2008

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Abstract

Recent papers have debated whether there are any additional insights still to be gained from traditional information systems (IS) adoption models. Independently, recent research has paid attention to the "usage" construct and offered taxonomies of IS use. In this paper, we offer an overview of a theoretical model that offers researchers the ability to study individual users' interaction with information technology (IT) artifacts, as well repeated interactions overtime. The proposed interaction-centric model highlights how the characteristics of an IT artifact, together with the user's internal system and other structuring factors, affect users' choices in terms of how to utilize the artifact. This subsequently, affects the types of beliefs users form about the artifact as well as their evaluations of it. Furthermore, we introduce a new set of constructs that capture users' overall perceptions of the artifact and the relationship with it. To facilitate the study of this dynamic relationship that develops between the user and the artifact, we further explicate the effects of evaluations of the artifact from past interaction, and evaluations of the relationship with it, on how users choose to utilize the artifact in future interactions.

Looking Beyond Adoption to Understanding the User-IT Artifact Relationship

1. Introduction

Investigating the determinants of adopting and using information systems (IS) has taken center stage in IS research. Recent papers (e.g., Benbasat and Barki, 2007; Straub and Burton-Jones, 2007; Venkatesh, Davis, and Morris, 2007) have debated the potential for any additional insights to be gained from traditional IS adoption models, especially given the abundance of replications. Overall, these replications have helped to reaffirm similar conclusions. It is now known, almost to the point of certainty that perceived usefulness and perceived ease of use positively affect intentions to adopt and use of information technology (IT) artifacts (Benbasat and Barki, 2007). While such investigations of the antecedents to IS adoption intentions is a worthy objective, these examinations only allow us to answer the question of *why* an e-commerce IT artifact is adopted, while offering little insight into other important considerations, such as, *how* to design the e-commerce IT artifact to induce positive evaluations of its usefulness or ease of use, *how* the artifact is being used, or what happens after the artifact is adopted (post-adoptive use).

Attempting to answer some of these questions, recent papers have looked more closely at the system usage construct (e.g., Burton-Jones and Straub, 2006), looked at the construct of habit as an additional predictor of continued use (e.g., Morris, Venkatesh, and Ackerman, 2005), or used longitudinal studies to understand changes in users' perceptions overtime (e.g., Bhattacherjee and Premkumar, 2004). Yet, in their efforts to understand post-adoptive use, none of these studies have explicitly looked at the type of bond (relationship) that forms between the user and the IT artifact, and how this bond is formed and the factors affecting its development and maturity. In other words, while traditional models of adoption, or even extensions of these models, can answer questions relating to why an artifact is adopted, and further, the effects of

this adoption on performance, they lack the ability to study the user-artifact *relationship*, and how this relationship is formed and develops.

This gap in literature is even more evident when studying newly developed IT artifacts used in electronic commerce (e-commerce) contexts. Unlike many IT artifacts that typically operate as productivity-enhancing tools within static settings, and as such offer their users limited options in how they can be utilized as well as a fixed set of features, e-commerce IT artifacts are distinguished by the flexibility and sophistication of their designs, enabling them to assume differing roles (e.g., support tools vs. autonomous agents), and enabling their users to utilize them in a variety of capacities and to pick and choose between the features employed. Consider for instance the case of online decision aids (DA), which are software tools that have been successfully utilized in e-commerce settings to reduce consumers' information overload and search complexity, while at the same time improving their decision quality (Xiao and Benbasat, 2007). These IT artifacts can assume multiple roles and perform a number of functions. Most commonly studied of which have been: 1) the tutor (e.g., educating users about product attributes and alternatives), 2) the decision-making support (e.g., recommending products), and 3) the delegated agent or the banker (e.g., buying products on behalf of customers) (West, Ariely, Bellman, Bradlow, Huber, Johnson, Kahn, Little, and Schkade, 1999). When performing any of these roles, a DA can follow a number of processes. For instance, when acting as a tutor, a DA can be appropriated so that the content of its informative guidance is: 1) specified a priori (predefined guidance), 2) generated dynamically to meet the customer's specific needs that are learned from observing her actions and behaviors (dynamic guidance), or 3) generated with the active participation of the customer (participative guidance). Likewise, when acting as a decision-maker, a DA can rely on any of a number of decision-making

strategies, and differ in the method in which it elicits customers' preferences, or the degree to which it provides explanations for its decisions and actions. When acting as a delegated agent, different DAs can vary in terms of if, how, and the degree to which they elicit customers' confirmation, how they complete the buying transaction, and the extent to which they bargain on the customer's behalf.

Sufficient to say, e-commerce IT artifacts, in general, are increasingly designed with flexibility that allows their users to choose how to utilize and interact with these artifacts. Yet, traditional adoption models used to predict users' adoption intentions and behaviors adopt the view of these artifacts as a static bundles of features, and ignore the idea that the same artifact can be used differently by different users, and consequently, the bases for evaluating these artifacts will also differ significantly. Alternatively, we believe that how an IT artifact is used in a particular interaction, forms the basis for how this artifact is perceived and evaluated by its users. In other words, while the characteristics of a certain artifact, such as the nature and type of features it offers, generate options concerning how this artifact can be used, it is users' choices in terms of how to use the artifact determine the type and nature of perceptions that users can and will form about this artifact during an interaction. Hence, we view the characteristics of a user's interaction with an IT artifact, which consist of how the artifact is used and the resulting perceptions of the artifact based on that usage, to be the appropriate unit of analysis when studying users' adoption and usage decisions and behaviors.

In this paper, we offer an overview of a new model for the study of users' interactions with e-commerce IT artifacts that describes why and how users interact with these artifacts in the context of a single interaction, as well as in a repeated use over time. As such our model in addition to highlighting how the utilization of an e-commerce IT artifact can affect how this

artifact is evaluated, also presents a mechanism to understanding and studying users' interactions with IT artifacts overtime. To do so, we conceptualize the bond that results from these repeated interactions as a form of "relationship" between the user and the artifact. Subsequently, we describe how this relationship, and users' perceptions about it, are influenced by repeated interactions, and further, act as determinants of how users use an IT artifact in future interactions. In other words, our model not only focuses on studying determinants of adoption on one hand, or the different types of IT artifact usage on the other, but integrates these two perspectives, and adopts an interaction-centric view of users utilization of e-commerce IT artifacts, where the nature of the artifact use is an antecedent to users' evaluations of it. These same evaluations as well as evaluations of this relationship that is developing with this artifact act as antecedents to how the artifact is used in future interactions.

We believe there is a need for such an approach. Specifically, we argue that only through understanding the dynamics of the relationship, and users' perceptions of it, can we explain why an artifact is being continually used, switched from, and most importantly, why an artifact is being used in a certain way (for a certain task). For instance, only through understanding the degree of association and the bond that forms between the user and the artifact (e.g., the degree of relationship interdependence) can we understand why a user might be hesitant to switch to a normatively better system (i.e., resistance to switch). Likewise, only through understanding the structure of the user's relationship with an IT artifact (e.g., degree of interdependence, perceived rapport) and this relationship's stage and depth, can we answer why two equally useful artifacts are, or for that matter, the same artifact used in the same context by different users is, being used differently. In summary, it is our contention that understanding the user's relationship with an IT

artifact is essential to fully understanding the user's decisions to reuse the artifact, switch to/from another artifact, and choosing to use the artifact in a particular capacity and in a certain way.

The model proposed is unique in two ways. First, the model adopts an *interaction-centric* approach to the study of user-artifact relationships, by proposing that a user's perceptions of an IT artifact are influenced by the cues the artifact manifests in each interaction with its user, which differ according to how the user chooses to interact with that artifact. The second distinguishing characteristic of our model is that of explicitly supporting a *dynamic* view of user-artifact interactions, by providing a clear framework for the study of the relationships users develop overtime with IT artifacts.

2. A New Model for Studying User-Artifact Relationships

Studying the developing relationship between two interacting entities involves more than capturing the perceptions of one another at different points in time. Instead, studying a relationship entails understanding the patterns of interaction that occur between the interacting entities. As proposed by Berscheid and Reis (1998), a relationship between two interacting partners is viewed as residing in neither one of them, but rather in their interactions with one another.

The proposed model focuses on investigating the nature of users' ongoing interactions with IT artifacts, and the effects of these on the user-artifact relationship. In doing so, it goes beyond examining adoption intentions and their antecedents, and focuses on investigating how users' *relationships* with IT artifacts are formed and the factors affecting their development and growth. The theoretical model proposed highlights how the user-artifact relationship is constituted from the set of user-artifact interactions, and describes a framework for studying the structure of these interactions and the determinants of these structures. Thus, the proposed model

posits that evaluations of IT artifacts and relationships with them are driven by the nature of users' interactions with them rather than directly by the characteristics of these artifacts. Nonetheless, the characteristics of these artifacts promote certain interaction structures, which together with other contextual and the user's own characteristics, determine the structure of the interaction. This stands in clear contrast to traditional models of adoption, which maintain what we term an *artifact-centric* approach, in which the artifact's characteristics, rather than the characteristics of the user-artifact interaction, is what determines users' evaluations of the artifact.

Below (Figure 1), we propose a model to study user-artifact relationships. The model includes three distinct elements: 1) the determinants of interaction structure, 2) the interaction structure, and 3) subsequent evaluations. Appendix A offers a detailed taxonomy and some examples of the model's different constructs. Appendix B provides a list of propositions and examples of testable hypotheses that can be derived from the proposed theoretical model.
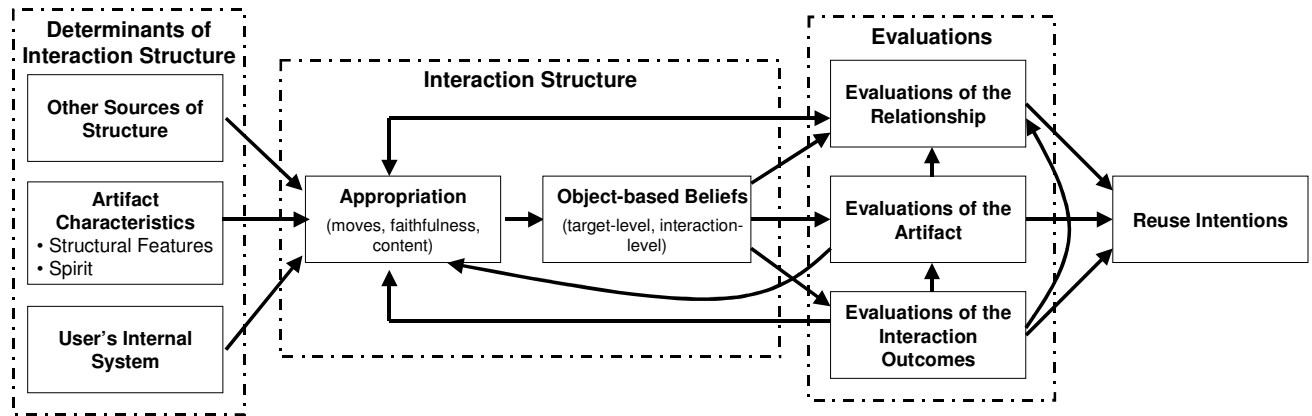

Figure 1: Proposed Theoretical Model

The model highlights the effects of the *interaction structure* on users' evaluations of an IT artifact (evaluations of the artifact, e.g., perceived usefulness), evaluations of the outcomes of interacting with the artifact (evaluations of the interaction outcomes, e.g., outcome quality), as

well as its role in affecting perceptions of the relationship with the artifact (evaluations of the relationship, e.g., relationship structure evaluations, such as, perceived interdependence). At this point, it is important to note that while the first two types of evaluations are typically defined within the context of a single interaction, evaluations of the user-artifact relationship inherently include mental representations of past interactions. The interaction structure is proposed to include two components: 1) *appropriation*, which refers to the visible actions that evidence deeper structuration processes of the artifact (DeSanctis and Poole, 1994), and 2) the resulting *object-based beliefs* regarding the artifact's characteristics and behaviors (target-level, e.g., information quality, perceived similarity, perceived consistency … etc), or in regards to the interaction with the artifact (interaction level, e.g., perceived coordination, mutual attentiveness, covariation of interest … etc).

Consistent with the adaptive structuration theory (AST, DeSanctis and Poole, 1994), we propose four determinants of the structure of the user-artifact interaction. Structural features are the specific types of rules and resources or capabilities offered through the artifact's design characteristics, and can be described in terms of restrictiveness and sophistication, or comprehension (the richness of the set). Spirit is defined as the general objectives and procedures that the artifact aims to promote (Chin, Gopal, and Salisbury, 1997), and can be described in terms of such dimensions as atmosphere (e.g., the degree to which the interaction is structured and formal). In the context of this model, both of these constructs are defined at a *perceptual* level. More specifically, given the user-centric nature of this model, we propose that the user's perceptions of the artifact's structural features and its manifested spirit is what determines how the user will interact with the artifact and the resulting structure that this interaction will take.

Structural features relate to the artifact's characteristics at a feature level and determine how the artifact can be used. On the other hand, the spirit, an artifact-level variable that describes the artifact as a whole than its specific features, concerns how the artifact in the *context of its use*, and through how the different features are combined and used, manifests certain attitudes and goals. Additional proposed determinants of the interaction structure include those of: 1) *other sources of structure,* which refers to factors that may impose some additional restrictions, such as, the task or other constraining factors (e.g., technological constraints, e.g., bandwidth), and 2) the *user's internal system*, which refers to the dispositional characteristics of the user that may affect how she uses the system.

Similar to DeSanctis and Poole (1994), the proposed model specifies a number of dimensions that characterize appropriations. Appropriation moves refers to changes made in the chosen structural feature set. Three categories of appropriation moves have been proposed by Sun and Zhang (2006): 1) size-related moves, in which the user increases/reduces the number of features used, 2) content-related moves, in which the user changes which features are used, and 3) network-related moves, in which the user combines features. The faithfulness of these appropriations refers to whether the appropriation is done in a manner that is consistent with the spirit promoted in the artifact. Finally, we propose *appropriation content* as an additional dimension that characterizes a given appropriation. While the appropriation moves and faithfulness tell us *what* structures are being used and *how* they are being used (respectively), the appropriation content tells *why* certain structures are being used. Three categories of the appropriation content are proposed to be relevant to the context of e-commerce IT artifacts: 1) role-based, which refer to artifact-level appropriations to choose a role for the artifact to perform (similar to the instrumental uses dimension proposed by DeSanctis and Poole, 1994), 2) process-

based, which refers to artifact-level appropriations that are performed with the goal of changing how the artifact performs its role, and 3) communication-based, which refers to artifact-level appropriations that are performed with the goal of specifying how the artifact communicates what it performs.

Two types of object-based beliefs are proposed to make-up the second component of the interaction structure, whilst being affected by the first component of appropriation: 1) target-level, which are beliefs concerning specific characteristics of the target artifact that do not affect the quality of the interaction (e.g., physical appearance), and 2) interaction-level, which are beliefs concerning specific characteristics of the artifact as an interaction partner within the context of that interaction (e.g., openness, leadership). Consistent with prior adoption research, object-based beliefs are proposed to affect users' evaluations of the IT artifact across a number of cognitive (e.g., perceived usefulness), relational (e.g., trust) beliefs, social (e.g., social presence) and emotional beliefs (e.g., perceived enjoyment), as well as beliefs that directly address the different outcomes of the behavior of interacting with the artifact.

Furthermore, the object-based beliefs as well as appropriations are proposed to affect perceptions of the *relationship*, which could take the form of evaluations of the relationship structure (e.g., interdependence, intimacy, rapport), or the relationship stage and depth. In doing so, the model facilitates the study of the dynamic component of the user-artifact relationship. First, the model captures the emergent nature of relationship structures by proposing that the structure of a given interaction will affect perceptions regarding the structure of the relationship. In other words, it is proposed that the structure of an interaction, including how the artifact is appropriated in that interaction, and the resultant user's beliefs about the artifact, will affect perceptions of the relationship structure subsequent to that interaction. This updated perception

of the relationship structure acts as another factor affecting how the user is likely to appropriate the artifact in future interactions. Second, the model captures the effects of the mental representations of past interactions on future interactions by proposing a link between user's artifact-based evaluations in one interaction, and appropriations in future interactions.

3. Concluding Remarks: Testing the Model

The proposed model can be divided into four components: 1) interaction inputs: which include the artifact's characteristics (structural features and spirit), other sources of structure as well as the user's internal system, 2) interaction structure: which includes the appropriation process and the object-based beliefs formed about the artifact during the interaction (as well as any feedback loops from these beliefs to appropriation), 3) interaction outputs: which include the users' evaluations of the artifact, the interaction experience, as well as evaluations of the relationship, and 4) temporal considerations: which include the proposed effects of relationship, interaction experience, and artifact evaluations on the structure of future interactions.

We propose that different research methods allow for the examination of certain components of the model. For example, while a survey approach essentially captures all constructs at a perceptual level, a process tracing experimental approach allows for the study of these constructs at an observed-level. These two differing approaches allow us to answer different questions. More specifically, while the first approach allows us to answer a question of the type "how *perceptions* of using the artifact affect adoption?" the second approach allows us to answer the question of "how users use a given artifact, and how that affects their evaluations?"

In general, we propose that: 1) a cross-sectional input-output experimental approach will allow us examine the casual links between the constructs (defined as perceptual constructs) included in the first three components of the model (a longitudinal approach is needed to

investigate the fourth component), where the focus will be on how specific types of the constructs in the first component affect constructs in other components, 2) a cross-sectional process tracing experimental approach will allow us examine the causal links between the constructs (as observed) included in all four components of the model within the context of a *single* interaction, while allowing us to better understand the micro-level interactions between the constructs within the same component (e.g., the feedback loops between artifact evaluations and appropriation, which constitute an examination of the structure of a single interaction), and 3) a survey approach will allow us to examine the full *perceptual* model, and validate its general structure in a number of different contexts.

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5. Appendix A: Taxonomies of the Model's Constructs

Construct	Definition
Design Characteristics	The artifact's characteristics, both at a feature level, and at a system level.
Structural Features	The artifact's specific types of rules and capabilities.
Guidance	The degree to which and the manner in which the artifact guides its users in constructing and executing their tasks, by assisting them in choosing and using its feature set.
Comprehensiveness	The richness of the feature set, where the more comprehensive the artifact, the greater the number and variety of features offered to users.
Communicability	The degree to which the artifact allows it users to communicate with it using different channels.
Restrictiveness	The degree to which and the manner in which the artifact restricts what users' do, and how they do it, to particular subset of all possible ways (i.e., restricting users to a subset of possible actions for applying the artifact's structural features).
Sophistication	The sophistication of the artifact's feature set, and the goals and tasks that are supported by that feature set.
Spirit	The general intent with regard to values and goals underlying the artifact's structural features.
Conflict Management	The degree to which the artifact emphasizes full user agreement (ask for users' consent), and emphasizes conflict awareness as opposed to conflict resolution.
Atmosphere	The degree to which the interaction with the artifact is structured and formal.
Information Processing	The type of promoted information processing methods.
Cooperativeness	The degree to which the advisor allow users' to participate and cooperate throughout the interaction.
Efficiency	The degree to which effort or timesaving are emphasized.
Other Sources of Structure	External constraining factors that can affect the structure of the interaction.
Task Goal	The goal (context) of the task being performed.
Task Object	The type of object for which the task is performed.
Technology Constraints	Constraints relating to the technology infrastructure used during the interaction.
Time Constraints	Constraints relating to time and effort aspects of the task.
Internal System	Users' inherent characteristics that can affect the structure of the interaction.
Knowledge and experience with structure	Users' knowledge and experience with similar tasks, and/or using the artifact.
Customer's information seeking behavior	The manner in which users' seek and process information, and their preferences in terms of the type of information sought.
Style of interaction	The user's style of interaction, whether democratic, dominant or supportive of conflict management.
Appropriation	
Moves	
Size	Increasing or decreasing the number of features used.
Network	Combining features.
Content	Changing the features used.
Faithfulness	The degree to which appropriations are true to the artifact's spirit.
Content	
Role	Artifact-level appropriations that are performed with the goal of changing the role the artifact performs

Process	Artifact-level appropriations that are performed with the goal of changing how the artifact performs its role
Communication	Artifact-level appropriations that are performed with the goal of specifying how the artifact communicates what it performs
Object-Based Beliefs	Beliefs about the artifact's characteristics or behaviors.
Individualistic	
Target-Level	Beliefs that relate to the artifact's inherent characteristics.
Interaction-Level	Beliefs that relate to the artifact's characteristics in the context of the interaction.
Evaluations of Interaction Outcomes	
Quality	User's perceived quality of the interaction outcomes.
Commitment	The degree to which the user is committed to the decision.
Consensus	The degree to which the user believes that there is a full agreement on that decision.
Artifact Evaluations	
Cognitive	Beliefs about the utilitarian benefits and costs of interacting with the artifact.
Emotional	Beliefs regarding users' affective states while interacting with the artifact.
Social	Beliefs about the social outcomes of interacting with the artifact, excluding any outcomes pertaining to the exchange itself.
Relational	Beliefs concerning the exchange aspects of the interaction with the artifact.
Relationship Evaluations	
Interdependence	The degree to which the artifact and the user influence one another's experiences.
Level of dependence	The degree to which the user relies on the artifact.
Mutuality of dependence	The degree to which the user and the artifact are equally dependent on one another.
Basis of dependence	The way the user and the artifact affect one another's outcomes.
Covariation of interests	The degree to which the user's and the artifact's outcomes correspond.
Intimacy	The perceived closeness with the artifact.
Responsiveness	The degree to which the artifact is perceived as understanding, caring and validating.
Disclosure Degree	Perceived depth and breadth of disclosures communicated throughout the relationship.

6. Appendix B: Examples of Propositions and Testable Hypotheses

Proposition	Example Testable Hypotheses
P1 Design Characteristics will affect appropriation	- Comprehensiveness ➔ + appropriation moves. - Restrictiveness ➔ + appropriation faithfulness, - appropriation content. - Sophistication, communicability ➔ + appropriation content. - Atmosphere (formal, structured) ➔ - appropriation moves, - appropriation content.
P2 Other sources of structure will affect appropriation	- Task goal (shopping vs. informative) ➔ + appropriation moves. - Task object (high involvement) ➔ + appropriation content. - Time constraints ➔ + appropriation moves. - Technological constraints ➔ - appropriation content.
P3 Internal system will affect appropriation	- Knowledge and experience with structure ➔ + appropriation moves, + appropriation content. - Information seeking behavior ➔ appropriation moves. - Style of Interaction ➔ appropriation moves, content.
P4 Appropriation (moves, faithfulness, and content) will affect object-based beliefs	⇑ Appropriation moves ➔ + system quality, + service quality, + service functionality, + rapport. - Appropriation faithfulness ➔ + system quality. - Appropriation content ➔ + information quality, + system quality, + service quality, + service functionality.
P5 Object-based beliefs will affect evaluations of the artifact	- System quality, service quality, information quality, service functionality ➔ + PU. - Rapport ➔ + social presence, + trust, + PEU.
P6 Object-based beliefs will affect evaluations of the interaction outcomes	- System quality, service quality, information quality, service functionality ➔ + outcome quality. - Rapport ➔ + outcome commitment, outcome consensus.
P7 Interaction structure (appropriation and object-based beliefs) will affect perceived interdependence (level and basis of interdependence)	- Appropriation moves ➔ - level of dependence. - Appropriation content ➔ + level of dependence, + basis of dependence. - Rapport ➔ + level of dependence.
P8 Level of interdependence will affect future appropriation intentions	Level of dependence (high) ➔ + appropriation moves
P9 Evaluations of the artifact will affect reuse intentions	PU, PEU, social presence, trust, enjoyment ➔ - reuse intentions.
P10 Evaluations of the interactions outcomes will affect reuse intentions	- Decision quality, consensus, commitment ➔ - reuse intentions.
P11 Evaluations of the artifact will affect future appropriation intentions	- PEU, trust ➔ + future appropriation moves. - Social presence, trust ➔ + future appropriation content.
P12 Evaluations of the interactions outcomes will affect future appropriation intentions	Decision quality ➔ + future appropriation moves.