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ABSTRACT:

Existing research identifies multiple types of uses, ranging from initial adoption of technology to uses that have been described by terms like adaptive system use, enhanced use, etc. Additionally, literature shows that researchers have used different instruments when using similar terms. Together, the lack of understanding of different types of use and the lack of coherent measures for use leads to construct validity problems. In this paper we aim to distinguish between the different types of uses, followed by isolating the key measurement items for each use type. The paper uses a modified Q-sort method to classify the different use measurement items. Findings indicate that there are three types of uses and distinct measurements. This study lays important groundwork for future research into the three types of use and is a first step in creating scales for these use constructs.

Keywords

IT use, initial use, continued use, novel use, Q-sort, card sort

INTRODUCTION

Practitioners use technology everywhere. The average American checks his/her smart phone 47 times per day (Deloitte 2017). Technology "use" happens each time someone swipes their smartphone or processes an invoice in an enterprise resource and planning (ERP) system. Use is how the benefits of technology are realized (Delone and McLean 2003; Straub and del Giudice 2012).

Despite its centrality, the conceptualization of "use" in IS literature suffers from two issues. The first issue relates to the definition of the "use" construct. A review of the literatures shows that there is no agreed-upon definition of "use" (Burton-Jones and Straub 2006; Stein et al. 2015) and many articles that study "use" do not give a definition of this critical construct when it is employed in their research (e.g. Kim 2009). Not having a clear and consistent definition of a construct leads to subsequent construct validity issues highlighted in previous literatures (Bagozzi 1980; Goodhue 1998; MacKenzie et al. 2011).

The second issue with the "use" construct is how it has been measured. Wide variation in measures of "use" hinders the generalizability of findings and impedes the increase of knowledge and theoretical development (Straub and del Giudice 2012; Straub et al. 1995).

In this paper, we aim to alleviate these gaps by 1) reviewing the literature to classify "use" into appropriate categories 2) defining each use type and 3) using a pool of existing measurement items to identify the appropriate measures for each use type identified. The next section presents the literature review and identifies the major kinds of uses in the literature. Section three outlines the Q-sort method used to pare down the items used in existing studies. Respondents sorted existing measure items into categories of "use" defined in step 2. This method was chosen for its wide acceptance in the IS literature (Prat et al. 2015). The final section presents our results and our interpretation of the same.

LITERATURE REVIEW & THREE TYPES OF IT USE

Prior literature generally recognizes these two broad categories of "use": Adoption and post-adoption. Both adoption and post-adoption articles are examined for their definition of "use", how "use" was measured and the underlying theory. The other dimension on which these measures can be classified is the subjective vs. objective measures. Many (post) adoption studies employ subjective measures when measuring "use" while objective measures occur most commonly in adoption studies when researchers try to measure "actual usage behavior". Table 1 shows a summary of the theories and measurement types employed in adoption and post-adoption papers.

	Adoption studies	**Post-adoption Studies**
Subjective Measures	Taylor and Todd (1995) - TAM, TPB Agarwal and Prasad (1999) - TAM Hu et al. (1999) - TAM Karahanna et al. (1999)* - TRA/TPB/TAM Venkatesh et al. (2000)* - TPB Saadé and Bahli (2005) - TAM Venkatesh et al. (2008)* - UTAUT, TAM2	Karahanna et al. (1999)* - TAM/TRA/TPB Venkatesh and Davis (2000)* - TAM2 Bhattacherjee (2001) - ECT Bhattacherjee and Premkumar (2004) - EDT/TAM Subramani (2004) - Learning and Action Ahuja and Thatcher (2005) - Theory of Trying Kim and Malhotra (2005)* - TPB/TRA Kim et al. (2005)** Burton-Jones and Straub (2006)** Lankton et al. (2010)* - Learning Theory Sun (2012)** Sun and Teng (2012) - TRA Liang et al. (2015) – AST Rezvani et al. (2017) - Self-determination
Objective Measures	Gefen and Straub (1997) - TAM Venkatesh et al. (2000)* - TPB Venkatesh et al. (2003) - UTAUT Burton-Jones and Hubona (2005) - TAM Venkatesh et al. (2008)* – UTAUT, TAM2	Venkatesh and Davis (2000)* - TAM2 Kim and Malhotra (2005)* - TPB/TRA Devaraj et al. (2008) - TAM Lankton et al. (2010)* - Learning Theory
* Papers that study both adoption and post-adoption use and papers with both objective and subjective measures are included in multiple cells. ** No theory given AST = Adaptive Structuration Theory, ECT = Expectation Confirmation Theory, EDT = Expectation Disconfirmation Theory, TAM = Technology Acceptance Model, TPB = Theory of Planned Behavior, TRA = Theory of Reasoned Action, UTAUT = Unified Theory of Acceptance and Use of Technology, TAM2 = Technology Acceptance Model 2		

Table 1. Measure Types and Theories in Use Studies

Table 1 shows that there is currently high fragmentation and, therefore, low generalizability in the use literature as evidenced from the plethora of theories employed to examine the "use" construct, and variations in how "use' is measured. Further, "use" is not conceptualized consistently in post-adoption literature, with constructs such as: "Novel use" (Ahuja and Thatcher 2005), "exploitive use" and "exploratory use" (Burton-Jones and Straub 2006), "habitual use" (Ortiz de Guinea and Markus 2009), "continued IT use" (Lankton et al. 2010), "adaptive system use" (Sun 2012), and "enhanced use" (Bagayogo et al. 2014) among others. These many types of "use" have nothing to bind them together. For example, some of the conceptualizations, such as "enhanced use", defined as, "using a formerly unused set of available features, using an IT feature for additional tasks, and using features extensions. Enhanced use also has key attributes: locus of innovation, extent of substantive use, and adaptation" (Bagayogo et al. 2014, p. 362) and "habitual use," defined as, "over time, in stable contexts, continuing IT use becomes habitual, which means that well-learned action sequences may be activated by environmental cues and then repeated without conscious intention" (Ortiz de Guinea and Markus 2009, p. 434) are antithetical to one another. Given this fragmentation, we chose a qualitative method to reduce these use constructs into appropriate categories. The next section outlines the methods used.

METHODS

The following steps were taken to achieve the objectives outlined earlier.

Step 1: Categorize Use types

Inherent in the idea of structures leading to three types of use is that the three types of use are distinct from one another and that researchers and practitioners can distinguish them from one another. We categorized existing IS papers based on the definitions of initial, continued, and novel use above. The key difference between these types of use are the intentions of the user when interacting with the IT. The authors iteratively achieved 100% agreement on how to classify existing papers. Classifications were made based on the theory used, the nature of the use variable, and the antecedents to use. Results of step 1 are presented in Figure 1.

Initial Use	Continued Use	Novel Use
• First-time use (Bhattacherjee 2001) • Adoption Studies	• Exploitive use (Burton-Jones and Straub 2006) • Continued use (Bhattacherjee 2001; Karahanna et al. 1999) • Habitual use (Ortiz de Guinea and Markus 2009) • Automatic use (Ortiz de Guinea and Webster 2013)	• Novel use (Ahuja and Thatcher 2005) • Enhanced use (Bagayogo et al. 2014) • Exploratory use (Burton-Jones and Straub 2006) • Extended system use (Liang et al. 2015) • Post-adoptive use (Jasperson et al. 2005; Sun 2012) • Adaptive system use (Sun 2012) • Expectable use (Walsh et al. 2016)

Figure 1. Three Types of IT Use

The intention of a user in initial use is to incorporate the technology into his/her work patterns, termed adoption. During initial use, users take in the new technology and seek to make sense of it and understand it. Initial use is use of technology while the user is learning the IT (Karahanna et al. 1999; Venkatesh et al. 2003). Initial use is characterized by the use of features of the technology that the user was trained to employ (Burton-Jones and Straub 2006). The user also gains broader understanding of the features of the technology.

The intention of a user in continued use is to increase his/her time efficiency (Burton-Jones and Straub 2006; Ortiz de Guinea and Webster 2013) and minimize how much mental effort must be exerted to use the technology (Arnott et al. 2017; Kahneman 2003). Continued use is the use of a technology after the user has incorporated the technology into his/her work patterns. Continued use is characterized by using known features of a technology without needing to put much effort into using them (Jasperson et al. 2005; Limayem et al. 2007; Ortiz de Guinea and Markus 2009).

The intention of a user in novel use is to increase how effective he/she can be with a technology. Novel use is when users try to innovate what tasks they can do with an information technology (Ahuja and Thatcher 2005). This means they may use familiar features in new ways or begin to use features of the technology that they have not used before (Walsh et al. 2016).

Step 2: Q-sort

137 subjective and objective survey items for measuring "use" were extracted from papers in the literature review. To make the items more generic, we replaced the names of specific technologies with "[technology]", and items that contained phrases related to tasks in the original survey contexts were also made generic.

After removing for duplication and ambiguous statements, 77 measurement items remained in the set. Due to the theoretical foundation of the three types of use, we elected to skip unlabeled sorting and move directly to labeled sorting (Nambisan et al. 1999). Participants were asked to sort the 77 statements into four categories (initial, continued, novel and none of the above). We provided shorter definitions of the types of use than those given above to allow them to draw their own conclusions about the definitions and how the items should be sorted and to avoid biasing the respondents. The following definitions were given to the respondents. Bolded words in the definitions were later used for key word analysis.

- **Initial** Use- Use while the user is **adopting** and **learning** the information technology.
- **Continued** Use- Use of an information technology after the user has **incorporated** the technology into his/her **work** patterns.
- **Novel** Use- Novel use is when users try to **innovate** what tasks they can do with an information technology.

Forty-one IT professionals working at a large university in the Southern United States were invited to participate in the sort via a personalized email from the lead author. Thirteen usable responses were gathered over the course of two weeks (response rate = 32%). Results were anonymized. All but one respondent reported earning at least a bachelor's degree and twelve of the thirteen respondents had at least six years' experience as an IT professional. 77% of the respondents were male. A criterion of 50% to identify an item as sorted with a particular use type (7 or more sorts out of 13) – See Table 3.

Category	Type from Paper	> 50% Sorts	Sorts Match Use Type from Paper
Initial Use	20	3	3
Continued Use	29	32	19
Novel Use	28	13	13
"None of These"	--	5	--
No Category > 50%	--	24	--

Table 3. Sort Results

Step 3: Key Word Analysis

We identified key words in each of the three definitions of use given to respondents. These key words included the name of the type of use as well as any non-generic words given in the definition that were unique to that definition. For example, key words for initial use included "initial", "adopting", and "learning." Of the 77 statements given, 2 contained a key word for initial use, 15 for continued use, and 3 for novel use. When key words are compared to how survey respondents sorted statements, the items with over 50% of the sorts had 1, 11, and 2 key words in common with the definitions of initial, continued, and novel use respectively. The key word analysis is summarized in Table 4. Based on these numbers we observe there is a significant difference between the number of statements with key words identified and the number of statements where the sorts match key words. Thus, we conclude that key words did not play a significant part in the process of sorting statements into one of the three types of use.

Category	> 50% Sorts	Statements with Key Words Identified	Sorts Match Key Words
Initial Use	3	2	1
Continued Use	32	15	11
Novel Use	13	10	3

Table 4. Key Word Analysis Results

CONCLUSION

This research into the three types of use makes two significant contributions to the literature. The first is to theory. This research identifies how the three types of use are present in existing papers on use and that they are distinct from one another, as evidenced by the items that were sorted into a particular type of use by more than half of the respondents. This research promotes consistency in the IS use literature by showing how extant literature has studied these three types of use and provides a foundation that future studies can reference instead of the many niche use constructs that have previously been studied (Williams and Gupta 2018).

The second contribution is developing a more refined understanding of how use may be measured. Continued use received disproportionately large and initial use received a disproportionately small share of sorts, indicating that clearer definitions of the types of use are needed. We show that extant papers have included survey items that relate to continued use instead of initial use. This research promotes consistency in the IS use literature by showing how extant literature has studied these three types of use and gives a foundation that future studies can reference instead of the many niche use constructs that have previously been studied (see Figure 1).

With validation of the constructs, future research into use may investigate antecedents to these use constructs. This could be done by analyzing what theories are most prominent for each type of IT use and then identifying extant and potential antecedents. Of particular interest would be antecedents to one type of use not present in other types of use. These antecedents may then be used as "triggers" by practitioners to motivate users to engage with a technology in a desired way. Unique antecedents may also serve as indicators of a particular type of use to practitioners and researchers. Other research may investigate how a user would move from one type of use to another. Longitudinal studies in this area could map when and how a user move from initial use ,when first introduced to a new IT, to continued use after a time, and then to novel use and perhaps even back to initial use (Williams and Gupta 2018).

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