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Diffusion and Infusion: Two Dimensions of “*Success of Adoption*” of IS Innovations

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Abstract

As the IS discipline matures, it is important to establish common terms and definitions to achieve the long-sought goal of a cumulative tradition in the field. It is with this intent that this paper attempts to synthesize some key literature in the area of IS/IT adoption and implementation for developing the concept of “success of adoption” as the key adoption success construct. The paper further develops this construct and suggests that there are two dimensions to “success of adoption” - diffusion and infusion. The paper finally concludes by reconciling some terms that have been used in the IS adoption and implementation literature using this “success of adoption” construct.

Introduction

The current state of research dealing with IS/IT adoption and implementation is quite similar to the one DeLone and McLean encountered in their classic research on IS success (DeLone & McLean, 1992). While research in the area of IS/IT adoption and implementation has a long history and is quite established in the IS/IT literature, there are still no commonly accepted process models and terms to capture, describe, and measure the phenomenon of the adoption of IS/IT innovations.

Researchers in the social sciences and IS communities have proposed different models of the adoption process to provide a better understanding of the phenomenon of adoption of technological innovations from a process perspective¹. Researchers interested in studying the antecedent factors of the adoption process and/or the characteristics of the adopters, the social system, or the environment have used one of the several available constructs from these process models to capture adoption as the dependent variable. Constructs such as adoption, implementation, institutionalization, routinization, incorporation, infusion, and deployment have been used by IS researchers in factor studies of IS/IT adoption to understand the factors and characteristics that impact adoption of such innovations. While the aforementioned adoption constructs are rich in meaning and connote differences in the stage of adoption or its context, they also have a substantial degree of overlap with each other. To reconcile the overlap between these constructs and to develop some common terms in the IS literature, this paper develops the notion of “success of adoption” in the following paragraphs.

Success of the Innovation Adoption Process

It is necessary to put the innovation adoption process in perspective to develop the notion of “success of adoption.” Adoption of a technological innovation occurs as a series of events over time. This is termed the “innovation adoption process.” As was mentioned before, different authors provide different process models to capture the stages an innovation and the adopting units pass through as the adoption process unfolds (Cooper & Zmud, 1990; Fichman & Kemerer, 1997; Kwon & Zmud, 1987; Rogers, 1995). Even though these authors use different terms and definitions for the adoption phenomenon, two common themes clearly emerge out from their descriptions and definitions of the adoption process. First, adoption as an event is a **decision** by the adopting unit to make use of an innovation. Second, post-adoption behaviors would necessarily include **use** of the innovation to some extent by the adopting unit for the adoption process to be complete.



Figure 1. Innovation Adoption Influence Diagram

graphically shown in Figure 1.

There are antecedents and characteristics of the potential adopters, the social system to which the adopters belong, and the environment that impact the unfolding adoption process (e.g., the role that opinion leaders play during the adoption process or an adopter’s socio-economic status generally impact the adoption process). After the adoption process is complete, the outcomes or consequences from the adoption process emerge. This is

¹The reader is referred to Franz and Robey (1987) for an excellent discussion about the objectives of and distinctions between process and factors research.

This perspective suggests that there are three major categories of variables of interest in the phenomenon of innovation adoption. They are: 1) the adoption antecedents, 2) the adoption process itself, and 3) the adoption outcomes. Therefore, based on this perspective, adoption success can be discussed either at the adoption process level or at the adoption outcomes level. The notion of success at the adoption process level gives rise to the idea of “*success of adoption*,” while the notion of success at the adoption outcomes level can be thought of as “*success from adoption*.”

From a process perspective, an innovation adoption process can be deemed to be successful when an innovation is successfully adopted and used by most, or all, of the adopting units within the community of potential adopters. This process success is termed “success of adoption.” On the other hand, designers of an innovation design the innovation with the hope that its adoption by potential adopters will provide them with some desired benefits. Realization of these potential benefits (outcomes) of an innovation by the adopting units can be termed “success from adoption.” This is graphically shown in figure 2. In the case of most modern-day IS/IT innovations, *success of adoption* is a necessary prerequisite for achieving *success from adoption*. This is shown as a dotted arrow in Figure 2.

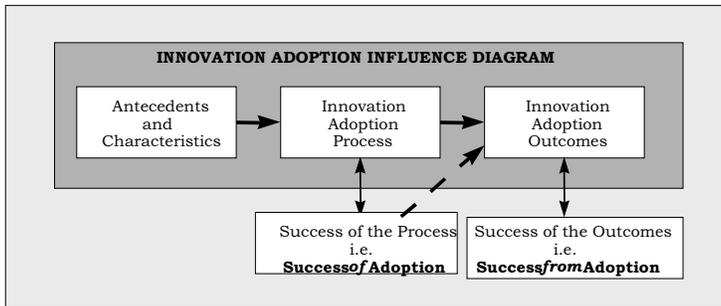


Figure 2. Success Model of Innovation Adoption

Thus, there is duality in the notion of innovation adoption success. While the construct “success of adoption” deals with the success of the adoption process itself, the construct “success from adoption” applies to the success of adoption outcomes. We are interested in this paper in the construct “success of adoption” and expand further on this notion in the following paragraphs.

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While there are two dimensions to the higher level innovation adoption success construct as discussed above (“success of adoption” vs. “success from adoption”), there

are also two underlying dimensions to the “success of adoption” construct. We have discussed above that “success of adoption” occurs when *most, or all*, of the adopting units within the community of potential adopters *adopt* and *use* the innovation successfully. This description indicates that, first of all, the innovation should be adopted widely - by most, or all, of the adopting units - within the community of potential adopters for the adoption process to be successful. This is the *breadth* dimension of the innovation adoption process and, therefore, of the “success of adoption” construct, and is covered by the classic term “*diffusion*” of innovations in the literature (Rogers, 1995).

Second, the adopted innovation should be successfully used by the adopting unit; i.e., it should be put to full and complete use by the adopters in the manner intended by the designers of the innovation. However, if the innovation is adapted to suit local conditions, successful use of the innovation occurs only when the innovation is used in a manner that enables full and complete use of the features and functionality of the adapted innovation. This is the *depth* dimension of the innovation adoption process and, therefore, of the “success of adoption” construct, and has generally been referred to as “*infusion*” of innovations in the literature (Cooper & Zmud, 1990; Fichman, 1995; Tornatzky & Klein, 1982; Zmud & Apple, 1992). This dimension is also consistent with suggestions in the literature that an innovation adoption process can be deemed to be complete only when post-adoption behaviors include use of the innovation to some extent.

Thus, when an innovation is adopted by a large number of potential adopters in the community of adopters, it is said to have diffused. On the other hand, an innovation that is used by its adopter(s) in a full and complete manner, the innovation can be said to have infused. While the literature has drawn a distinction between the terms diffusion and infusion (Fichman, 1995; Tornatzky & Klein, 1982), it has not been so clearly made. Moreover, this distinction does not differentiate between diffusion and infusion as two dimensions of the success of adoption process. These two dimensions of success of the adoption process are shown in figure 3 in the two-dimensional model of “success of adoption” construct. This model is used in this paper to reconcile some common terms that have been used in the IS literature to refer to the final stage of the innovation adoption process.

Reconciling Some Terms for the Final Stage of the Innovation Adoption Process

The IS/IT adoption and implementation literature has provided and used different terms to denote the final stage of the innovation adoption process. Terms such as institutionalization, routinization, and incorporation have been used to denote the stage in the unfolding adoption process during which an innovation becomes an integral part of the regular work-routine in the adopting organization. These terms can now be reconciled using the two-dimensional model of the “success of adoption” construct.

An innovation will become institutionalized, routine, or incorporated in an organization when two conditions are met. First, most, or all, of the individual members of the adopting organization must adopt the innovation; i.e., the innovation should diffuse highly within the adopting organization. Second, each individual adopter should fully and completely use the innovation by making it a regular part of their work routine; i.e., the innovation should infuse highly amongst individual members of the adopting organization. Thus, when an adopting organization achieves both a high degree of diffusion and infusion of an innovation, the innovation will become incorporated, routine, or institutionalized within that organization. This is indicated on the success model in Figure 3 in the top right-hand corner of the diagram.

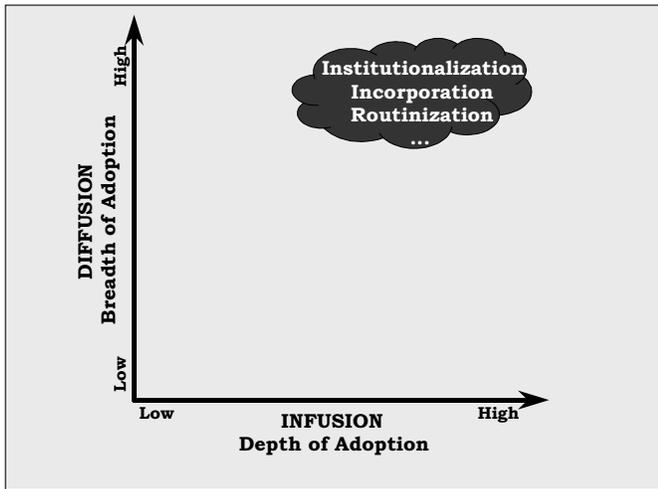


Figure 3. Two Dimensions of “Success of Adoption”

Contributions

This model of "success of adoption," with its two dimensions - diffusion and infusion, seems to be parsimonious and yet powerful enough in that it is not only able to provide a simple way of understanding the adoption dependent variables, but it is also able to reconcile overlap in some of the terms that have been proposed and used in the literature for denoting the final stage of the innovation adoption process. It is hoped that researchers interested in studying the phenomenon of IS/IT adoption will find this model useful in their research. We further hope that the adoption success model will provide some impetus to the IS research community to undertake further research with the intent of 1) reducing the number of terms and definitions, and 2) providing rigorous definitions and robust measures for the terms and variables we most commonly use in the IS literature, specifically in the area of IS/IT adoption research.

References

References are available upon request from the first author (rikshore@gsu.edu).