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A GENERAL THEORY OF TECHNOLOGY ADOPTION: DECODING TAM FROM A USER VALUE PERSPECTIVE

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"... more studies of TAM per se will die out, unless someone can find a new addition to TAM and the paradigm shifts" Alan Dennis

ABSTRACT

The technology acceptance model (TAM) is widely recognized as one of the more influential information systems (IS) theories and a practical and parsimonious framework for IT adoption. However, TAM is not without its limitation. Numerous incremental additions in TAM due to easy publication possibilities have made the model unwieldly and theoretically impoverished (Bagozzi, 2007). As a result, TAM, even after years of development is able to explain only 30-40% of the variance in the dependent variables (Lee and Kozar, 2003; Venkatesh, Thong and Xu, 2012). In this study we suggest that using the value perspective in technology adoption can overcome the above limitations. The value perspective leads us to propose a General Theory of Technology Adoption (GTTA). This first version of GTTA addresses the limitations of direct and mediating variables in core and extended TAM used for explaining the behavioral intention of users to use a technology.

KEYWORDS

Technology Acceptance Model, Value Perspective, General Theory of Technology Adoption

INTRODUCTION

With increasing use of software at the work place, and increasing competition, providers of software products and organizations that deploy them are constantly looking for guidance on factors that make users accept software and factors that maximize their intended use. The technology acceptance model (TAM) is widely recognized as one of the more influential theories in the area, and provides a practical and parsimonious framework for IT (Information Technology) adoption (Davis, Bagozzi and Warshaw, 1989; Lucas and Spitler, 1999; Venkatesh and Davis, 2000). However, TAM has its limitations. "It is unreasonable to expect that one model, and one so simple, would explain decisions and behavior fully across a wide range of technologies, adoption situations, and differences in decision making and decision makers." (Bagozzi, 2007).

Keeping this criticism in view we use the value perspective to propose a general theory of technology adoption. In the consumer behavior and product management literatures, the perceived value (benefits – costs) of a product or service is suggested to lead directly to favorable outcomes such as behavioral intentions (BI) to purchase, use or remain loyal to a product or service (e.g., Chang and Wildt, 1994; Cronin et al., 1997; Sirohi, McLaughlin and Wittink, 1998; Sweeney, Soutar, and Johnson, 1999). Although, on the surface there does not seem to be much in common between the determinants of BI in TAM and the determinants of BI in the these literatures, on deeper analysis (see Theory Development section) we find that the two models and the relationships proposed in them are remarkably similar. They are just represented in different forms and use different nomenclatures. Yet, by re-conceptualizing TAM from the user value perspective we find that we can significantly broaden the scope of TAM.

Our investigations in this article begin by comparing TAM in information systems literature and the value perspective in consumer behavior literature. As this comparison is the crux of our theoretical model, we discuss in detail the reasons for suggesting that the two models from two different literature streams are similar and its implications for the theory of technology adoption. We then proceed by developing the model from the value perspective in three stages. In the first stage of the three part study we develop the core GTTA describing the users' value calculus and its impact of users' BI to choose and use the technology. This article covers this first stage in development of GTTA. The other three stages are outlined in the future development discussed in the contribution section.

THEORY DEVELOPMENT

Core TAM from Value Perspective represents 1 Value and 1 Cost

A multi-disciplinary review of literature suggests that the core TAM model is similar to the value perspective in the consumer behavior and product management literature (see Figure 1) where user perceived value of a product or service is shown to lead directly to favorable outcomes such as behavioral intentions (BI) to purchase, use or remain loyal to a product

or service (e.g., Cronin et al., 1997; Sirohi, McLaughlin and Wittink, 1998; Sweeney, Soutar, and Johnson, 1999). Prima facie, there does not seem to be much in common between these models (figure 1). They appear to refer to different constructs as predictors. However, on deeper analysis we find that although Model 1 from value literature is presented in a different form, it is remarkably similar to Model 2 of TAM (Figure 1).

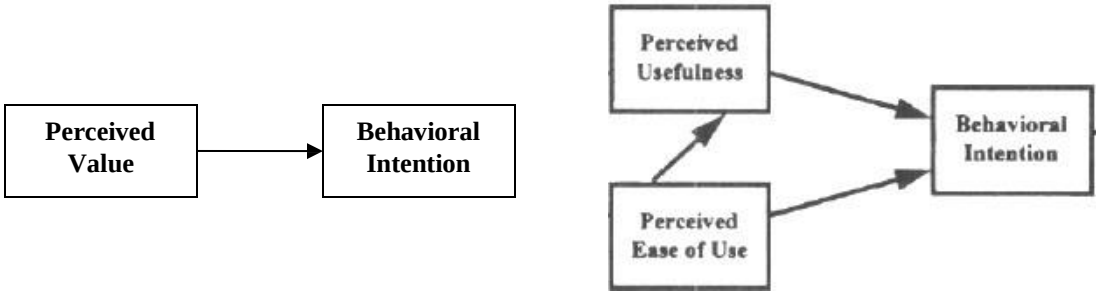

Figure 1.Model 1 from the Value Perspective & Model 2 from TAM (Davis, 1989)

The core TAM (Figure 1; model 2 on the right) consists of three major variables: Perceived Usefulness (PU), Perceived Ease of Use (PEOU) and Behavioral Intention (BI). Davis (1989) defined PU as the "degree to which an individual believes that a particular system would enhance his or her job performance and PEOU as the degree to which an individual believes that using a particular system would be free of physical and mental effort." Behavioral Intention is the users' intention to use the system. PU is used as both dependent and independent variable as it is predicted by PEOU, and predicts BI at the same time. PEOU was found as a significant antecedent of PU, and predicts BI directly as well as indirectly through PU (Davis et al., 1992).

In the Model 1 from the value perspective (see Figure 1; model 1 is on the left), customer perceived value is considered "the fundamental basis for all marketing activity" (Holbrook 1994, p. 22). High value is primary motivation for customer patronage and positively impacts the behavioral intention to acquire, use and remain committed to a product or service. But how does perceived value in Model 1 relate to PU and PEOU in Model 2? Perceived value has been conceptualized as the consumer's overall evaluation of the utility of a product or service provision based on perceptions of what one receives for what one gives (Baker et al., 1994). In line with this conceptualization PU and PEOU together represent the value provided by the technology to the user. While PU represents the perceived benefit (what he receives) of using the new technology, the inverse of PEOU, effort expectancy, defined as the degree of ease while using the system (Venkatesh et al., 2003), refers to the perceived cost of learning to use the new technology (what he gives). However PU represents only 1 benefit - utilitarian benefit - and effort expectancy represents only 1 cost – effort expectancy. Therefore the core TAM model from the value perspective is essentially 1 cost and 1 benefit model.

Extended TAM from the Value Perspective represents 2 Benefits and 1 Cost

In TAM researchers later found that PU and PEOU may not be the sole prominent determinants for using hedonic systems (Wu and Du, 2012). Perceived enjoyment (PE) defined "as the extent to which using a system is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated" (Davis et al., 1992), plays an important role in user technology acceptance and has great implications, especially for hedonic systems (Sun and Zhang, 2006). Studies have shown that while perceived usefulness in TAM is the strongest determinant of user acceptance in utilitarian system-use environments, it is less influential than perceived enjoyment in hedonic system-use settings (Hsu and Lu, 2004; Koufaris, 2002).

Two recent meta-analyses of TAM studies (Gerow, Ayyagari, Thatcher and Roth, 2013; Wu and Lu 2013) have confirmed the impact of perceived usefulness and perceived enjoyment on BI but come to slightly different conclusions. While Wu and Lu (2013) contend that for utilitarian systems, PU is more important than PE, whereas, in the context of hedonic software, PE plays a more critical role than PU, Gerow, Ayyagari, Thatcher and Roth (2013) suggest PE is equally relevant for user intention to use and actual use behavior for both hedonic and utilitarian software. In terms of Model 1 in Figure 1 PE and PU represent benefits. While PU represents utilitarian benefits provided by the product PE represents hedonic benefits provided by the technology to the user. The extended TAM model shown in Figure 2 (studies have observed both kinds of directionality of causal variables impacting BI depicted in Model 1 and Model 2) thus represents a 2 Benefits 1 Cost model from the value perspective..

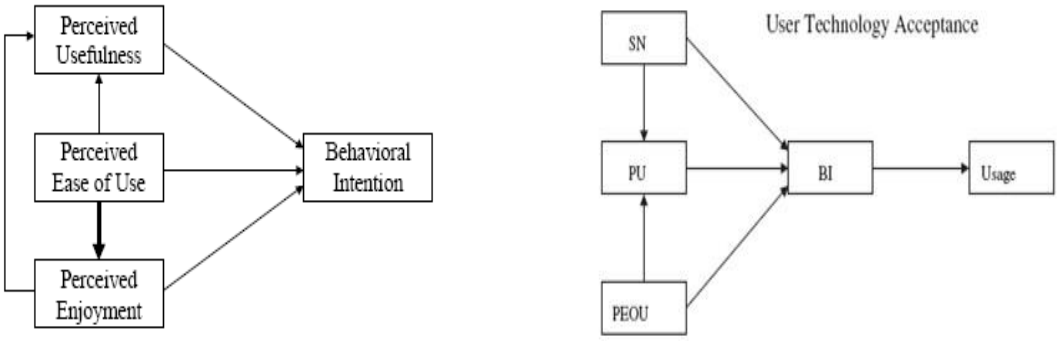

Figure 2. Extended TAM Model 1 and Model 2 (Sun and Zhang, 2006)

From the value perspective which benefits are still missing from TAM?

Taking cues from the value literature one can expect the positive impacts of social benefits on BI to use a technology. Buying a particular product represents a way in which the customer wants to see herself or be seen by others (Sheth et al., 1991; Sirgy et al., 2000; Sweeney and Soutar, 2001) and can serve as a vehicle for status enhancement by communicating "signs of position or membership to others" (Rintamaki et al., 2006; Babin et al., 1994). Technology just like consumer products can be used by individuals in enhancing self-esteem as well as assigning social identity to themselves as well as others (Belk, 1988).

Users are known to identify themselves in relation to other users or group of users (Bagozzi, 2007; Kelman, 1974). One can expect technology to provide self-esteem and status benefits to its users. By sharing their knowledge and expertise users can enhance their own self esteem as well as status within the desired community of users. Self-esteem and status can provide immense psychological and emotional benefits to the user. Status is often pursued by users as an ego reward (Emerson, 1962), or a source of gratifying social contract (Homans, 1950) and serves as a psychological asset (Fornbrun, 2001). In addition, enhanced status can be used by users to seek economic and social advantage.

The greater the utilitarian benefits, hedonic benefits and social benefits perceived by the user of the software product the greater will be its impact on BI leading us to the following proposition:

Proposition 1: The BI to purchase, choose or use a technology will be positively influenced by the perceived utilitarian, hedonic and social benefits provided by the technology to the user

Which costs are still missing from TAM from the value Perspective?

As discussed the core and extended TAM considers only 1 cost i.e. effort expectancy, the effort required in using a software or technology (inverse of ease of use) ((Venkatesh, Thong and Xu, 2012). But users also incur various other types of direct and indirect costs not included in TAM such as:

1. Financial (or monetary) costs: Investigated in TAM literature as Price Value by Venkatesh, Thong and Xu (2012) they represent the monetary cost of use or acquisition of the software. For software available or provided free to the user the monetary costs are not relevant.

2. Switching costs: Switching costs are the users' perceptions of time, effort and money they will have to incur for changing the technology (Jones, Mothersbaugh and Beatty, 2000). We identify the following costs of switching software in the context of software products:

a) Pre-switching evaluation and search costs: Pre-switching evaluation and search costs are the user perceptions of the effort and time required in looking out for information and assessing the viability of available software alternatives prior to switching. The pre-switching costs may not apply in work situations where the software is selected by the organization for the user.

b) Uncertainty costs (Guiltinan, 1989; Schmalensee, 1982; Jiang et al., 2000): Uncertainty costs are prominent in intangible products, services and technologies such as software (Zeithaml et al., 1985). Uncertainty costs represent the psychological uncertainty or perceptions of risk surrounding the performance of unknown, untested or untried software or technology. Further, risk and uncertainty are higher when quality is difficult to judge or varies considerably across alternatives.

c) Learning costs: Learning costs occurs after switching, as consumers adjust to a new alternative. They are behavioral and cognitive costs of using new software and reflect the user perceptions of the time and effort needed to effectively use the new software (Joshi, 2005; Hirschheim and Newman, 1988; Martinko et al., 1996).

d) Setup costs (Guiltinan, 1989; Jackson, 1985): When customization is high, there are additional learning and coordination costs involved with the new software provider. These setup costs vary from software to software and can be very high for certain applications such as ERP (Enterprise Resource Planning) softwares.

e) Sunk costs (Dick and Lord, 1998): Sunk costs represent customer perceptions of the non-recoupable time, money, and effort invested in the existing software which will be lost after switching. Sunk costs are economically irrelevant but psychologically important to the user.

3. Opportunity Costs: These are users' estimate of (opportunity lost) costs associated with not deriving benefits from using alternative software in the same product category.

The higher the costs in the users' perception the lower will be the BI to use the software product leading us to proposition 2.

Proposition 2: The BI to purchase, choose or use the technology will be negatively influenced by the financial costs, effort expectancy and opportunity costs and positively influenced by switching costs

To summarize, taking a value perspective allows us to include a number of variables that directly impact BI but not considered in TAM (see Table 1).

TAM	GTTA
BENEFITS	
Utilitarian Benefits	Utilitarian Benefits
Hedonic Benefits	Hedonic Benefits
-	Social Benefits
COSTS	
Ease of Use (Inverse of Effort Expectancy)	Effort Expectancy (Inverse of Ease of Use)
-	Financial Costs
-	Switching Costs
-	Opportunity Costs

Table 1. Comparison of TAM with GTTA

The above discussion leads us to our first theoretical statement (core GTTA):

Theoretical Statement 1: "The behavioral intention (BI) to purchase, choose or use a new technology is determined by the perceived value of the technology to the user"

CONTRIBUTION

In this study we propose the core GTTA. The simplicity of the model developed from the user value perspective can be seen from Figure 1 (Model 1) when compared to TAM (Figure 2). The directionality of causal variables impact on dependent variables is unambiguous, unlike TAM (see Figure 2). The core GTTA will also be able to explain a higher variance in BI due to a host of new relevant variables (benefits and costs) in the model (see Table 1). Further, there is theoretical coherence with which these new variables are seamlessly added in GTTA. By contrast in TAM, the equivocal and conflicting results and a plethora of studies recommending new items to be added or removed has only resulted in confusions without providing guidance to researchers or practitioners (Doll, Hendrickson and Deng, 1998).

Additionally GTTA brings tool choice within the domain of TAM. TAM assumes that users do not have a choice in official tools. However, there is an increasing realization that wherever possible organizations must provide choice, simplicity and service as if users were consumers. This approach is likely to build greater trust, responsibility and ownership of tools. The one-size fits all and top-down approach to providing tools to the users may not only alienate employee but also result in lost avenues for improvement. Further, with consumerization of IT (Information Technology) users often bring their own tools to

the workplace. TAM does not address consumptive choice i.e. how users choose these personal tools. The value perspective enables GTTA to address this gap in TAM.

In the next stage of development we upgrade this core GTTA using human psychological needs theory to explain the moderating influence of user characteristics on the impact of user perceived value on BI. In the third and final stage we upgrade the core GTTA applying Levitt's (1980) total product concept to include the moderating influence of system use context on the impact of user perceived value on BI.

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