examine prior research on individual technology adoption, IS continuance, and IS success to identify various approaches to contextualization. Based on our literature review, we develop a framework to summarize previous contextualization efforts. Overall, there are two general approaches to incorporating context into theory development—i.e., what we term as single-context theory contextualization and cross-context theory replication (see Figure 1). We present examples of both approaches to contextualization in Appendix A in the online supplement (available as supplemental material at http://dx.doi.org/10.1287/isre.2013.0501).

3.1. Single-Context Theory Contextualization

Single-context theory contextualization typically starts with the identification of some well-established general theories that are relevant to a particular domain of interest. For example, a general behavioral theory, i.e., the theory of reasoned action (TRA; Ajzen and Fishbein 1980), was used as the basis to formulate TAM to study user acceptance of IS

Figure 1 Approaches to Incorporating Context Into Theorizing



(Davis 1989). Similarly, the expectation confirmation theory was used as the basis to formulate the expectation confirmation model of IS continuance (Bhattacherjee 2001).

Because of the wide-ranging instantiations of information technology, a theory is not always generalizable to different IS contexts (Lee and Baskerville 2003). Thus, general models need to be refined based on the contexts being studied. We describe the first level of contextualization to be one where general models may be refined by adding or removing core constructs based on the context (level 1 in Figure 1). For example, although the original TAM suggests that attitude fully mediates the effects of perceived usefulness (PU) and perceived ease of use (PEOU) on intention, subsequent research (e.g., Venkatesh 1999, 2000; Venkatesh and Davis 1996, 2000) has excluded attitude from the model because of the dominant effects of PU and PEOU over attitude. Prior research has also incorporated additional factors into general models to capture users' specific perceptions about different systems. For example, perceived ease of use, perceived enjoyment, and trust are incorporated into the IS continuance model to explain continued usage of mobile Internet services and online transactional systems (Hong et al. 2006, Thong et al. 2006, Venkatesh et al. 2011). Although these factors are context specific, they are not directly connected to system characteristics but serve to capture high-level user perceptions about a system. Thus, factors such as perceived enjoyment and trust can be considered core constructs for certain types of systems.

The second level of contextualization is one where general models may be contextualized at a finer level by incorporating context-specific factors that are directly relevant to the characteristics of technologies, users, and usage contexts. Researchers have three options to further their contextualization efforts.[2] The first option, which is more common in the extant research, is to add contextual variables as antecedents of the core constructs or dependent variables (level 2a in Figure 1). This approach allows the effects of contextual variables to be explained by the underlying theoretical frameworks of general models (Bagozzi 2007, Burton-Jones and Hubona 2006) and directly accounts for the context distinguishing effects related to the phenomenon being studied (Whetten 2009). For instance, Pavlou and Fygenson (2006) identified a number of context-specific factors—e.g., characteristics of Web vendor, technology, product, and consumer—as antecedents of the constructs of attitude and perceived behavioral control in the theory of planned behavior (TPB; Ajzen 1991) in the context of e-commerce. Similarly, Venkatesh et al. (2012) incorporated three context-specific factors—i.e., hedonic motivation, price value, and habit—into UTAUT as predictors of behavioral intention and use behavior in the consumer context. Further, to assure the effects of context-specific factors are mediated through the underlying theoretical framework (e.g., TAM), some studies have explicitly examined the mediating effects of the core constructs on the relationships between the context-specific factors and dependent variables (e.g., Agarwal and Prasad 1999, Burton-Jones and Hubona 2006).

The second option of second-level contextualization is to incorporate contextual variables as moderators of the relationships in general models (level 2b in Figure 1). This approach is in line with the general direction of explicating the interplay among the explanation variables and contextual variables (Bamberger 2008, Whetten 2009). It helps explain inconsistent effects of the factors across studies and improve the explanatory power of general models when they are applied to specific contexts (Sun and Zhang 2006). Prior research has reported significant moderating effects of context-specific factors on the relationships among core constructs of individual technology adoption, IS continuance, and IS success (e.g., Fang et al. 2005, Jang 2010, Lin 2011).

The third option of second-level contextualization is to decompose the core constructs into contextualized variables. This approach is consistent with the general direction of formulating context-sensitive versions of the explanation variables (Whetten 2009). It facilitates theoretical generalizations across different studies by ensuring that the core constructs refer to the same phenomenon across contexts (Lee and Baskerville 2003). It also helps overcome the drawback of monolithic structures of general beliefs and make the relationships between the constituent dimensions of core constructs and dependent variables clearer. For example, Taylor and Todd (1995) decomposed the core beliefs in the TPB into multidimensional belief constructs in the context of IT usage: with attitudinal belief structure decomposed into PU, PEOU, and compatibility; normative belief structure decomposed into peer influence and superior influence; and control belief structure decomposed into self-efficacy, resource facilitating conditions, and technology facilitating conditions.[3]

3.2. Cross-Context Theory Replication

The second general approach to contextualization, i.e., cross-context theory replication, requires researchers

[2] Although these options are supported by different theoretical considerations, they are not mutually exclusive and may be adopted together to direct contextualization efforts (as discussed later in §4).

[3] Another example is He and Wei (2009) who decomposed the contribution belief and seeking belief into multiple factors in the context of knowledge management systems continuance.

Table 1 Guidelines for Context-Specific Theorizing in IS Research

Guidelines	Description
1: Grounded in a general theory	Context-specific research could be built on a general theory that is applicable to the research domain of interest. For example, TRA and TPB have been widely used as general behavioral theories to understand individual technology adoption.
2. Contextualizing and refining a general theory	The general theory needs to be contextualized to the specific research domain. Refinement of the model may be necessary in order to include a minimal set of core constructs relevant to a particular context. For example, TAM can be selected as a contextualized model to explain individual technology adoption intention, and perceived enjoyment may be identified as an additional core construct that is specific for hedonic information systems.
3: Thorough evaluation of the context to identify context-specific factors	Context-specific factors could be identified based on a thorough evaluation of the context and the factors should be tied to the core constructs identified in the refined general model. In addition, salient user and usage context factors could be identified if they play a major role in characterizing the context. The context-specific factors could be identified based on past research on relevant technologies and/or an in-depth analysis of the technology under investigation using qualitative methods, such as interviews, focus groups, and content analysis. For example, relevance may be identified as a context-specific usefulness factor in a particular technology adoption context, and screen layout may be identified as a context-specific ease-of-use factor in another context. Also, computer self-efficacy may be identified as a relevant individual factor in a particular technology adoption context.
4: Modeling context-specific factors	We suggest decomposing the core constructs into context-specific factors. These context-specific factors can then be included in the refined general model. Following the previous example, both relevance and screen layout could be modeled as direct predictors of usage intention. Similarly, computer self-efficacy may also be modeled as a direct predictor of usage intention when appropriate.
5: Examination of the interplay between the IT artifact and other factors	Interactions among context-specific factors pertaining to the specific technology, user, and usage context should be examined. For example, the interactions between computer self-efficacy and previously identified context-specific usefulness and ease-of-use factors may be incorporated into the model.
6: Examination of alternative context-specific models	When the objective is to examine the indirect influence of context-specific factors, alternative context-specific models could be formulated based on the selected general theory. Models of mediation, mediated moderation or moderated mediation that involve the context-specific factors and the relevant core constructs could be examined.

to replicate a theoretical model in different contexts and then consolidate the findings into a context-contingent theory by conducting theory-grounded meta-analyses (Bamberger 2008, Johns 2006). This approach helps to validate the assumption of generalizability that a theory confirmed in one context can be used to describe what can be expected in new contexts (Lee and Baskerville 2003). For example, in a meta-analysis of technology adoption research based on TAM, Schepers and Wetzels (2007) found significant moderating effects of an individual-related factor (i.e., type of users), a technology-related factor (i.e., type of technology), and a contingency factor (i.e., culture) on the relationships in TAM (see also King and He 2006).[4] Such meta-analytical studies validate the relationships in general models and identify contextual factors that moderate the relationships across studies. The findings demonstrate the significant interplay between people, technology, and usage context. However, the lack of such studies also reflects the difficulty in developing and testing context-contingent theory through conducting meta-analyses (Bamberger 2008, Johns 2006).

[4] Another example is a meta-analysis of IS success research by Sabherwal et al. (2006), who found significant effects of contextual factors (i.e., top-management support and facilitating conditions) and user-related factors (i.e., user experience, user training, user attitude, and user participation) on the IS success constructs.

4. Guidelines for Context-Specific Information Systems Research

The above review of the literature shows that there are different ways to incorporate context into theory development. We focus on single-context theory contextualization and provide guidelines for developing context-specific models for a particular context. Table 1 summarizes the six guidelines. In the remainder of this section, we will elaborate on each of the guidelines and relate our discussion to the domain of individual technology adoption as an illustration.

4.1. Guideline 1: Grounded in a General Theory

A general theory relevant to the domain of interest should be selected to guide the contextualization efforts. As Benbasat and Zmud (1999, p. 9) noted, "in order for IS researchers to be more proactive in a direct sense, it is imperative that the IS research community produce cumulative, theory-based, context-rich bodies of research." Thus, we advocate that context-specific theorizing should be theory grounded, so that the findings can converge into new integrative theoretical frameworks at a faster pace (Bamberger 2008). Zahra (2007, p. 445) suggested that contextualizing research means "the effective linking of theory and research objectives and sites, where researchers build on the innate

qualities of the phenomena they examine." He noted that one convenient way to link theory with the research phenomenon is to consider the stage of their development—i.e., the status of theory (established versus emerging) and that of the phenomenon (established versus new). Following this notion, we suggest that researchers may adopt either an established theory or an emerging theory to guide the development of a context-specific model to examine an IS phenomenon (which can be either established or new). Researchers adopting an established theory have the benefits of building on a well-established body of literature and utilizing well-accepted methods (Tsui 2006). Researchers applying an emerging theory from other disciplines can enrich the understanding of the phenomena of interest by offering a new theoretical perspective, yet they need to ground it in the research context and be cautioned about its boundaries and underlying assumptions (Zahra 2007).

Although technology adoption is an established phenomenon in IS research, researchers may adopt either established or emerging theories to guide the development of context-specific models. On the one hand, the general behavioral theories, such as the theory of planned behavior (Ajzen 1991), are well established and have been applied to a wide variety of contexts for predicting different human behaviors (e.g., Armitage and Conner 2001). Given that these general behavioral theories have a high degree of predictive validity, they can serve as an effective diagnostic tool to identify areas of concern for a specific context, such as individual technology adoption (Benbasat and Zmud 1999). On the other hand, researchers have also borrowed theories from other disciplines, such as social networks (e.g., Sykes et al. 2009), to examine individual technology adoption and use. Although both established and emerging theories may be adopted to guide the development of context-specific models, researchers adopting an established theory, such as TPB, will encounter fewer challenges, particularly in terms of explaining the relevance of the theory to the contexts (Zahra 2007).[5]

4.2. Guideline 2: Contextualizing and Refining a General Theory

A general theory first needs to be contextualized to the specific research domain. As Zahra (2007) noted, two particular ways to contextualize an established theory is to explore its contingencies and relax its assumptions. Depending on the maturity of the research domain, such domain-contextualized theories may already exist. Instead of repeating previous research efforts, researchers can adopt an existing domain-specific contextualized theory and further contextualize it to a specific context. Refinement of a chosen theory may be necessary in order to include a minimal set of core constructs relevant to a particular context.

As prior research has already contextualized general behavioral theories to study individual technology adoption and synthesized research in this domain (e.g., Venkatesh et al. 2003), researchers can adopt an existing general adoption model, such as TAM or UTAUT, and further contextualize it to a specific technology adoption context. Consistent with Zahra's (2007) notion of contextualization, prior research on technology adoption has explored the contingencies (e.g., Morris and Venkatesh 2000, Venkatesh and Morris 2000) and challenged the assumptions of general adoption models (e.g., Burton-Jones and Hubona 2006). Thus, the cumulative knowledge of individual technology adoption research helps to illuminate the boundaries and assumptions of these models, providing a clearer direction for contextualization.

Further, the choice of a general adoption model should adequately capture the key core constructs relevant to the context. For example, in contexts where social influence is of great importance in understanding user acceptance, general models that capture this aspect, such as UTAUT, will be appropriate. A chosen model may be refined by including additional core constructs relevant to a particular context. For example, perceived enjoyment could be considered a core construct for hedonic systems and trust could be considered a core construct for systems where user privacy and security are at risk. These constructs, which are more context specific yet still broadly applicable across different types of systems, could be incorporated into a chosen general model for further contextualization.

4.3. Guideline 3: Thorough Evaluation of the Context to Identify Context-Specific Factors

Context-specific theorizing in IS requires a thorough evaluation of the technology usage context and identification of salient technology, user, and usage context factors. One way to contextualize a theory is to formulate context-sensitive versions of the explanation variables, making their meaning functionally equivalent across multiple contexts (Whetten 2009). The rationale is that although the meaning of a construct may be the same across contexts, its implementation or manifestation may vary in different contexts (Tsui 2007). We suggest that researchers can identify context-specific factors by decomposing the core constructs in a general model (or a refined general model) into context-specific factors, following the decomposition approach utilized in some prior research

[5] We do not dispute the merits of emerging theories, as they may contribute new insights to the existing research phenomenon, and may even displace the dominant theories in a research domain one day, along the line of Kuhnian paradigm shifts.

(e.g., Karahanna et al. 2006, Taylor and Todd 1995). If a general model does not fully capture the characteristics of technology, user, and usage context, additional salient factors may be identified and incorporated into the model if they play a major role in characterizing the context. The identification of context-specific factors could be based on past research into relevant technologies and/or an in-depth analysis of the technology under investigation using qualitative methods, such as interviews, focus groups, and content analysis. More importantly, the identified factors must be relevant to the core constructs contained in the general model, so that the influences of these factors can be explained and predicted based on the general theory.

Applying this guideline to the contextualization of TAM, researchers may decompose PU and PEOU into performance-specific and effort-specific variables (e.g., Venkatesh 2000, Venkatesh and Davis 2000). For example, PU of an e-commerce website can be decomposed into download delay, which is the amount of time it takes for a website to display a requested page from a Web server, and product diagnosticity, which is the extent to which a consumer believes that a website is helpful in terms of fully evaluating a product (Pavlou and Fygenson 2006). PEOU of an e-commerce website can be decomposed into navigability, which refers to the sequencing and organization of information that makes information easily accessible to users (Pavlou and Fygenson 2006), and learning capability, which refers to the presence of interactive learning tools that help customers to learn how to browse and find relevant information on the site (Liu and Arnett 2000).[6]

Further, because the constructs in extant technology adoption models are primarily technology-centric perceptions (Venkatesh 2006), a general model may not fully capture the characteristics of individuals and usage context. Thus, researchers can identify salient individual and contextual factors based on the context being studied. For example, computer self-efficacy and personal innovativeness are salient individual factors for individual technology adoption as they are directly relevant to one's response to and use of new technologies (Agarwal and Prasad 1998, Brown et al. 2010, Compeau and Higgins 1995). Similarly, voluntariness is a salient contextual factor that has been found to moderate the relationships in general adoption models (e.g., Venkatesh et al. 2003).

[6] Similarly, perceived enjoyment of a computer game can be decomposed into enjoyment in terms of concentration, challenge, and control (Sweetser and Wyeth 2005); and trust in an e-voting system can be decomposed into trust in security, trust in privacy, and trust in accountability of the system (Oostveen and Van den Besselaar 2009).

4.4. Guideline 4: Modeling Context-Specific Factors

Following Edwards (2001), we suggest modeling the core constructs in a general model as multidimensional constructs with the corresponding context-specific variables as separable dimensions (consistent with level 2c contextualization in Figure 1). The dimensions could be treated as separate yet related constructs that have direct effects on the outcome, allowing the differential effects of each dimension of the overall construct to be apparent (Howell et al. 2007; see Karahanna et al. 2006 for an example). Because these context-specific variables represent constituent dimensions of the core constructs, their effects can be explained based on the theoretical rationale of the general model. Ultimately, this approach helps to simplify the relationships between the context-specific variables and the relevant dependent variables without sacrificing theoretical rationalization and reveal the actual effects of the context-specific variables (Burton-Jones and Hubona 2006).

For example, researchers can use performance-specific and effort-specific variables as constituent dimensions of PU and PEOU in TAM, and draw inferences of how performance-specific and effort-specific variables will influence intention based on TAM. In general, one would expect that high scores on performance-specific and effort-specific variables would contribute to enhancing intention.

4.5. Guideline 5: Examination of the Interplay Between Technology Artifact and Other Factors

It is crucial to examine the interdependence among the salient characteristics of the technology artifact, users,[7] and usage context (Hevner et al. 2004). The interplay between technology, users, and usage context can be understood by examining their interaction effects (Bagozzi 2007, Chin et al. 2003). When context-specific factors are incorporated into a general model, researchers often focus on the direct effects of the context-specific factors on the core constructs. Much less attention has been devoted to examining the possible interactions between context-specific factors and other existing contextual features. This results in an isolated examination of different contextual features. Thus, we suggest that researchers should examine the possible interactions among context-specific factors pertaining to technologies, users, and usage contexts (consistent with level 2b contextualization). Such an examination should be grounded in theory and provide theoretical insights into the mechanisms behind the proposed interaction effects (Bagozzi 2007). For

[7] Users could be defined at individual level, team level, or organization level depending on the context.

example, researchers can incorporate the interaction effects between performance-specific variables and a domain-specific individual factor, such as computer self-efficacy, into a context-specific model.

4.6. Guideline 6: Examination of Alternative Context-Specific Models

The decomposition approach described in the above guidelines (i.e., a combination of levels 2b and 2c contextualization) yields theory-grounded models that reveal the direct influence of context-specific factors on a phenomenon of interest. As Whetten (2009) noted, however, context-specific factors may have indirect influence on a phenomenon. When the objective is to examine the indirect influence of context-specific factors, researchers may retain the core constructs in general models and examine the interplay between the core constructs and the context-specific factors. Specifically, we suggest that the indirect effects of context-specific factors may exist in one of the following forms—i.e., mediation (i.e., level 2a contextualization), moderated mediation, and mediated moderation (i.e., a combination of levels 2a and 2b contextualization).

First, the effects of context-specific factors may be mediated through the core constructs in general models. Although the decomposition approach allows the effects of context-specific factors to be explained based on the theoretical rationale of the general model, the context-as-antecedent approach will yield insights into the mechanisms (i.e., full, partial, or no mediation) behind the relationships between the context-specific factors and the ultimate dependent variables. For example, researchers can model performance-specific variables as the antecedents of PU and examine the mediating role of PU between the antecedents and intention.

Second, extending the notion of mediation, we suggest that the mediating effect of a core construct on the relationship between a context-specific factor and a dependent variable may be moderated by a context-specific moderator (i.e., another context-specific factor), which is known as moderated mediation (Muller et al. 2005). For example, if the context-specific moderator is an individual difference variable, then it would mean that the mediating process that intervenes between the context-specific factor and the dependent variable (e.g., PU mediating the effects of a performance-specific variable on intention) is different for people who differ on that individual difference. If the context-specific moderator pertains to usage context, it would mean that the mediating process varies as a function of context.

Third, assuming that the effect of a context-specific factor on a dependent variable is moderated by a context-specific moderator (i.e., there is an interaction between two context-specific factors), this moderating effect may be mediated by another factor (either a third context-specific factor or a core construct in a general model), which is known as mediated moderation (Muller et al. 2005). Examining this mediated moderation effect helps discover the possible mediating process that accounts for the overall moderation. For example, given that an individual factor moderates the relationship between a performance-specific variable and intention, researchers can examine whether this overall moderation effect is mediated by PU, i.e., either the effect of the performance-specific variable on PU varies as a function of the individual factor, or the effect of PU on intention varies as a function of the individual factor, or both.

Taken together, the consideration of these different alternative models can help to understand the potential indirect effects of context-specific factors on a phenomenon.

5. Illustrating the Guidelines for Context-Specific Theorizing

Using individual technology adoption research as an illustration, we apply the proposed guidelines by developing context-specific models for two different contexts—i.e., a digital library and an agile Web portal. First, because of the maturity of the individual technology adoption domain, we decided to use an established general adoption model to examine individual technology adoption in the two contexts (guidelines 1 and 2).[8] We chose TAM as it is a dominant technology adoption theory that has been replicated and adapted to many different contexts (see Venkatesh et al. 2007 for a review), facilitating the comparison between general models and context-specific models. Next, we identify two sets of context-specific factors—i.e., performance-specific and effort-specific variables—pertaining to each of the two technologies. In addition, we identify two salient individual factors—i.e., computer self-efficacy and personal innovativeness—based on their relevance to the two contexts (guideline 3). On the one hand, the digital library serves to facilitate self-learning by distance education students who use the system with minimal support from others. Thus, computer self-efficacy, which captures users' general computer literacy, will be salient in this context. On the other hand, the agile Web portal keeps evolving and

[8] If an emerging theory were selected when following guideline 1, one will need to refine the theory by following guideline 2. In our illustrations, we chose TAM as it is already refined to fit the individual technology adoption context. No further refinement was necessary as both systems in our illustrations are utilitarian-based systems that are used on a voluntary basis, where both PU and PEOU are the most salient beliefs related to the technologies.

requires users to adapt to the frequent changes and updates of the system. Thus, personal innovativeness, which captures users' reaction to new technologies and changes, will be salient in this context. Based on the theoretical rationale of TAM, we then model the performance-specific and effort-specific variables as direct determinants of intention to use the technology. The individual factors are also modeled as direct determinants of intention (guideline 4). Then, we examine the interactions between the performance-specific and effort-specific variables with the individual factors (guideline 5). Finally, we compare the decomposed TAM that incorporates interaction effects between context-specific factors with two alternative context-specific models—i.e., the extended TAM with context-specific antecedents identified above and the integrated TAM that incorporates mediated moderation and moderated mediation effects of context-specific factors (guideline 6).

5.1. Study 1—Digital Library Context

5.1.1. Usage Context. We first examined a context where the technology is relatively stable. The target technology was a new digital library in a university that offers mainly distance education programs. The university administrators wanted to learn whether the students were actually using the system, which was implemented about three months before the survey was conducted.

5.1.2. Models (TAM, Decomposed TAM, TAM-with-Antecedents, Integrated TAM). Following the first two guidelines, we chose TAM to guide the development of a context-specific model (see Figure 2a). TAM predicts that an individual's intention to use the digital library depends on his or her perceptions of PU and PEOU of the technology. In addition, PEOU will have a positive effect on PU. Using TAM is appropriate for the current adoption context for several reasons. First, the digital library was new to the users at the time of the survey and TAM is an established model that has been widely applied to individual technology adoption settings. Second, the digital library serves mainly a utilitarian purpose. Also, as the use of the digital library is voluntary, the effect of social influence is expected to be minimal (Venkatesh and Davis 2000). Thus, TAM is adequate in capturing user expectations pertaining to the performance and effort aspects of technology use.

Following the third guideline, we identified performance-specific and effort-specific variables, and other salient individual and/or contextual variables. Based on prior research in digital libraries (e.g., Lindgaard 1994, Shackel 1991), we identified two performance-specific variables (i.e., relevance and timeliness) and two effort-specific variables (i.e., screen layout and terminology) that are salient in the research context. The performance-specific variables and effort-specific variables are system characteristics that correspond to the notion of usability (Shackel 1991).

The performance-specific variables (i.e., relevance and timeliness) define how *effectively* a system can be used by users. Relevance refers to the degree to which the system matches tasks as carried out in the current environment and as specified in the task analysis (Lindgaard 1994), and can be interpreted as the degree to which the digital library matches users' information needs (Rees and Schultz 1967). Timeliness refers to the degree to which the system offers timely responses to requests for information or action (Wixom and Todd 2005), and can be interpreted as the efficiency with which the digital library provides information to users. Thus, relevance and timeliness are two key context-specific factors that characterize the performance aspect of the digital library.

The effort-specific variables (i.e., screen layout and terminology) define how *easily* a system can be used by users (Shackel 1991). Screen layout refers to the way information is presented on the screen (Lindgaard 1994). As the digital library serves to provide access to information, a well-designed screen layout can create a comfortable viewing environment such that users can easily identify functional groups and navigation aids and effortlessly search/browse for information. Terminology refers to the words, sentences, and abbreviations used by a system (Lindgaard 1994). A clear and consistent terminology will help to reduce users' effort at comprehension, as compared to the use of multiple terminology and unfamiliar jargons (Chen et al. 1997). Thus, screen layout and terminology are two key

Figure 2a TAM (Digital Library)–Level 1 Contextualization

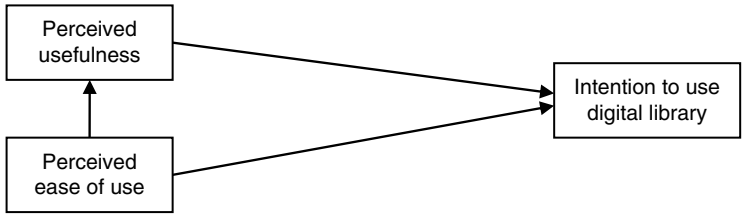
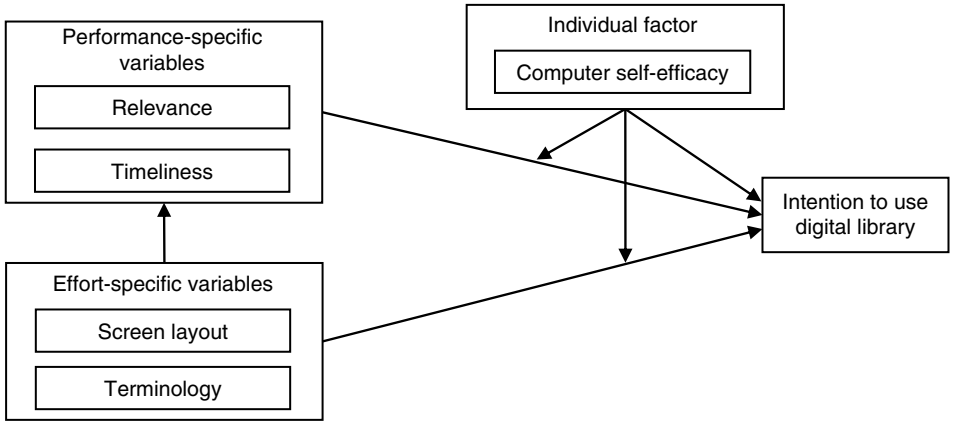


Figure 2b Decomposed TAM with Interactions (Digital Library)–Combination of Levels 2b and 2c Contextualization



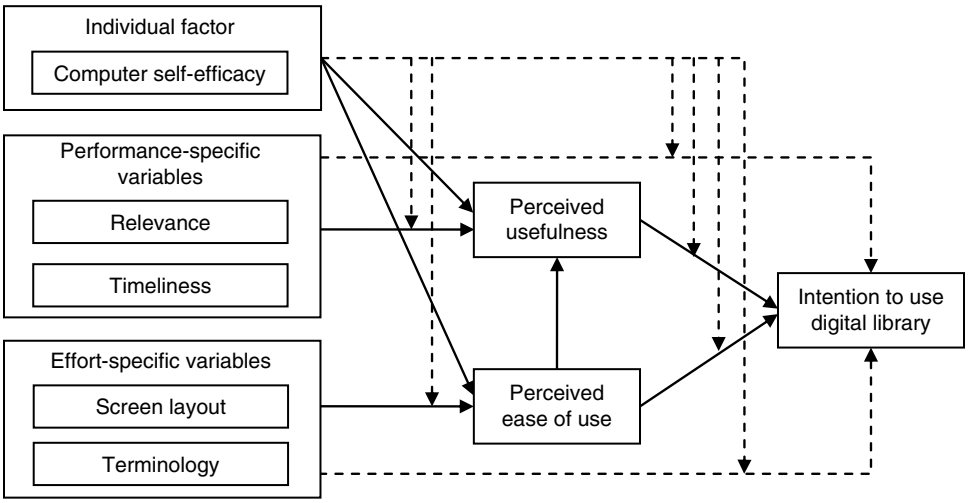
context-specific factors that characterize the effort aspect of the digital library.

We included computer self-efficacy (CSE), defined as the judgment of one's ability to use a computer (Compeau and Higgins 1995), as a key individual factor. In the context of the digital library, individual computer literacy is a key factor that increases usage (Davies 1997). CSE has received consistent support in prior literature as an important individual factor in technology adoption research (Marakas et al. 2007). It influences individuals' cognitive interpretations of technology and consequently, affects technology adoption outcomes (Lewis et al. 2003).

Following the fourth guideline, we proposed direct effects from the two performance-specific variables, the two effort-specific variables, and CSE to intention. Further, the moderating role of CSE has been acknowledged in prior research (Schepers and Wetzels 2007). Hence, following the fifth guideline, we proposed that CSE will moderate the effects of performance-specific and effort-specific variables on intention (see Figure 2b).

Finally, following the sixth guideline, we formulated two alternative models to examine the indirect influence of the context-specific factors on intention and to facilitate comparison between various approaches to contextualization. The TAM-with-antecedents (see Figure 2c) has the same set of variables that were used to develop the decomposed TAM. Following prior literature that models contextual factors as antecedents of the two main constructs of TAM, we expected relevance and timeliness to affect PU, and screen layout and terminology to affect PEOU. Also, prior research suggests that self-efficacy positively affects one's expectations about performance outcomes (Compeau and Higgins 1995) and

Figure 2c TAM-with-Antecedents (Digital Library)–Level 2a Contextualization, and Integrated TAM with Mediated Moderation and Moderated Mediation–Combination of Levels 2a and 2b Contextualization



Notes. 1. Relationships of TAM-wth-antecedents are shown as solid lines. 2. Additional relationships of integrated TAM with mediated moderation and moderated mediation are shown as dashed lines.

the ease of use of a specific technology (Agarwal et al. 2000). Thus, CSE was expected to affect both PU and PEOU.

We formulated the integrated TAM with mediated moderation and moderated mediation[9] based on the TAM-with-antecedents. Instead of being an antecedent, CSE was modeled as a moderator of the relationships between (1) performance-specific variables and PU, (2) performance-specific variables and intention, (3) effort-specific variables and PEOU, (4) effort-specific variables and intention, and (5) PU/PEOU and intention (see Figure 2c). The mediated moderation perspective suggests that the moderating effects of CSE on the relationships between performance-specific/effort-specific variables and intention are mediated by PU and PEOU, respectively. The moderated mediation perspective suggests that the mediating effects of PU and PEOU on the respective relationships between performance-specific/effort-specific variables and intention vary as a function of CSE.

5.1.3. Sample, Data Collection, and Measures. A telephone interview method was employed to gather students' perceptions of the new digital library. The university provided a random sample of 1,000 students. We obtained 497 usable responses. About 73% of the respondents were between 26 and 40 years of age, and 64% were male.

All measures were adapted from prior research in IS and the library science literature to suit the digital library context (see Appendix B1 in the online supplement).[10] PU and PEOU were measured by four items each, from Davis (1989). The items measuring intention to use the digital library were drawn from Agarwal and Prasad (1999) and Venkatesh and Davis (1996). The items measuring the performance-specific and effort-specific variables (i.e., relevance, timeliness, screen layout, and terminology) were drawn from Hill et al. (1997). CSE was measured by eight items adapted from Compeau and Higgins (1995), with seven-point Likert scales ranging from "not at all confident" to "totally confident." All other variables were evaluated by items with seven-point Likert scales ranging from "strongly disagree" to "strongly agree."

5.1.4. Data Analysis and Results. Table 2 reports the descriptive statistics for the constructs. Convergent validities of the constructs were evaluated using composite reliabilities (Fornell and Larcker 1981), which were all above the recommended value of 0.7. To assess discriminant validity, we compared the shared variances between constructs with the average variance extracted (AVE) of the individual constructs (Fornell and Larcker 1981). As Table 2 shows, the square roots of the AVEs were consistently greater than the off-diagonal correlations, suggesting adequate discriminant validity among the constructs. The results of factor analysis provided further support for discriminant validity (see Appendix C1 in the online supplement).

The research models were tested using partial least squares (PLS), a structural modeling technique that is suitable for complex predictive models (e.g., Venkatesh 2000, Venkatesh et al. 2003). Table 3 summarizes the results for TAM, TAM-with-antecedents, and the decomposed TAM. In the case of TAM, all three paths were significant. PU and PEOU together explained 35% of the variance in intention, consistent with prior work. For the TAM-with-antecedents, most paths were significant, except for the paths from timeliness to PU and from CSE to PU. It appears that the speed with which the digital library provides information to students did not affect their beliefs of the usefulness of the digital library. Similarly, students' judgments of their own computer capability did not seem to affect their beliefs of the usefulness of the digital library. The results of mediation analysis (Baron and Kenny 1986; see Tables 3 and 4) showed that the effect of relevance on intention was fully mediated through PU. The effects of screen layout and terminology on intention were partially mediated through PEOU. The effect of CSE on intention was fully mediated through PEOU.

The decomposed TAM received significant support (see Table 3), with the performance-specific and effort-specific variables positively affecting intention. In addition, CSE not only had a significant direct effect on intention, but also significant interaction effects with both the performance-specific and effort-specific variables. Following Aiken and West (1991), we plotted the four significant interaction effects (see Figures 3(a)–3(d)) and performed simple slope tests for each interaction effect. First, a greater relevance of the digital library resources to students' needs increased intention and the effect was stronger for students with higher CSE (high CSE: $\beta = 0.22$, $p < 0.001$; low CSE: $\beta = 0.06$, $p > 0.05$). Students possessing greater computer capabilities were more able to exploit the benefits of highly relevant library

[9] Mediated moderation and moderated mediation are incorporated into the same model as they share the same analytical strategy but have a different starting point—mediated moderation requires that the direct effect of an independent variable on the dependent variable is moderated, whereas moderated mediation requires that the direct effect of an independent variable on the dependable variable is significant and not moderated (Muller et al. 2005).

[10] We did not find evidence of common method bias, as a chi-square difference test between the one-factor model and our measurement model was significant at $p < 0.001$ (Podsakoff et al. 2003). Also, the significant interaction effects in our analyses provide further evidence that common method bias was less of a concern (Siemsen et al. 2010).

Table 2 Descriptive Statistics and Correlations (Digital Library Context)

Construct	M	SD	CR	1	2	3	4	5	6	7	8
1. Relevance	4.25	1.12	0.91	**0.91**							
2. Timeliness	4.11	1.06	0.78	0.42	**0.81**						
3. Screen layout	4.75	1.02	0.94	0.46	0.31	**0.94**					
4. Terminology	4.86	1.00	0.90	0.29	0.21	0.49	**0.90**				
5. Perceived usefulness	4.51	1.08	0.96	0.61	0.32	0.45	0.41	**0.92**			
6. Perceived ease of use	4.83	0.94	0.93	0.46	0.32	0.57	0.59	0.57	**0.88**		
7. Computer self-efficacy	5.54	0.88	0.91	0.16	0.09	0.17	0.29	0.25	0.39	**0.75**	
8. Intention	5.08	0.87	0.91	0.44	0.30	0.52	0.46	0.52	0.52	0.23	**0.91**

Note. M: Mean; SD: Standard deviation; CR: Composite reliability; Diagonals are square root of AVEs; Correlations greater than 0.16 are significant at $p < 0.001$; $n = 497$.

resources. Similar results were obtained for timeliness of responding to students' information requests. The effect of timeliness was stronger for students with higher CSE than for those with lower CSE (high CSE: $\beta = 0.16$, $p < 0.001$; low CSE: $\beta = -0.03$, $p > 0.05$), probably because a faster response time enabled students with higher CSE to explore and obtain more information from the digital library. Finally, the two effort-specific variables showed similar interaction effects. A well-designed system layout and an easy-to-understand terminology were more important to students with lower CSE than to students with higher CSE (screen layout—high CSE: $\beta = 0.18$, $p < 0.001$; low CSE: $\beta = 0.29$, $p < 0.001$; terminology—high CSE: $\beta = 0.08$, $p > 0.05$; low CSE: $\beta = 0.26$, $p < 0.001$). These digital library-specific characteristics helped students with lower CSE to overcome their weaker computer skills in order to obtain the benefits of the digital library. Altogether, the decomposed TAM explained 43% of the variance in intention, which was a significant increase from the variance explained by TAM and the TAM-with-antecedents.

The integrated TAM with mediated moderation and moderated mediation was tested following the procedures suggested by Muller et al. (2005). Given that CSE had significant interaction effects with all four performance-specific and effort-specific variables, we considered the mediated moderation effects in the model. To demonstrate mediated moderation, either or both of the following conditions should exist: the effects of the performance-specific/effort-specific variables on PU/PEOU are moderated by CSE or the effects of PU/PEOU on intention are moderated by CSE. Table 5 shows that none of these interaction

Table 3 Predicting Intention to Use Digital Library

	Dependent variables							
	TAM		TAM-with-antecedents			Decomposed TAM		
Independent variables	PU	BI	PEOU	PU	BI	RELE	TIME	BI
R^2 (%)	32	35	50	48	35	22	10	43
TAM constructs								
Perceived ease of use (PEOU)	0.58***	0.32***		0.35***	0.32***			
Perceived usefulness (PU)		0.34***			0.34***			
Performance-specific variables								
Relevance (RELE)				0.43***				0.18***
Timeliness (TIME)				0.03				0.08*
Effort-specific variables								
Screen layout (SCRE)			0.35***			0.42***	0.28***	0.27***
Terminology (TERM)			0.36***			0.09*	0.07	0.20**
Individual factor								
Computer self-efficacy (CSE)			0.23***	0.04				0.08*
Interactions with performance-specific variables								
RELE * CSE								0.14***
TIME * CSE								0.12***
Interactions with effort-specific variables								
SCRE * CSE								−0.10**
TERM * CSE								−0.11**

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Table 4 Mediation Analysis for the Digital Library Sample

	Block 1	Block 2	Block 3
R^2 (%)	38	35	42
Performance-specific variables			
Relevance (RELE)	0.20***		0.07
Timeliness (TIME)	0.08*		0.06
Effort-specific variables			
Screen layout (SCRE)	0.29***		0.23***
Terminology (TERM)	0.22***		0.14***
Individual factor			
Computer self-efficacy (CSE)	0.08*		0.03
TAM constructs			
Perceived usefulness (PU)		0.34***	0.23***
Perceived ease of use (PEOU)		0.32***	0.10*

*$p < 0.05$; ***$p < 0.001$.

terms (in steps 2 and 3) was significant, indicating that the moderating effects of CSE were not mediated through PU and PEOU.

All of the context-specific models confirmed the importance of performance and effort expectancies of the technology in predicting intention. However, the decomposed TAM revealed new and interesting relationships that were hidden in the TAM-with-antecedents. For example, in the TAM-with-antecedents, timeliness did not affect PU and thus had no effect on intention. But according to the decomposed TAM, timeliness had a significant direct effect on intention. Also, more complex results were found for CSE in the decomposed TAM. In the TAM-with-antecedents, CSE only affected intention through PEOU. In the decomposed TAM, CSE not only had a direct effect on intention, but also had significant interaction effects with all performance-specific and effort-specific variables. Further, the results of mediated moderation analysis showed that PU and PEOU did not mediate any of the moderating effects of CSE. Also, the inclusion of PU, PEOU, and their interactions with CSE in the model deflated some of the significant effects observed in the decomposed TAM (step 1 versus step 3 in Table 5). In sum, the decomposed TAM revealed complex relationships that were obscured in the TAM-with-antecedents and provided a more granular understanding of the phenomenon given its parsimony compared with the integrated TAM.

5.2. Study 2—Agile Web Portal Context

5.2.1. Usage Context. In study 2, we examined a nontraditional adoption context to further assess the validity of the guidelines in developing context-specific models. The target technology was

Figure 3 Predicting Intention to Use Digital Library

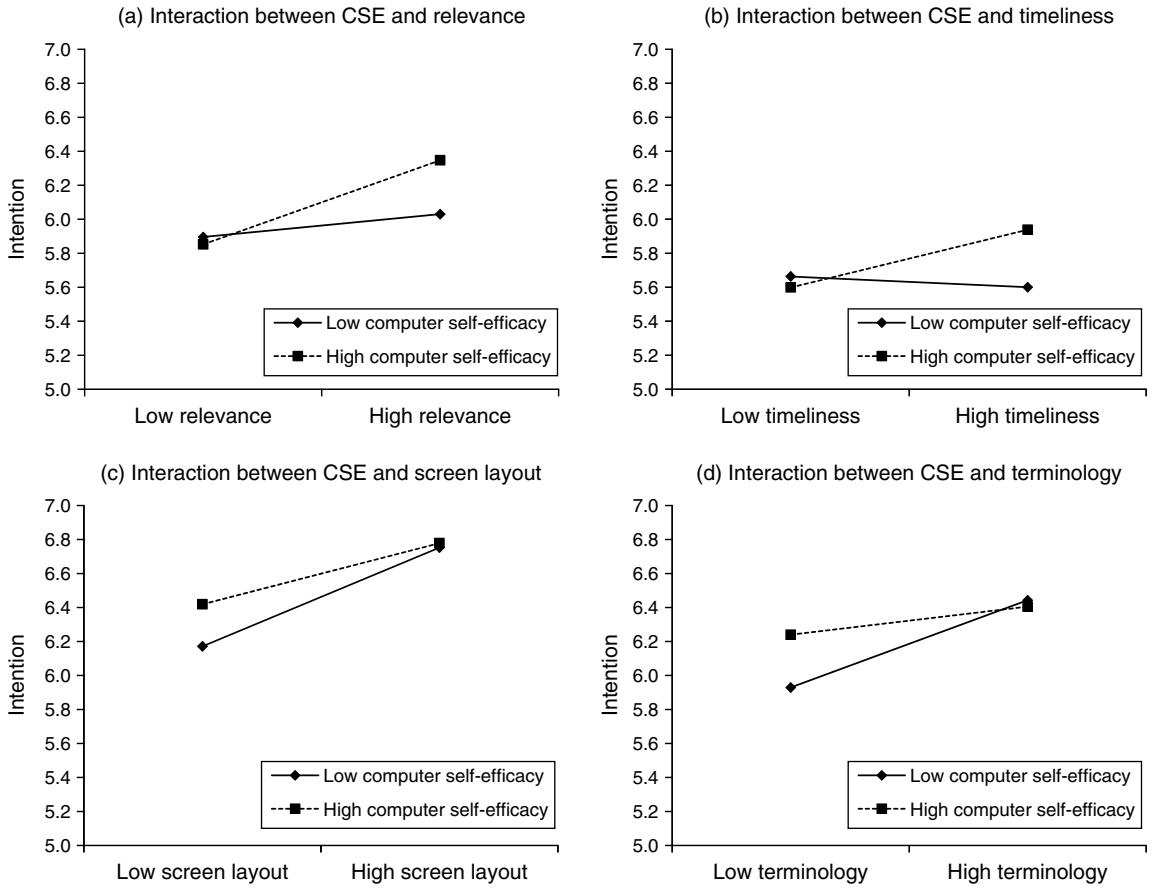


Table 5 Mediated Moderation and Moderated Mediation Analysis for the Digital Library Sample

	Step 1	Step 2		Step 3
	BI	PEOU	PU	BI
R^2 (%)	43	50	48	47
Performance-specific variables				
Relevance (RELE)	0.18***		0.43***	0.05
Timeliness (TIME)	0.08*		0.02	0.07
Effort-specific variables				
Screen layout (SCRE)	0.27***	0.36***		0.21***
Terminology (TERM)	0.20***	0.35***		0.11**
Individual factor				
Computer self-efficacy (CSE)	0.08*	0.22***	0.05	0.03
Interactions between performance-specific variables and CSE				
RELE ∗ CSE	0.14***		−0.02	0.11**
TIME ∗ CSE	0.12***		0.06	0.10**
Interactions between effort-specific variables and CSE				
SCRE ∗ CSE	−0.10**	0.03		−0.10**
TERM ∗ CSE	−0.11**	−0.01		−0.14***
TAM constructs				
Perceived ease of use (PEOU)			0.34***	0.12*
Perceived usefulness (PU)				0.24***
Interactions between TAM constructs and CSE				
PEOU ∗ CSE				0.03
PU ∗ CSE				0.08

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

an internal Web portal of a Fortune 500 company in the service industry. The company's annual revenue was over US$10 billion and it had 20,000 employees. Its Web portal provides company information, seamless connection to other internal websites, internal search functions, and other personalized Web services to employees.

The portal was developed using an agile method, i.e., a system development method that emphasizes early and continuous delivery of software and welcomes changing user requirements (Beck 1999). Traditional waterfall methods typically entail a sequence of steps (analysis, design, implementation, and test) to develop systems that address user requirements identified in the early stages of the project. Recognizing the rapid changes in user requirements in today's business environment and the lack of flexibility provided by traditional methods to address such changes due to the long development cycle, agile methods do not try to identify or address all user requirements at once. Instead, agile methods break the development cycle into many small cycles, each containing the same steps (Beck 1999). In each release, only the smallest set of the most valuable functions requested by users will be implemented. As a result, the system is constantly evolving in both its interface and available functions, making it "agile" in the eyes of the users. In the case of the Web portal, the changes included access to additional applications, look and feel of the interface, incorporation of new tools or capabilities, etc. In line with the dynamic nature of the development process, we considered the Web portal to be an agile system.

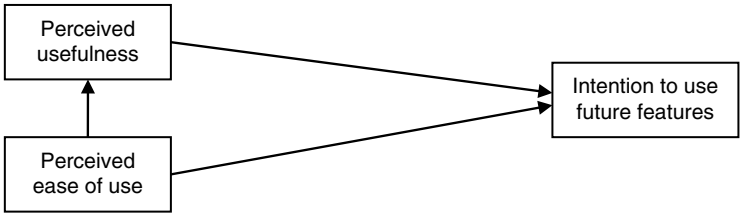
The dynamic development process brings unique characteristics to the system. First, following the agile method, only some basic features were made available when the Web portal was launched, with users using the system before full features were available. In fact, agile methods assume that the so-called "full features" is a moving target that will never be known exactly or addressed. So the goal is to address only the smallest set of the most useful functions during each development cycle. As a result, the ultimate success of the system largely depends on whether users will readily adopt new features when they are added to the system. Second, because of the frequent releases of new features, the system has a constantly evolving interface and set of functions. Senior IT management were interested in understanding users' perceptions of the changing interface and system functions because of the frequent upgrades.

5.2.2. Models (TAM, Decomposed TAM, TAM-with-Antecedents, Integrated TAM). Following the first and second guidelines, we decided to use TAM to guide the development of a context-specific model (see Figure 4a). In TAM, we predicted that employees' PU and PEOU of the past upgrades will affect their intentions to use future features.[11] In addition, PEOU will have a positive effect on PU. Using TAM is appropriate for the current context for three reasons. First, TAM is an established model that has been validated in multiple work contexts (e.g., Venkatesh and Davis 2000, Venkatesh et al. 2003). Second, as the agile Web portal primarily serves utilitarian purposes, TAM is adequate in capturing user expectations pertaining to the performance and effort aspects of technology use. Third, prior research suggests that current perceptions of TAM constructs (i.e., PU, PEOU, and intention) will serve as anchors for future evaluations, which will be updated with new adjustments (Kim and Malhotra 2005). This notion of intertemporal updates of user evaluations provides support for our contention that employees' PU and PEOU of past upgrades will affect their intentions to use future upgrades.

Following the third guideline, the salient performance-specific and effort-specific variables were

[11] According to the heuristics principle (Kahneman and Tversky 1982, Sherman and Corty 1984), individuals will use a subset of information or knowledge that comes to mind most easily when making judgments involving uncertainty. When forming intention to use future upgrades (which is uncertain to users), the information that comes to mind most easily are the perceptions of the past upgrades.

Figure 4a TAM (Agile Web Portal)–Level 1 Contextualization



identified from a survey conducted prior to our main study. The survey asked employees what they liked and disliked about the agile Web portal using open-ended questions. We conducted content analysis to identify a number of salient beliefs that employees had toward the system. From this analysis, we identified relevance, timeliness, and customization as performance-specific variables, and comfort with changes and consistency of interface design as effort-specific variables. These variables also had theoretical support from the IS and human-computer interaction literature. The three performance-specific variables capture different dimensions pertaining to the performance aspect of the agile Web portal. Relevance refers to the degree to which features offered by the upgrades are relevant to employees' work (Lindgaard 1994). Timeliness refers to the improvement in response time enabled by the upgrades (Doll and Torkzadeh 1988, Wixom and Todd 2005). Customization refers to the ability of the system to provide more customized information to each employee through continuous upgrades (Palmer 2002). The two effort-specific variables capture different dimensions pertaining to the effort aspect of the agile Web portal. Comfort with changes refers to the degree to which employees are comfortable with the changes brought about by the frequent upgrades (Daniels 2000, Simmons 2001). Consistency refers to the degree to which the interface design remains consistent during the upgrades (Ozok and Salvendy 2001).

Further, we identified personal innovativeness (PI), which is defined as the willingness of an individual to explore new technology (Agarwal and Prasad 1998), as a salient individual factor in the agile Web portal context. As new features are constantly added to the agile Web portal, PI will be particularly relevant to the adoption of new features. Innovative individuals are more likely to be early adopters of an IT innovation (Thong 1999). As the agile Web portal can be considered to be composed of many small innovations, an innovative person is likely to be an early adopter of these small innovations.

Following the fourth guideline, we proposed direct effects from the performance-specific and effort-specific variables, as well as PI, to intention. As the moderating role of PI is supported by prior research (Agarwal and Prasad 1998), we proposed that PI will moderate the effects of performance-specific and effort-specific variables on intention to use future features by following the fifth guideline (see Figure 4b).

Finally, following the sixth guideline, we formulated alternative models to facilitate comparison between various approaches to contextualization. We formulated the TAM-with-antecedents using the same set of variables that were used to develop the decomposed TAM (see Figure 4c). Following prior research, we expected relevance, timeliness, and customization to affect PU, and comfort with changes and interface consistency to affect PEOU. Also, based on Lewis et al. (2003), we expected PI to affect

Figure 4b Decomposed TAM with Interactions (Agile Web Portal)–Combination of Levels 2b and 2c Contextualization

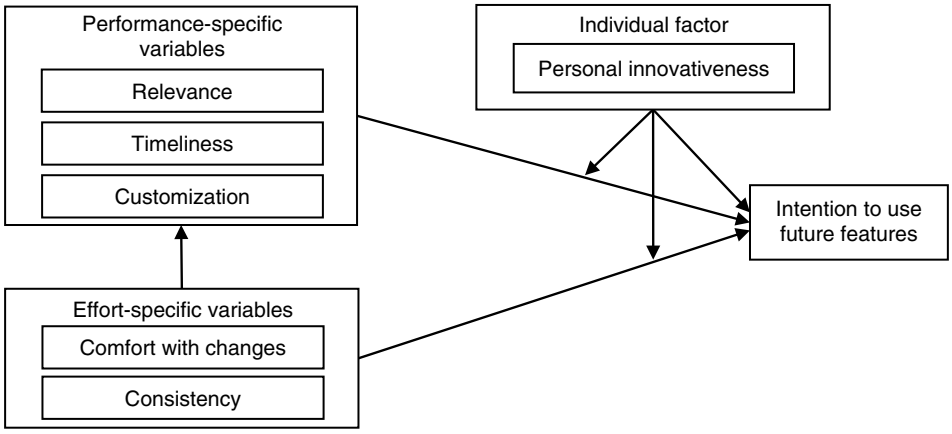
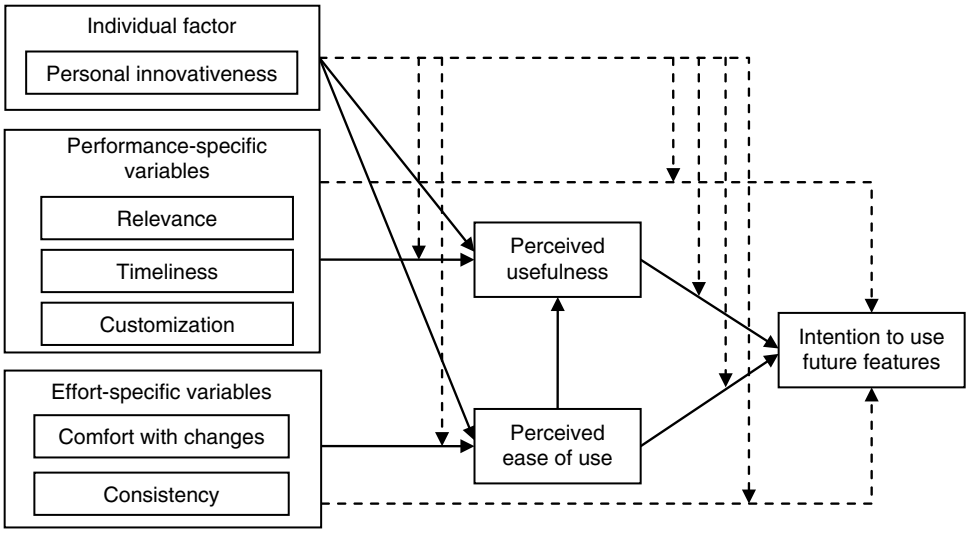


Figure 4c TAM-with-Antecedents (Agile Web Portal)–Level 2a Contextualization, and Integrated TAM with Mediated Moderation and Moderated Mediation–Combination of Levels 2a and 2b Contextualization



Notes. 1. Relationships of TAM-wth-antecedents are shown as solid lines. 2. Additional relationships of integrated TAM with mediated moderation and moderated mediation are shown as dashed lines.

both PU and PEOU. Further, based on the same rationale described in study 1, we formulated the integrated TAM with mediated moderation and moderated mediation based on the TAM-with-antecedents by modeling PI as a moderator of the relationships between (1) performance-specific variables and PU, (2) performance-specific variables and intention, (3) effort-specific variables and PEOU, (4) effort-specific variables and intention, and (5) PU/PEOU and intention (see Figure 4c).

5.2.3. Sample, Data Collection, and Measures. We conducted our survey during a lull in the periodic release of new features. Flyers about the survey were distributed to employees attending an event at the company headquarters. Respondents were offered a chance to win gift prizes for their participation. We received 507 responses over a period of five days. After removing responses with incomplete data, we had 475 usable responses.

As the company had very strict privacy regulations, we were not allowed to collect demographic data about the respondents, except for their job titles. The job titles showed a representative sample of respondents from senior management, middle management, and operational personnel, who were the primary users of the Web portal. About 2% of respondents were in the executive board of the company (i.e., executive directors and senior directors); 37.5% in middle management (i.e., directors, senior managers, and managers); and 60% were operational personnel. This distribution of job titles was representative of the company's distribution of employees who had access to the Web portal. We also found no significant difference in the means of the research variables between early and late respondents. Hence, nonresponse bias did not appear to be a major concern.

Wherever possible, existing scales with multiple items were used to measure the constructs (see Appendix B2 in the online supplement).[12] All constructs used seven-point Likert scales, ranging from 1 (strongly disagree) to 7 (strongly agree). The items for measuring intention to use future features were developed following Ajzen and Fishbein's (1980) suggestions and by modifying existing intention scales in IS adoption studies (Venkatesh et al. 2003). We provided a list of the past upgrades to the respondents before asking them for their perceptions of the past upgrades. Items measuring PU and PEOU were adapted from Venkatesh et al. (2003) to suit the current context. Relevance and timeliness were measured by items adapted from Doll and Torkzadeh (1988) and Wixom and Todd (2005). Customization was measured by items adapted from Palmer (2002). We developed the measure for comfort with changes by modifying Thurstone and Chave's (1929) affect measure with a focus on the feeling of comfort. Consistency was measured by three items from Ozok and Salvendy (2001). PI was measured by three items from Agarwal and Prasad (1998).

5.2.4. Data Analysis and Results. Table 6 reports the descriptive statistics for the constructs. Composite

[12] We conducted a pilot study of the questionnaire on 30 employees to verify that the questions were relevant and understandable to users of the Web portal. Based on their feedback, we made minor rephrasing to some of the questions. The concern of common method bias was alleviated by the significant chi-square difference between the one-factor model and our measurement model, and the findings of significant interaction effects in our analyses.

Table 6 Descriptive Statistics and Correlations (Agile Web Portal Context)

Construct	M	SD	CR	1	2	3	4	5	6	7	8	9
1. Relevance	5.29	1.04	0.95	**0.96**								
2. Timeliness	5.32	1.03	0.94	0.66	**0.91**							
3. Customization	5.33	1.05	0.96	0.56	0.66	**0.96**						
4. Comfort with changes	5.63	0.95	0.91	0.59	0.70	0.67	**0.91**					
5. Consistency	5.58	0.82	0.94	0.59	0.58	0.55	0.70	**0.87**				
6. Perceived usefulness	5.17	1.07	0.96	0.69	0.79	0.60	0.65	0.60	**0.94**			
7. Perceived ease of use	5.42	1.02	0.95	0.56	0.65	0.58	0.70	0.69	0.70	**0.93**		
8. Personal innovativeness	5.38	1.10	0.95	0.27	0.21	0.26	0.26	0.37	0.29	0.31	**0.92**	
9. Intention	5.92	0.83	0.98	0.49	0.46	0.40	0.54	0.54	0.49	0.49	0.38	**0.98**

Note. M: Mean; SD: Standard deviation; CR: Composite reliability; Diagonals are square root of AVEs; All correlations are significant at $p < 0.001$; $n = 475$.

reliabilities were all higher than 0.70, indicating high convergent validity. The square roots of AVEs were consistently greater than the off-diagonal correlations, suggesting adequate discriminant validity among the constructs. The results of factor analysis provided further support for discriminant validity (see Appendix C2 in the online supplement).

Table 7 summarizes the results for TAM, TAM-with-antecedents, and the decomposed TAM. For TAM, all three paths were significant. PU and PEOU together explained 28% of the variance in intention, which was reasonable given the novelty of the context. For the TAM-with-antecedents, most paths were significant, except for the paths from customization to PU, and from PI to PU and PEOU. Providing more customization did not increase the usefulness perceptions among the respondents. Surprisingly, innovative employees did not find the upgrades more useful or easier to use. The results of mediation analysis (Baron and Kenny 1986; see block 3 in Table 8) showed that both PU and PEOU were not significant, indicating that none of the effects of performance-specific and effort-specific variables was mediated through PU and PEOU.

The decomposed TAM received significant support from the data (see Table 7). The three performance-specific variables either had direct impact on intention (i.e., relevance), or interaction effects with PI on intention (i.e., timeliness and customization). Specifically, employees who found the past upgrades relevant to

Table 7 Predicting Intention to Use Future Features of Agile Web Portal

	Dependent variables								
	TAM		TAM-with-Antecedents			Decomposed TAM			
Independent variables	PU	BI	PEOU	PU	BI	RELE	TIME	CUST	BI
R^2 (%)	48	28	59	71	28	40	50	45	45
TAM constructs									
Perceived ease of use (PEOU)	0.69***	0.30***		0.25***	0.30***				
Perceived usefulness (PU)		0.28***			0.28***				
Performance-specific variables									
Relevance (RELE)				0.22***					0.16**
Timeliness (TIME)				0.45***					0.08
Customization (CUST)				0.02					−0.05
Effort-specific variables									
Comfort with changes (COMF)			0.42***			0.32***	0.56***	0.54***	0.21***
Consistency (CONS)			0.39***			0.37***	0.20***	0.18***	0.16**
Individual factor									
Personal innovativeness (PI)			0.05	0.05					0.21***
Interactions with performance-specific variables									
RELE ∗ PI									0.07
TIME ∗ PI									−0.19**
CUST ∗ PI									0.22***
it Interactions with effort-specific variables									
COMF ∗ PI									−0.03
CONS ∗ PI									−0.22***

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Table 8 Mediation Analysis for the Agile Web Portal Sample

	Block 1	Block 2	Block 3
R^2 (%)	40	28	40
Performance-specific variables			
Relevance (RELE)	0.17***		0.15**
Timeliness (TIME)	0.06		0.02
Customization (CUST)	−0.05		−0.05
Effort-specific variables			
Comfort with changes (COMF)	0.24***		0.23***
Consistency (CONS)	0.19***		0.17**
Individual factor			
Personal innovativeness (PI)	0.21***		0.20***
TAM constructs			
Perceived usefulness (PU)		0.28***	0.06
Perceived ease of use (PEOU)		0.30***	0.05

**$p < 0.01$; ***$p < 0.001$.

their work were more willing to try new features. Following Aiken and West (1991), we plotted the significant interaction effects and performed simple slope tests for each interaction effect. Figures 5(a) and 5(b) present the interaction effects between timeliness and PI, and between customization and PI, respectively. Innovative employees had a higher tolerance for low access speed probably because of their eagerness to try out new features (high PI: $\beta = -0.06$, $p > 0.05$). In contrast, fast speed was essential for less innovative employees to be willing to try new features (low PI: $\beta = 0.20$, $p < 0.01$). Employees with different levels of innovativeness also reacted very differently to the provision of customized content and interface. For highly innovative employees, a greater degree of customization would increase their likelihood of using the new features (high PI: $\beta = 0.19$, $p < 0.001$). In contrast, less innovative employees were somewhat turned off by customization and were less likely to use new features because of it (low PI: $\beta = -0.28$, $p < 0.001$).

Similarly, the two effort-specific variables either had direct impact on intention (i.e., comfort with changes and consistency of interface design), or had interaction effects with PI on intention (i.e., consistency of interface design). Employees who were comfortable with the frequent upgrades were more willing to try new features. They were also more willing to use new features when past upgrades did not cause major changes to the consistency of interface design. We also plotted the significant interaction effect between consistency and PI (see Figure 5(c)). When the interface changed significantly with the frequent upgrades, employees with low innovativeness would find it difficult to cope as they were forced to relearn how to use the system. For these employees, maintaining the consistency of interface design would increase their willingness to try new features (low PI: $\beta = 0.32$, $p < 0.001$). In contrast, inconsistency in interface design did not bother innovative employees as they like to experiment with new features (high PI: $\beta = 0.01$, $p > 0.05$). In addition to the interaction effects with performance-specific and effort-specific variables, PI had a significant main effect on intention. Altogether, the decomposed TAM explained 45% of the variance in intention, which was a significant increase from the variance explained by the TAM-based models.

The integrated TAM with mediated moderation and moderated mediation was tested following the procedures suggested by Muller et al. (2005). As seen

Figure 5 Predicting Intention to Use Future Features of Agile Web Portal

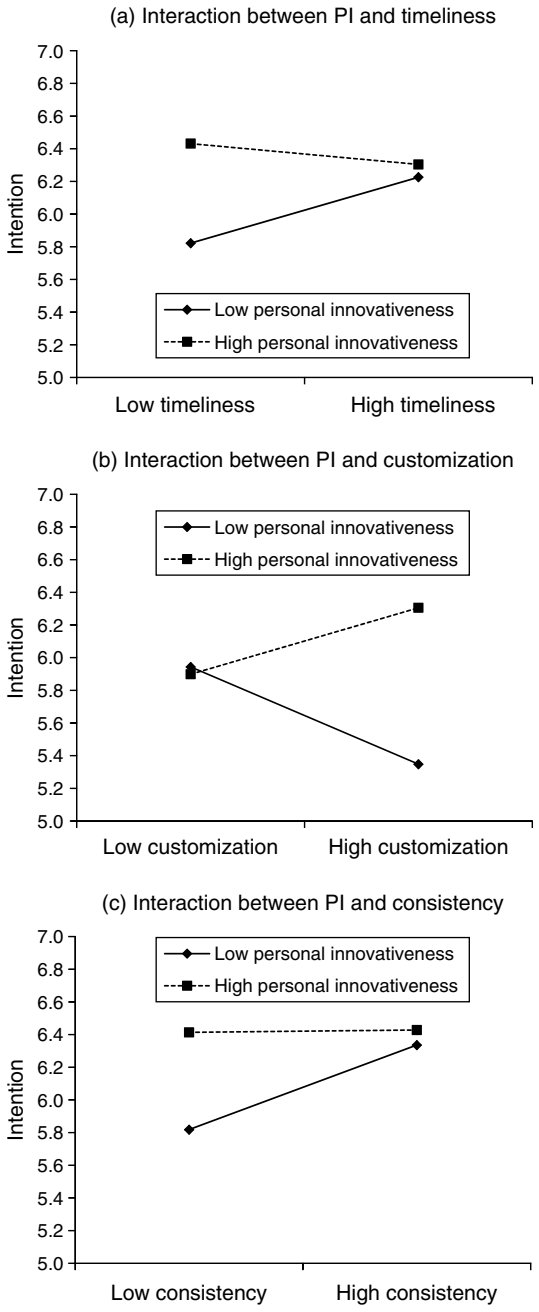


Table 9 Mediated Moderation and Moderated Mediation Analysis for the Agile Web Portal Sample

	Step 1	Step 2		Step 3
	BI	PEOU	PU	BI
R^2 (%)	45	57	71	45
Performance-specific variables				
Relevance (RELE)	0.16**		0.22***	0.13*
Timeliness (TIME)	0.08		0.45***	0.04
Customization (CUST)	−0.05		0.02	−0.05
Effort-specific variables				
Comfort with changes (COMF)	0.21***	0.42***		0.19**
Consistency (CONS)	0.16**	0.38***		0.14*
Individual factor				
Personal innovativeness (PI)	0.21***	0.06	0.05	0.20***
Interactions between performance-specific variables and PI				
RELE ∗ PI	0.07		0.01	0.03
TIME ∗ PI	−0.19**		0.01	−0.24**
CUST ∗ PI	0.22***		−0.02	0.21***
Interactions between effort-specific variables and PI				
COMF ∗ PI	−0.03	0.03		−0.04
CONS ∗ PI	−0.22***	0.00		−0.24**
TAM constructs				
Perceived ease of use (PEOU)			0.25***	0.06
Perceived usefulness (PU)				0.07
Interactions between TAM constructs and PI				
PEOU ∗ PI				−0.00
PU ∗ PI				0.13

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

from the results for the decomposed TAM, timeliness, customization, and consistency of interface design had significant interaction effects with PI, whereas relevance and comfort with changes had direct effects on intention but no interaction effect with PI. Thus, we considered both mediated moderation effects (for timeliness, customization, and consistency) and moderated mediation effects (for relevance and comfort with changes) in the model. To demonstrate mediated moderation or moderated mediation, either or both of the following conditions should exist: the effects of the performance-specific/effort-specific variables on PU/PEOU are moderated by PI or the effects of PU/PEOU on intention are moderated by PI. Table 9 shows that none of these interaction terms (in steps 2 and 3) was significant, indicating that there was neither mediated moderation nor moderated mediation.

Although all of the context-specific models confirmed the importance of performance and effort expectancies in predicting intention in the agile Web portal context, the decomposed TAM revealed more complex and interesting relationships in the data. In the TAM-with-antecedents, timeliness only affected intention through PU. In contrast, in the decomposed TAM, the effect of timeliness on intention was moderated by the innovativeness of the employees. Similarly, customization was not a significant predictor of PU or intention in the TAM-with-antecedents, but was found to have a significant interaction effect with PI on intention. PI did not appear to be a salient construct in the TAM-with-antecedents, but it played a significant role, not only as a main predictor but also as a moderator, according to the decomposed TAM. Further, the results showed that mediated moderation and moderated mediation did not exist. PU, PEOU, and their interactions with PI were nonsignificant when they were included in the integrated TAM (step 1 versus step 3 in Table 9). Taken together, the results indicated that the importance of PU and PEOU in determining intention, relative to the context-specific factors, was minimal in the agile Web portal context.

6. Discussion

This paper has examined the strengths and weaknesses of context-specific versus general theories. Using individual technology adoption research as an illustration, we compared various context-specific models—i.e., a decomposed TAM, an extended TAM-with-antecedents, and an integrated TAM with mediated moderation and moderated mediation—in two different contexts (a digital library and an agile Web portal). The results showed that although both the TAM-with-antecedents and the decomposed TAM have incorporated the specificity of context, the decomposed TAM can reveal the underlying relationships that are hidden in the TAM-with-antecedents. Specifically, the decomposed TAM provides better understanding of the direct influences of performance-specific and effort-specific variables on intention, as well as the interactions between performance-specific and effort-specific variables with individual factors. To gain further understanding of the indirect effects of the context-specific factors, we examined the integrated TAM that incorporates both mediated moderation and moderated mediation, but these models were not supported.

6.1. Implications

First, our work represents an initial effort to examine the role of context in IS research. Although the significance of context in theory development has been acknowledged in the literature (e.g., Johns 2006, Orlikowski and Iacono 2001), there is still limited theoretical and empirical research into the ways to incorporate context-specificity into theory development. To fill this gap, we have reviewed the literature on individual technology adoption, IS continuance and IS success, and developed a framework to categorize different approaches to contextualization. We have identified two general approaches: (a) single-context theory contextualization, and (b) cross-context theory replication. Further, we found that there exist

different levels of contextualization: from the general theories (e.g., TRA and TPB) to the first level of contextualization (e.g., TAM) and the second level of deeper contextualization (e.g., TAM-with-antecedents or decomposed TAM). The rationales for the different contextualization approaches are broadly applicable to other areas of IS research. Thus, the framework can be used to assess the state of contextualization in theory development and guide the contextualization efforts in other research domains. Based on this framework, we proposed a set of guidelines for contextualizing theories. Overall, this study contributes to the IS literature by discussing the significance of context in theory development and providing guidance for context-specific theorizing in IS research.

Second, we have expounded on a decomposition approach with a set of guidelines for constructing context-specific models and illustrated the application of the guidelines in two different individual technology adoption contexts. Our work highlights the importance of incorporating the specificity of technology characteristics, individual characteristics, and usage contexts into the domain of individual technology adoption research. We have also tested the validity of our proposed approach by comparing the decomposed TAM that incorporates interaction effects between context-specific factors against an extended TAM with context-specific antecedents, and an integrated TAM that incorporates both mediated moderation and moderated mediation involving context-specific factors and TAM constructs. Our results show that compared with the alternative models, the decomposed TAM is able to reveal important relationships and provide more actionable advice to practitioners. Although our guidelines are illustrated in the domain of individual technology adoption research, it is likely that the guidelines, with some refinement, are applicable to other domains of IS research. For example, in our illustration of the third guideline, we have incorporated salient individual factors into the context-specific model. When applying our proposed set of guidelines to team-level or organizational-level research, the salient team or organizational characteristics should be taken into account. Further, future research can explore the utility of applying the proposed guidelines to developing context-specific models in research areas beyond the domain of technology adoption.

Third, our proposed decomposition approach helps to contextualize the meanings of important constructs and make the theory more context sensitive. We have illustrated this approach by decomposing the two general beliefs in TAM (i.e., PU and PEOU) into two sets of context-specific factors—i.e., performance-specific and effort-specific variables—in two different contexts. As Whetten (2009) noted, there are basically two ways to make a theoretical contribution—i.e., contributions of theory and contributions to theory. Contributions of theory involve the application of a theoretical lens that is broadly accepted within a field of study but that has not previously been applied to the targeted phenomenon, whereas contributions to theory include formulations of new theory as well as improvements in existing theory (Whetten 2009). In this regard, our work presents a contribution to theory by proposing a way to improve an existing theoretical lens (e.g., TAM) by making it more context sensitive.

Fourth, context-specific theory development emphasizes the interplay between the characteristics of technologies, users, and usage contexts. In our illustration, we focused on the interaction between technology characteristics and individual factors. Our results have demonstrated the importance of examining moderators to better understand users' perceptions of specific technology characteristics. For example, in the agile Web portal context, customization may mistakenly be considered to have no effect on technology adoption, until individuals' PI is incorporated into the model as a moderator. Also, our work responds to Bagozzi's (2007) call for more theoretical grounding in the consideration of moderating variables by introducing individual factors whose moderating roles have been theoretically justified in prior research (e.g., Agarwal and Prasad 1998).

Fifth, we have illustrated an examination of the mediated moderation and moderated mediation effects involving context-specific factors and core constructs. Our results show that the effects (including direct and moderating effects) of context-specific factors are not necessarily mediated via the core constructs in general models, particularly for the context of agile Web portal. Although this is consistent with the conjecture that general models are less able to capture the characteristics of emerging technologies and usage contexts, it is still necessary to probe the indirect effects of context-specific factors, as the context-specific factors and core constructs in general models are likely to have different relationships across contexts. Such an examination will help avoid committing a contextual fallacy where the context-specific factors are assumed to operate in the same way across contexts (Rousseau 1985).

Sixth, we suggest that the different approaches to contextualization are best used in different circumstances. The decomposition approach is best used in contexts where the users' core perceptions are well understood (e.g., when the core constructs in TAM or UTAUT are adequate in capturing users' perceptions about the key aspects related to technology use). In contexts where users' core perceptions are not immediately apparent, the identification of

context-specific factors that pertain to different key aspects will be more challenging. In such cases, researchers can adopt the context-as-antecedents approach to incorporate potential context-specific factors as antecedents of core constructs (e.g., attitude) in general models (e.g., TPB) that favor extensions of the belief set and allow for novelty and discovery (Benbasat and Barki 2007). Hence, the different approaches to contextualization have their own roles to play in theory development.

Finally, our study helps to increase the practical relevance of IS research. As Benbasat and Zmud (1999, p. 6) noted, "in order that IS research be relevant, IS researchers must in some form or another be exposed to the practical contexts where IT-related usage and management behaviors unfold." Because the construction of context-specific models requires a thorough evaluation of a context, the outputs of the evaluation process—i.e., context-specific beliefs—are salient in that particular context. For example, in our illustration, relevance is considered to be a performance-specific variable that contributes to the PU belief in both the digital library context and the agile Web portal context. However, the conceptualization of relevance is tailored to the two contexts—i.e., focusing on study needs in the digital library context and focusing on job needs in the agile Web portal context. In sum, the context-specific beliefs provide greater details of how technology artifacts can be constructed and used within different usage contexts.

6.2. Limitations and Future Research

Here, besides discussing some limitations to keep in mind when interpreting the results of this study, we also suggest some avenues for future research. First, in our illustration of context theorizing, we have used TAM as the basis to develop the context-specific models, thus potentially omitting other important core beliefs, such as social influence and facilitating conditions (Venkatesh et al. 2003). Future research can utilize other general adoption models that capture these beliefs, such as UTAUT, when appropriate. For example, social influence can be decomposed into peer influence and superior influence in the context of collaboration technology use in the workplace (Brown et al. 2010), whereas it can be decomposed into friends and family influences, secondary sources' influences, and workplace referent's influences in the context of household adoption of personal computers (Brown and Venkatesh 2005). Second, this study has incorporated only two individual factors—i.e., computer self-efficacy and personal innovativeness—into the context-specific models. Future research can examine other individual characteristics, such as personality, to enhance the context theorizing. Third, our proposed guidelines apply to situations in which an IT artifact is studied in a single context. For the situations that canvas a broad range of different systems and organizational settings, higher-level factors (e.g., type of systems and type of organizations) and their cross-level effects on the lower-level factors and relationships (e.g., TAM constructs and relationships) will need to be examined.

7. Conclusion

We examined the role of context-specific theory development and provided directions for contextualizing theories in IS research. We also formulated a framework to organize different approaches to contextualization and expounded on a decomposition approach with a set of guidelines to develop context-specific models. We then illustrated the application of these guidelines in two different technology adoption contexts, and compared the decomposed TAM with the extended TAM with context-specific antecedents and the integrated TAM with mediated moderation and moderated mediation. Among the advantages of decomposed context-specific models are their ability to reveal hidden relationships and the provision of actionable advice for designing technologies.

Supplemental Material

Supplemental material to this paper is available at http://dx.doi.org/10.1287/isre.2013.0501.

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