

INFORMATION SYSTEM RESPONSE MODEL: AN EXTENSION OF THE TAM MODEL

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Summary

Inventors and visionaries have made remarkable strides in information technology development. Increasingly, information technology is viewed as a critical source of firm competence and is expected to make a valuable contribution to the functioning, processing, and service provided by an organization. Information technology investments now represent approximately half of all global capital investments. The implementation of information systems has become an increasingly popular information technology initiative. The race to standardize systems and keep up with technological advances, however, comes at a high price. Information systems provide the potential for vastly improving the performance of individuals and organizations. Yet, performance gains are often not realized due to users' unwillingness to optimize the use of information systems.

1. Introduction

Information systems are commercial software packages that promise the seamless integration of all the information flowing through a company including financial and accounting, human resource, supply chain, and customer information. Information systems are designed to defragment information in large businesses where data are typically spread over hundreds of computer systems each completing an individual function in an individual region and/or office. Each of these systems performs processes

integral to the organization's function, but often cause lag time in the efficiency of the organization's performance. A successful information system is one that becomes an organization's central database where its functions and processes transcend every department, unit, region, and country. Information systems are designed to update information in real time where data is inputted and the related information is automatically updated. The information system can cut days of communicating between various departments down to a few seconds. Additionally, information systems can reduce the margin of error for miscommunication.

When information systems are not optimized, the dissemination of necessary information for management becomes a difficult and laborious chore. A potential trap exists for information technology professionals who construct elaborate technology architectures and enterprise information models to guide system development. Technocratic solutions often disregard how people in organizations actually go about acquiring, sharing, and making use of information. In other words, organizations and information technology professionals often get so caught up with the details of the process function, they lose sight of the practical application of the system to the people who will use it. This causes a problem because a system is not fully utilized and runs the risk of becoming useless.

Often, information system transformation in organizations entails a large number of simultaneous changes. It is not likely that these changes will only affect a single aspect of an individual's job. Even less likely is the chance that all individuals affected will view the consequences similarly. Based on different perceptions and interpretations, some employees will define themselves as "winners," making them more likely to accept the information system. These workers are energized by the adoption and use of information systems and consider using the information system as an opportunity for personal growth. Self-perceived "winners," may perceive the new or enhanced information systems as useful for accomplishing their job requirements and/or perceive the technology as easy to use. These perceptions may increase the odds that this group of end-users applies an active and constructive approach toward the information system. Also, others will define themselves as "losers." These workers may pay a high price when a new or enhanced information system is introduced. Most likely, workers in this category will resist technology-induced changes. Technology initiatives are often justified through reductions in staff, thus increasing the workloads of survivors. Trust and morale often erode as workloads increase and job insecurity escalates. The process of change entails a certain amount of current disruption-assuming new jobs, learning new skills, or even simply working harder and longer. "Losers" do not consider this a fair exchange for improved future job prospects with the firm. Thus, this group of end-users may adopt a destructive and/or passive response toward the information system. Finally, others may reluctantly accept and use a new or enhanced information system. This group views use of the information system as satisfaction of normative expectations imposed by specific referent individuals or groups. Thus, individuals in organizations react quite differently to information systems. Information systems can assist employees to do their jobs better, but only if they are willing to use the information system effectively. Unfortunately, many (information technology) applications are misused, underutilized, or abandoned. Thus, a better understanding of the relationships between end-users' cognitive and affective reactions and their

behavioral use of information systems is integral for raising an organization's productivity.

The Technology Acceptance Model (TAM) is recognized as a robust theoretical model for explaining information system use. The model is also useful for practitioners for predicting the adoption of new information systems. TAM argues that users' develop perceptions about the usefulness and ease of use of various information systems and, in turn, user perceptions influence information system use. Empirical investigations by Davis and others indicate that the model may predict information system usage across a wide spectrum of settings, persons, and times. Despite the activity dedicated toward testing the reliability and validity of TAM, research has not extended to understanding the complex relationship between perceived usefulness, perceived ease of use, and information system use. Specifically, while the model explains the likelihood of information system usage, little attention has been paid to identifying the implications of different user responses to information systems. As a result, little theoretical and even less empirical evidence of the consequences of different user responses to information systems exists. To extend TAM, we adapt the exit, voice, loyalty, and neglect typology to explain different end-user responses to information systems and the consequences of those responses.

The purpose of this chapter is to examine the consequences of technology implementation and adoption in organizations. We do so by extending the theoretical framework of TAM, and by developing a model of user responses to information systems. The model reviews previous literature, and identifies the underlying cognitive, affective, and behavioral dimensions of the varied responses, identifies the potential consequences related to the different responses, and suggests opportunities for testing the model. This chapter is organized as follows. After introducing and briefly reviewing the literature about the Technology Acceptance Model (TAM), and a model of employee reactions to job dissatisfaction, the Information System Response Model is introduced. The chapter concludes with a discussion of the potential contributions of the Information System Response Model, implications for practice, and directions for future research.

2. Technology Acceptance Model

TAM was conceptualized to explain user acceptance of technology. The model can be used in a wide variety of ways. The model may be used by system designers to obtain user feedback of different system features or design approaches. TAM may also be used to diagnose problems with user acceptance after the implementation of technology. For this chapter, TAM is used to explain factors that influence the use of information systems.

The theoretical grounding for the model is the Theory of Reasoned Action. This theory hypothesizes that an individual's behavior depends on his or her intention to perform a function, the individual's evaluation with respect to the act, and the person's subjective norm or perception of the normative pressures regarding the behavior. The belief, attitude-intention-behavior sequence was adopted to explain user acceptance of information technology. TAM was intended to provide an explanation of the

determinants of information system acceptance that is both wide-ranging and able to explain user behavior across a broad range of technology applications and user populations. At the same time, TAM is intended to be both parsimonious and theoretically justified.

Perceived usefulness and perceived ease of use were hypothesized to predict usage of information technology. Perceived usefulness is defined as the level and degree to which an end-user perceives that using a particular information system would enhance his or her job performance. Perceived ease of use is defined as the level to which an end-user perceives that using a particular system would be free of effort. With theoretical support from various theories and models including expectancy theory, self-efficacy theory, cost-benefit research, innovation research, and the channel disposition model, TAM postulates that computer usage is a function of the end-user's behavioral intention to use the system. Behavioral intention was jointly determined by a person's attitude toward using the system as well as the end-user's perception of the usefulness of the system. TAM also postulates that perceived usefulness is influenced by perceived ease of use and external variables. External variables that influence perceived usefulness include features of the system, training, documentation, demographic characteristics of end-users, and end-user support. A diagram of TAM is included here as Figure 1. A number of studies have investigated the reliability and validity of TAM and have examined the model in different contexts. A summary of those studies is discussed next.

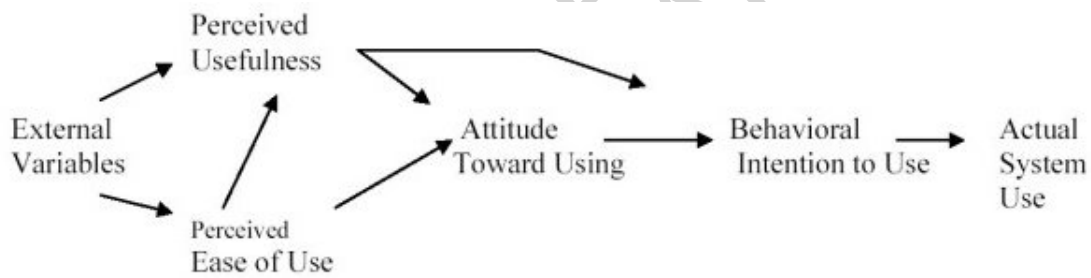


Figure 1: TAM

Numerous studies have evaluated the psychometric properties of the ease of use and usefulness scales. These studies also examined the relationship between the two constructs and system usage. Studies have confirmed the strong convergent and discriminant validity between and among the perceived ease of use and usefulness scales. Studies have also confirmed the significance of perceived ease of use and usefulness in predicting system usage.

One longitudinal study investigated subjects' perceptions of usefulness and ease of use over a 14-week period. Subjects were college graduate students and the study examined their use of a word processing program. The results of this study found that perceived usefulness strongly influenced the students' intentions. At the end of the 14-week period, perceptions of usefulness explained half of the variance in intentions. Perceptions of the ease of use of the program were also significant, but explained less of the users' intentions. Also, the significance of ease of use perceptions diminished during the study period.

Others investigated whether TAM applied to different cultures. The findings of this study suggest the model may not be appropriate for predicting information system use across all cultures. This study's subjects were American, Swiss, and Japanese airline employees who used E-mail. Research results indicate the model holds for American and Swiss employees, but not for the Japanese employees.

The Japanese employees reported that neither perceived usefulness nor perceived ease of use were significant predictors of information system usage. The researchers suggested that cultural specific tendencies toward more uncertainty avoidance, greater power distances between managers and workers, collective sentiments, and assertiveness may limit E-mail use and disassociate usefulness from use.

Others have researched TAM by investigating the relationship between perceived usefulness and ease of use and system usage among different genders. The findings of this study indicate that women and men differed in their perceptions, but not their use of an E-mail system.

Women perceived a higher value for perceived usefulness than men, while men's rating of perceived ease of use of E-mail was significantly higher than women's. The findings of these studies suggest that researchers should address and include cultural and gender effects in information system usage models.

Recently, a modified TAM which delineated users' perceived near-term and long-term usefulness of technology has been proposed. The perceptions of the usefulness and ease of use of popular word processing and spreadsheet programs was investigated. Subjects were administrative/clerical staff members of a large organization.

This study found that perceived near-term usefulness had the most significant influence on the behavioral intention of users. Perceived long-term usefulness also had a significant influence on technology use, although the impact was less than the influence of perceived near-term usefulness. In this study, no significant, direct relationship was found between ease of use and intention to use technology. TAM has been criticized for its unidirectional causal explanation of the relationship between beliefs, attitudes, intentions, and behavior. In addition to TAM, other theoretical perspectives have been used to investigate users' intentions regarding technology. Those theories include social cognitive theory, Diffusion of Innovation, and the Theory of Planned Behavior.

In summary, research effort has been directed at testing the reliability and validity of TAM, and researching the model in different contexts and among different types of information technology users. While the model seemingly explains the relationship between beliefs, attitudes, intentions, and technology usage, little is understood about different user responses to information systems. Specifically, while the model explains the likelihood of technology usage, little attention has been paid to identifying the implications of different user responses to information systems. To that end, the exit, voice, loyalty, and neglect typology is proposed to explain different end-user responses to the introduction of technology in organizations. The literature regarding the exit, voice, loyalty and neglect model is reviewed next.

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