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Examination of Software Reuse in Information Systems Projects

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Abstract

We examine software reuse by individuals in information systems (IS) projects. We draw on the Technology Acceptance Model (TAM) and DOI literatures to inform out theoretical framework. We propose to use a survey methodology to collect data and LISREL to analyze our data.

Introduction

Software reusability is widely seen as one of the major areas for improving software productivity (Kim and Stohr, 1998; Sherif and Vinze, 1999). Research has shown that software reuse can lead to an order of magnitude gains in software development productivity (Banker and Kauffman, 1991). However, it is not widely practiced in the industry in spite of its touted advantages (Kim and Stohr, 1998).

Many reasons have been cited for the lack of widespread acceptance and practice of software reuse in organizations. First among those reasons is that it has not been as effective as expected (Kim and Stohr, 1998). Other reasons cited are lack of appropriate tools to catalog, refine, and compose reusable resources, lack of formal representation for reusable resources, lack of managerial and organizational support, etc.

A survey of the literature shows that no systematic investigation has been done to examine reuse by individuals in information systems projects (Kim and Stohr, 1998; Sherif and Vinze, 1999). In this study, we propose to examine reuse using established theories in IS implementation and DOI literatures. We examine reuse at individual level as success of any reuse project depends on the initiatives of individual project members. Below, we describe our proposed theoretical framework and methodology to better understand the software reuse by individuals in IS projects.

Proposed Theoretical Framework for Examining Reuse

Software reuse is practiced at the individual level, although organizations and groups can mandate reuse. The TAM has been widely used for predicting the acceptance and use of information technologies (IT) in the IS implementation literature (Venkatesh and Davis, 1996). We argue that TAM can also be used to understand software reuse by individuals in IS projects. Although the focus of this study is to understand reuse at the individual developer level, one should keep in mind that organizational factors are important facilitators and inhibitors of software reuse (Kim and Stohr, 1998; Sherif and Vinze, 1999).

The TAM is an application of the Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1975). TAM posits perceived usefulness and perceived ease of use as two beliefs that determine user's attitude towards their intention to use, and actual usage (Davis, Bagozzi, and Warshaw, 1989) (see Fig. 1). Intention to use is in turn the sole direct determinant of actual usage.

From their field study, Sherif and Vinze (1999) found the importance of developer characteristics in reuse usage. Unfortunately, the TAM does not take into consideration individual characteristics. On the other hand, the DOI literature shows that individual characteristics along with the characteristics of the innovation, communication channel type, and communication channel source are important determinants of diffusion of any innovation at the individual level (see Fig. 2) (Rogers, 1995; Brancheau and Wetherbe, 1990; Huff and Munro, 1989; Leonard-Barton and Deschamps, 1988; Agarwal and Prasad, 1999). Thus, it makes sense to draw on these two important but separate research streams to derive a theoretical framework for examining reuse by individuals. Karahanna, Straub, and Chervany (1999) have previously done the same to examine pre-and post-adoption beliefs of individuals.

Figure 3 shows a consolidation of the extended TAM (Taylor and Todd, 1995) and Innovation Diffusion models. We used extended TAM instead of TAM because a review of the reuse literature showed that technology infrastructure and resource facilitating condition are important facilitators of reuse. We kept the core of the extended TAM model. The only difference from the original model is the “ease of use” construct in place of “perceived ease of use,” and “relative advantage” in place of “perceived usefulness”. We have shown the “ease of use” construct influencing individual attitude directly, and indirectly through the “relative advantage.”

We have also kept the core of the DOI theory at the individual level, with some modifications. It is important to keep in mind that the DOI theory postulates diffuison of an innovation at individual level to proceed through

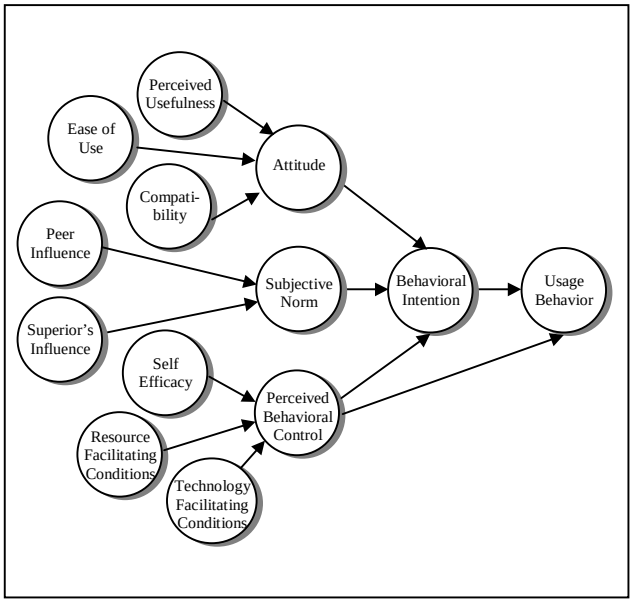

Figure 1. Extended Technology Acceptance Model

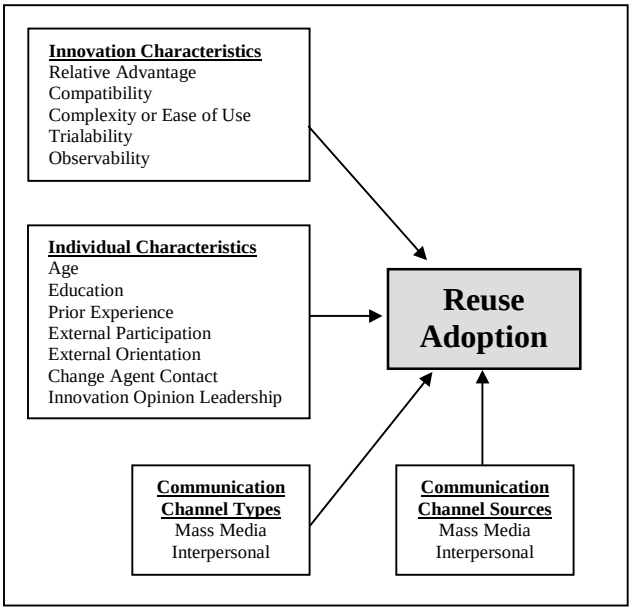

Figure 2. Individual Innovation Diffusion Model

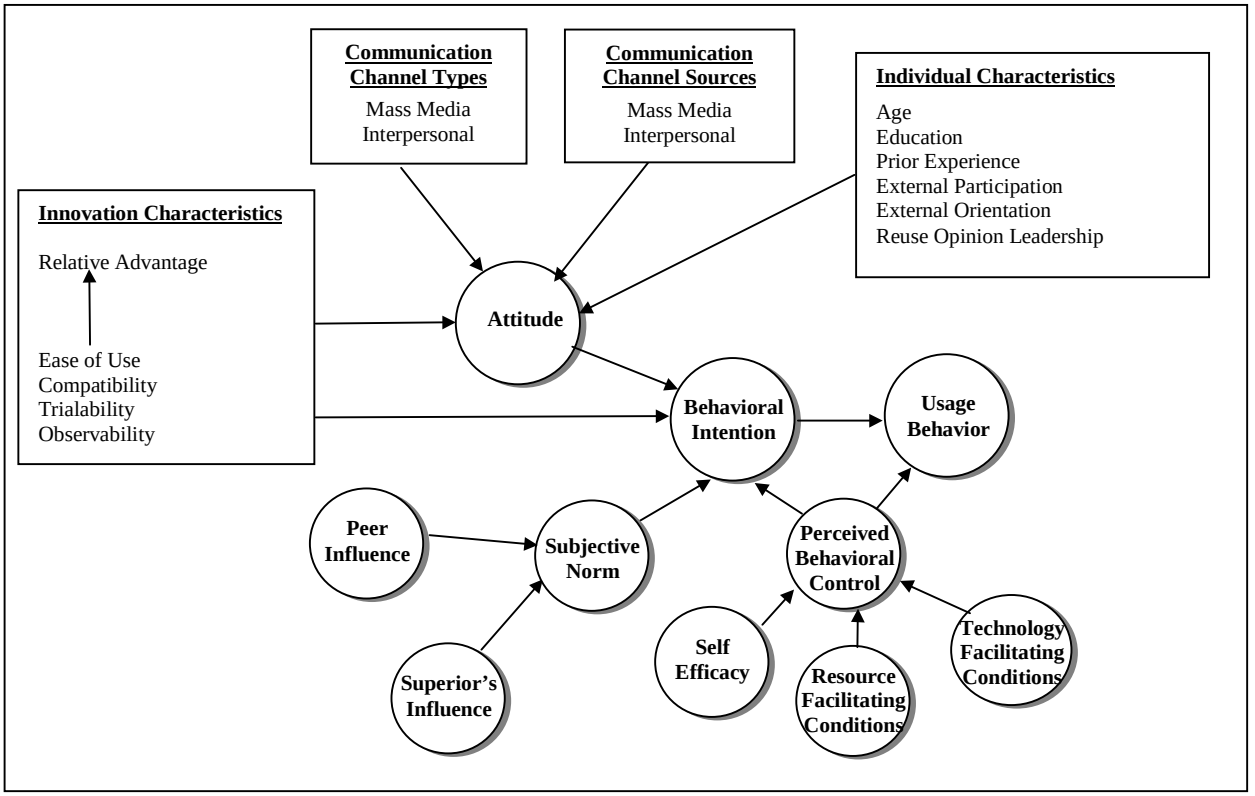

Figure 3. Theoretical Framework for Individual Reuse

knowledge, persuasion, decision, implementation, and confirmation stages (Rogers, 1995). Implementation occurs when an individual puts an innovation to use. Until the implementation phase, innovation decision process is strictly a covert exercise. It can be argued that the TAM is applicable during the persuasion, decision, and implementation stages because it assumes that attitude is influenced by perceived ease of use and perceived usefulness. Since these two constructs are also characteristics of any innovation, we argue that, in general, attitude is influenced by innovation characteristics. We further postulate that attitude is influenced by both type and source of communication channels and individual characteristics. Consistent with our treatment of attitude, we suggest that innovation characteristics will also influence behavioral intention.

Methodology

Similar to previous studies on innovation diffusion, we plan to use survey methodology to collect data. A review of the literature shows that most of the constructs in our research model have been operationalized previously. We plan to adapt them to fit the context of reuse. We will add additional items to these instruments if our research shows they don't fully capture the domain of the construct(s) they are intended to measure. We plan to develop our instrument following Churchill (1979). We plan to extensively pretest this version with a small scale survey. Then we plan to pilot test our instrument with a large scale survey. Subsequently, after necessary modifications to the instrument, we plan to do another large scale survey to collect data for analysis purposes. We plan to use LISREL as the data analytic method.

Conclusions

We have presented a theoretical framework for examining individual reuse behavior in IS projects. The framework has been derived by consolidating TAM and DOI literatures. An empirical test of the model is underway. This study when completed will shed further light on our understanding of individuals' behavior in IS projects involving reuse. It will also substantiate (one way or the other) many anecdotal evidences present in the practitioner literature, and put them on a solid empirical footing.

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