

To accept or not to accept : is that the question?

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technische universiteit eindhoven

Inaugural lecture
6 June 2003

prof.dr. M.G.M. Wetzels

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not to accept
is that the question?

/ department of technology management

Inaugural lecture

Given on 6 June 2003
at the Technische Universiteit Eindhoven

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prof.dr. M.G.M. Wetzels

Introduction

Für Diana

“Nothing is quite so practical as a good theory.”
Andrew van de Ven (1989, 486)

Rector Magnificus, ladies and gentlemen,

It is both a pleasure and an honour to welcome you to this inaugural lecture. The impact of technology on both our private and professional lives has become truly pervasive. I would like to illustrate this development from my personal experience.

When I started studying in 1987 the proliferation of personal computers, or PC's, had just commenced. Increasingly, mainframe workstations were being replaced by networked PC's. For example, in 2002 the number of PC's-in-use reached 663 million worldwide (of which 206 million [31%] in the USA; Computer Industry Almanac, Inc. [www.c-i-a.com]). At the same time to imagine that within a few years a computer network would span the globe was hardly conceivable. However, this global network, the Internet, and more specifically the World-Wide Web, is currently one of the most successful technological innovations. For instance, in 2002 the number of Internet users surpassed 665 million (of which 161 million [24%] in the USA; Computer Industry Almanac, Inc. [www.c-i-a.com]). Another technology which has developed a significant impact on our lives are mobile devices, such as mobile telephones, PDA's, wireless LAN, etc. Again, relating from personal experience I would have seriously doubted the viability of such a technology. However, you might have noted the signs requesting you to turn off your mobile telephone before entering this lecturing hall, which is a testimony to the ultimate success of mobile telephones. In most European countries the mobile telephone penetration rate exceeded 40% in 2001 and is predicted to grow steadily (Durlacher Research [www.durlacher.com]).

At an ever-increasing pace, technology-based products and services are being introduced into the market. Firms, be it in a business-to-business (B2B) or business-to-consumer context (B2C), are more and more relying on increasingly sophisticated products, services, and



systems in selling to and serving customers (Parasuraman, 1999). As a consequence, buyer-seller relationships are transformed fundamentally for both business-to-business (B2B) and business-to-consumer (B2C) markets (Parasuraman, 1999). Two technological trends feature prominently in this development: (1) the Internet and (2) mobile or wireless technology (Kleijnen, De Ruyter and Wetzels, 2003). Both academic and management journals have presented E-commerce (and to a lesser extent M-commerce) as *panacea* for business success in the 21st century. The recent global dot.com downturn has only dampened the enthusiasm for electronic exchanges, but not changed the positive sentiment of the business community. Furthermore, the proliferation of E-commerce has led to a widespread acceptance of electronic transactions on a global scale. As a result, mobile commerce, or M-commerce has been heralded as the new marketing frontier. Essentially, integrating the functionality of the Internet with mobile technology offers users the complete freedom of time and location (Kleijnen, De Ruyter and Wetzels, 2003).

Furthermore, Rust and Kannan (2002) propose that the rapid expansion of (information) technology is not the only important transformation-taking place. They indicate that the confluence of the rapid expansion of (information) technology and the shifting of the overall economy from goods to services leads to the emergence of **E-service** as the dominant paradigm for future research. Increasingly, it has been argued that the service component is at the core of most successful business strategies (Rust and Kannan, 2002). Despite all of the attention devoted to E-business, or even M-business Brown in Brown *et al.* (2001) contends that S-business actually is essential to the success of companies, regardless of the fact whether they predominantly produce goods or services. To illustrate this Brown in Brown *et al.* (2001) reports that IBM and General Electric, well known for their tangible products, are actually the largest service providers of the world.

The extant literature on the Internet and E-commerce has been dominated by a technological and economic perspective, largely neglecting the behavioural dimension (Rosenbloom, 2003). However innovative a product (good, service or system) may be, ultimately it is the individual customer or employee, who decides on the adoption and use of the product. It is the acceptance and continued use of the product, which is essential to the ultimate success of the innovation (Agarwal and Prasad, 1997; Rogers, 1983). The Technology Acceptance

Model, or TAM, developed by Davis (1986) has laid the foundation for revitalising the behavioural research tradition regarding the adoption of technological innovations. The growth of technology-based products in the realms of E-commerce, M-commerce or S-commerce has not been matched by theoretically guided research.

In line with the motto of this inaugural lecture by Andrew van de Ven (1989, 486), “*Nothing is quite as practical as a good theory*,” I would like to stress the importance of theoretical underpinnings of marketing research, actually of any research. However essential theory may be in marketing research, the term theory is still viewed in disfavour, and sometimes even in disdain by marketing students and marketing faculty alike (Hunt, 1991). A cautionary note seems to be warranted, it is not only in the field of marketing that theory is perceived quite unfavourably; almost any other field can be substituted in the above statement. It is quite serious that theoretical and practical are considered to be at opposite ends of a continuum. Hunt (1991, 151) answered this contention with ‘**Nonsense**’. I can only wholeheartedly approve of this answer, as theory must be empirically testable and able to explain and predict real-world phenomena. In the remainder of this lecture several theories will feature prominently. I hope I will be able to communicate these theories clearly, as the main purpose of theory, apart from to organize parsimoniously, is to communicate clearly.

Before I continue with this inaugural lecture, I would first like to provide you with an outline. To begin with, I would like to introduce the theoretical foundations of the Technology Acceptance Model, or TAM. Subsequently, I will deal with the Technology Acceptance Model, or TAM. The goal of TAM is it to serve as a universal model for the acceptance of end-user computing technologies. After having discussed the theoretical rationale of TAM, I will then focus my attention on recent empirical studies, which attempt to replicate and extend TAM. Next, I will discuss avenues for future research. Finally, I will conclude this lecture by expressing my gratitude and thanks for the contribution of relevant others to this inaugural lecture, or in Dutch, ‘*het dankwoord*’.

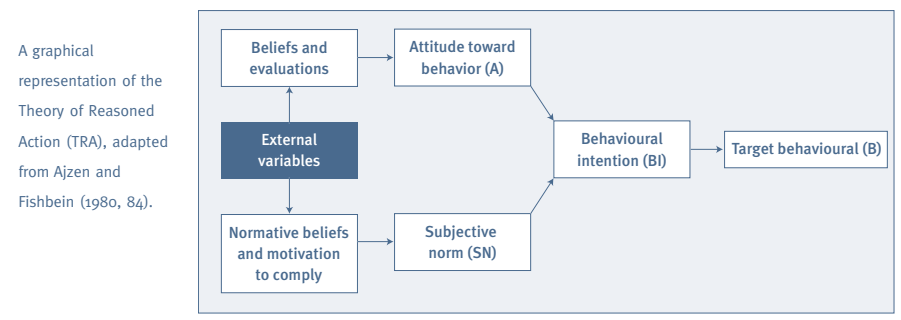
Theoretical foundations

The theoretical foundations of the Technology Acceptance Model (TAM) are based on the attitude paradigm developed in the field of social psychology, more in particular the Theory of Reasoned Action (TRA; Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975) and the Theory of Planned Behavior (TPB; Ajzen, 1991). In TRA a person's target behaviour (B) is directly affected by a person's (behavioural) intention (BI) to perform (or not to perform) the target behaviour in question. A person's (behavioural) intention, in turn, is influenced by two determinants: (1) attitude towards behaviour (A) and (2) subjective norm (SN). Attitude towards behaviour is a person's negative or positive evaluation of performing the target behaviour (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975). Subjective norm is a person's perception of the social pressures directed towards her/him to perform (or not perform) the target behaviour (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975). Furthermore, in TRA a cognitive or information-processing approach to attitude formation is employed. Fishbein and Ajzen's (1975) expectancy-value model of attitude posits that a person's attitude towards behaviour (A) is determined by salient beliefs about the consequences of the performing the target behaviour multiplied by evaluation of these consequences. For example, the more a person believes that the target behaviour will lead to a positive consequence (or alternatively prevents a negative consequence) the more likely it will be that her/his attitude will be favourable towards the target behaviour. A person's subjective norm (SN) is likewise determined by the product of normative beliefs and motivation to comply with these beliefs. For instance, the more referent individuals or groups disapprove the target behaviour and the more a person is willing to comply to the views of the referent individuals or groups the more likely it will be that her/his subjective norm will be unfavourable towards the target behaviour.

In Figure 1 a graphical representation of TRA is depicted. It can be observed from Figure 1 that external variables (i.e., variables external to the TRA model, such as personality characteristics, demographic variables, attitude towards targets, etc.) do not directly affect target behaviour, but are mediated by TRA. Although TRA has been developed

to "...explain virtually any human behavior..." (Ajzen and Fishbein, 1980, 4), it does not specify salient (normative) beliefs for any given context. Ajzen and Fishbein (1980) suggest that in-depth interviews with representative members of the subject population might be employed to elicit the "modal beliefs" (i.e., beliefs most frequently cited by the respondents). In multiple studies in a wide variety of areas the key assumptions and restrictions of TRA have been explored and have led to various refinements and extensions (for an overview see Sheppard, Hartwick and Warshaw, 1988).

figure 1



The Theory of Planned Behavior (TPB) is an extension of the original Theory of Reasoned Action (TRA). A major restriction of TRA is that it does not apply to behaviours, over which persons have incomplete volitional control. As in the original TRA behavioural intention (BI) is the focal construct in TPB. Essentially, TPB differs from TRA by the inclusion of perceived behavioural control (PBC). Perceived behavioural control is defined as a person's (Ajzen, 1991, 183) "...perception of the ease or difficulty of performing the behavior of interest". In TPB perceived behavioural control (PBC) is hypothesized to be both directly related to the target behaviour (B) and indirectly, mediated by behavioural intention (BI). A person's perceived behavioural control (PBC) is a multiplicative function of control beliefs and the perceived power of the particular control factor to facilitate or inhibit the target behaviour (Ajzen, 1991). Control beliefs may be based on past experience, but also on secondary sources, such as word-of-mouth communication with important others, newspapers, magazines, etc. As far as empirical support for TPB is concerned Ajzen (1991) reports using the results

The Technology Acceptance Model



of 16 studies that a considerable amount of variance (multiple correlation coefficients range from 0.43 to 0.94) can be accounted for in Behavioural Intention (BI) by the three predictors, attitude toward behaviour (A), subjective norm (SN) and perceived behavioural control (PCB). In every study reported PCB exhibited statistically significant regression coefficients.

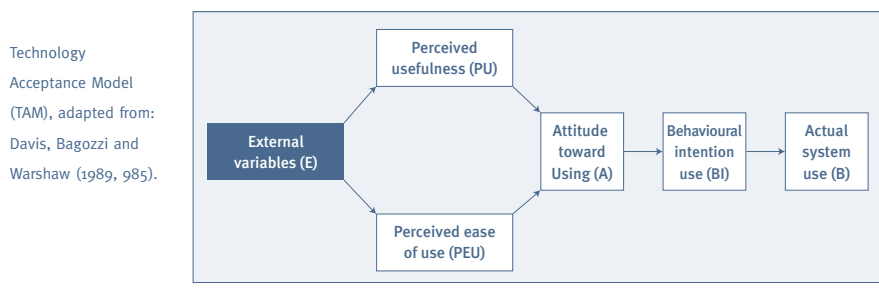
The Technology Acceptance Model (TAM), introduced by Davis (1986), is an adaptation of the original TRA. It was originally developed for modelling the user acceptance of information systems. TAM assigns a substantial role to two beliefs (Davis, 1989; Davis, Bagozzi and Warshaw, 1989): (1) perceived usefulness (PU) and (2) perceived ease of use (PEU). Perceived usefulness (PU) is defined as (Davis, Bagozzi and Warshaw, 1989, 985) “...the prospective user’s subjective probability that using a specific application system will increase his or her job performance within an organizational context” and perceived ease of use (PEU) refers to (Davis, Bagozzi and Warshaw, 1989, 985) “...to the degree to which the prospective user expects the target system to be free of effort”.

In close correspondence to the original TRA, TAM posits that system usage (behaviour, B) is determined by behavioural intention to use (BI). However, TAM differs from TRA in that it assumes that behavioural intention to use (BI) is determined by both attitude toward using (A) and perceived usefulness (PU). The direct effect of a belief, perceived usefulness (PU), is not in accordance with the original TRA. The positive effect of PU on A is based on the mechanism that (Davis, Bagozzi and Warshaw, 1989, 987) “...positively valued outcomes often increase one’s affect toward the means to achieving those outcomes...”. Furthermore, the direct relationship between perceived ease of use (PEU) and attitude toward using (A) is based on the notion that ease of use may positively affect the user’s self-efficacy (Bandura, 1982). Apart from the direct relationship of PEU on A, PEU also influences A, as it is mediated through PU. This mediated effect can be viewed as instrumental in that it allows a person to accomplish more work for the same effort. Moreover, PU and PEU may be influenced by various external variables (E; See TRA), such as objective system characteristics, training programs, documentation, and user support. The graphical depiction of the relationships in TAM can be found in Figure 2.

After the pioneering work by Davis *cum suis* (Davis, 1986, 1989; Davis, Bagozzi and Warshaw, 1989), validation and refinement of TAM has continued progressively (e.g., Adams, Nelson and Todd, 1992; Davis, Bagozzi and Warshaw, 1992; Venkatesh and Davis, 1996). In general,

substantial theoretical and empirical support has been brought forward in favour of TAM (Venkatesh and Davis, 1996, 2000). Moreover, TAM compares favourably in comparison to alternative models, such as TRA (Davis, Bagozzi and Warshaw, 1989) and TPB (Mathieson, 1991). Taylor and Todd (1995) report that the pure TPB model does not exceed the explained variance for behaviour *vis-à-vis* TAM. However, they find that a decomposed version of TPB explains marginally more variance than TAM. This comes at a price however, while TAM contains five constructs, the decomposed TPB contains thirteen.

figure 2



Recently, Venkatesh and Davis (2000) have proposed an extension of the original TAM model on the basis of the theoretical and empirical advances. They refer to the extended model as TAM2*. More specifically, TAM2 incorporates social influence processes (subjective norm, voluntariness and image) cognitive instrumental processes (job relevance, output quality, result demonstrability and perceived ease of use), which are hypothesized to influence perceived usefulness (PU) and behavioural intention to use, or usage intention (BI). TAM2 introduces, consistent with TRA (and TPB), subjective norm (SN) as a determinant of BI. SN is also hypothesized to positively affect perceived usefulness and image. Furthermore, TAM2 includes the moderating effects of voluntariness and experience. It is hypothesized that voluntariness (Agarwal and Prasad, 1997; Moore and Benbasat, 1991) will moderate the effect of SN on BI. PU is also positively affected by job relevance,

* It should be noted that in TAM2 attitude has been excluded from the core 'attitudinal' model. Empirical evidence only supported the partially mediating effect of attitude and consequently attitude was omitted from TAM2 (cf. Venkatesh and Davis, 1996).

output quality, results demonstrability and PEU. Finally, the positive effect of PEU on PU is in accordance with the original TAM model. When pooling the data of their four empirical studies (n = 468) Venkatesh and Davis (2000) found strong empirical support for most of their hypotheses. The basic relationships in the original TAM conceptualization (PU→BI, PEU→BI, PEU→PU and BI→B) were well supported. In addition, Davis and Venkatesh (2000) report significant moderating effects of both experience (in early stages) and voluntariness (mandatory usage) on the relationship between SN and BI. TAM2 extends TAM by showing that SN has a positive direct effect on BI over the direct effects of PU and PEU, when usage is mandatory and experience is in the early stages. The relationship between SN and PU was also significantly moderated by experience (in early stages) and confirms that SN positively affects PU through internalization. SN positively and significantly influences image. Both image and results demonstrability exhibit a significant positive effect on PU. Finally, Venkatesh and Davis (2000) report a significant interaction effect of job relevance and output quality on PU.

Recent applications



In addition to TAM Diffusion Of Innovation (DOI) theory has contributed significantly to the identification of determinants of user technology acceptance (Rogers, 1983). DOI theory assumes that perceived characteristics of an innovation (or beliefs) influence technology acceptance and use (Agarwal and Prasad, 1997; Moore and Benbasat, 1991; Rogers, 1983). Both TAM and DOI theory posit that perceived characteristics (or beliefs) are the key determinants of usage or acceptance behaviour. TAM contains only two beliefs, perceived usefulness (PU) and perceived ease of use (PEU), while Rogers (1983) on the basis of a literature review of diffusion studies proposes that five general perceived characteristics affect adoption and use: (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5) observability. Moore and Benbasat (1991) have extended this framework. They suggest seven perceived characteristics of innovations: (1) relative advantage, (2) ease of use, (3) compatibility, (4) image, (5) results demonstrability, (6) visibility, and (7) trialability. Moreover, perceived voluntariness was identified as an additional construct, which might affect usage behaviour (Agarwal and Prasad, 1997; Moore and Benbasat, 1991). Empirical results largely support the DOI framework (e.g., Agarwal and Prasad, 1997). It is interesting to note that in TAM2 (Venkatesh and Davis, 2000) we can basically witness a synthesis of the TAM and DOI theory research streams.

The majority of applications of TAM focuses on work settings using task-related software or systems (e.g., Venkatesh and Davis, 2000; see Lederer, Maupin, Sena and Zhuang, 2000 for an overview). Recently, researchers started focusing their attention on applying TAM to the World-Wide Web (WWW; Lederer, Maupin, Sena and Zhuang, 2000; Moon and Kim, 2001; Teo, Lim and Lai, 1999). However, these studies basically use a correlational design on the basis of a survey. Experimental designs might add to the extant literature in a complementary fashion (cf. De Ruyter, Wetzels and Kleijnen, 2001). Moreover, as TRA, TAM typically focuses on a single behaviour, such as for instance, the usage of a specific software program for a work-related task. Consequently, not being able to choose among alternatives is a serious omission of

the framework (Ajzen and Fishbein, 1980; Sheppard, Hartwick and Warshaw, 1988). Although alternative model specifications have been suggested to correct for this omission (see for instance Sheppard, Hartwick and Warshaw, 1988), conjoint analysis constitutes an alternative avenue to incorporate choice into the framework. More specifically, conjoint analysis can be used to determine the contributions of attributes and their levels when attempting to determine consumer preferences and to establish a valid model of consumer judgements (Green and Srinivasan, 1990). Keen, Wetzels, De Ruyter and Feinberg (*in press*) use conjoint analysis to explore the structure of consumer intentions to purchase products through three retail formats (store, catalogue or Internet). Apart from retail format five characteristics of innovation were selected for the study on the basis of TAM and DOI theory: (1) price, (2) perceived control, (3) perceived ease of use, (4) subjective norm, and (5) attitude. Following the suggestion by Moore and Benbasat (1991, 1995) we have included price as attribute in our study, as it “...has the greatest effect on buying behaviour”. For the conjoint analysis study we choose the part-worth function model, as it provides the most flexibility in terms of functional form of the preference function. Moreover, the full-profile method was employed to collect the data for the conjoint analysis. The dependent variable in the study was intention to purchase. Two product categories, music CD's and PC's, were chosen for this study. Each product was chosen based on the frequency of on-line purchases. Compared to one another, CD's offer a lower level of risk with the purchase from the consumers' point of view than would a PC. We used a sample of 290 mall shoppers in the USA (281 usable: 143 for CD's and 138 for PC's). Subsequently, the part-worth utilities for the individual levels of the attributes included in the study were obtained for both CD's and PC's. On the basis of the part-worth utilities importance scores can be obtained using the range of the part-worth utilities. The importance scores for this study are depicted in Figure 3. As can be observed from Figure 3 that for CD's retail format (27%) is the most important characteristic, while price is the second most important factor (23%). For PC's price is the most important factor (26%), while retail format is the second most important characteristic. For a lower cost, lower risk item like a CD, retail format may outweigh price because of the convenience factor in the purchase. Most consumers want the CD immediately and may be willing to pay a higher price in order to have the CD in-hand quickly. Alternatively, with a high cost purchase,

Importance scores
for CD's and PC's.
Source: Keen,
Wetzels, De Ruyter
and Feinberg
(in press).

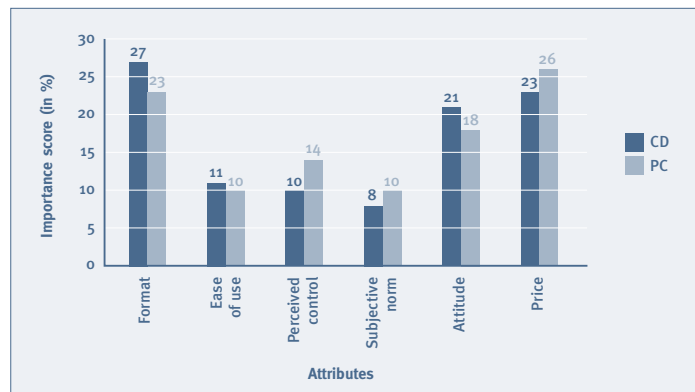


figure 3

consumers would probably shop around for the best price and then make the purchase. For these types of products, it may be worth it to do price-comparison shopping and then wait for the product. It is also interesting to note that for PC's perceived control is more important (14%) than for CD's (10%). It would appear that for higher cost, higher risk products, control would be more important than for lower cost, lower risk products.

Furthermore, we employed choice simulations to further validate the results of our study (Green and Srinivasan, 1990). By using choice simulations, we were able to translate the utility values for each of the retail alternatives into 'market shares' to identify the impact of attributes on consumer choice. These simulations provide the probability of choosing a particular bundle of attributes as the most preferred. The results from the choice simulations supported our earlier findings. Notably, we found that changing the attitude from negative to positive for the Internet option led to a substantial market share increase for the Internet option for both PC's and CD's as compared to the baseline model. Cluster analysis can be used to group the subjects according to some measure of distance, relatedness, or similarity. Our results suggested the presence of four clusters for both PC's and CD's. We identified a 'generalist' cluster, for which none of the attributes showed marked differences in importance. The second cluster was named 'formatters', for which format is the most important attribute. Essentially, they are willing mainly to buy their products in retail stores.

The third cluster was named 'price sensitives', for which price is the single most important attribute. Finally, the fourth cluster was named 'experiencers', as for them (positive) attitude was the most important attribute. Several practical implications can be derived from this study. The study indicates that the attractiveness of the Internet format can be increased by emphasizing high degrees of control (24/7, no out-of-stock, no parking problems, etc.) and ease of use (a few clicks and you get what you want). Moreover, prices can be lower, as expenses are not as high as for traditional formats. It should also be emphasized that a customer should have a positive experience every time she or he visits. Finally, the results of the cluster analysis have identified potential customer segments, which may be each targeted in a unique way.

Similarly, Kleijnen, De Ruyter and Wetzels (in progress) use conjoint analysis to explore the adoption of wireless services, more in particular mobile gaming. On the basis of TAM and DOI theory eight characteristics of innovation were identified which affect adoption: (1) relative advantage, (2) compatibility, (3) communicability, (4) complexity (5) navigation, (6) critical mass (subjective norm), (7) perceived risk, and (8) payment options. Adaptive Conjoint Analysis was used to collect the data for this study given the large number of attributes and levels. Our sample consisted of 99 respondents using an intercept style of sampling design (for the analyses 84 responses were usable). Our results indicate that perceived risk is the most important factor in adopting mobile services (21%), complexity (15%) ranks second, and compatibility (14%) is third in importance. Payment options (11%), navigation (11%), and relative advantage (11%) seem to be comparatively equal in importance. Critical mass (10%) and communicability (10%) seem to have a relative weaker influence on the intention to adopt. Using choice simulations we found that decreasing perceived risk and complexity (including navigation; thus increasing perceived ease of use) result in substantive increases in market share as compared to the baseline model. An important practical implication of this research is that perceived risk should be reduced. It is essential for the success of M-commerce that transaction security and privacy of personal information are assured. Possible solutions to security problems are currently being introduced, including securing WAP gateways, sophisticated encryption, digital signatures and Public Key Infrastructure (PKI). In a multi-user environment, these measures allow secure communications over an insecure channel. Furthermore, companies may develop privacy policies



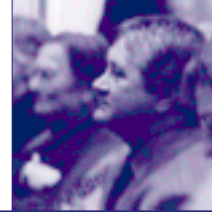
Future research

or employ some form of certification.

Both conceptually and empirically much work has focused on TAM in a work setting pertaining to work-related usage behaviour. Moreover, the majority of the research originates from the information systems (IS) discipline (see Lederer, Maupin, Sena and Zhuang, 2000 for a recent overview). As a consequence, it might be difficult to apply TAM in settings beyond the workplace, since TAM's core constructs do not fully reflect the variety of user contexts (Moon and Kim, 2001; Teo, Lim and Lai, 1999). To capture all the relevant determinants of using the World-Wide Web TAM might require an extension. Several authors suggest that in addition to extrinsic motivation (mainly reflected in perceived usefulness), intrinsic motivation should be included in TAM, especially in non work-related contexts. Several empirical studies provide support for the inclusion of intrinsic motivation in the original TAM model (Dabholkar and Bagozzi, 2002; Davis, Bagozzi and Warshaw, 1992; Lederer, Maupin, Sena and Zhuang, 2000; Moon and Kim, 2001; Teo, Lim and Lai, 1999).

It is the objective of this section to provide an outlook towards future research on the basis of a review of the extant literature and recent research. It is not the objective of this section to be either an exhaustive or complete research agenda; rather I would like to introduce you to my personal research priorities. In this section I will report findings of research, which is being conceptualized, very much in progress or in progress.

A major issue for the further development of TAM is external validity. The proliferation of TAM has been phenomenal (cf. Venkatesh and Davis, 2000). Consequently, it might be useful to conduct a meta-analytical study (e.g. Hunter and Schmidt, 1990). A meta-analytical study will not only be able to synthesize the results of multiple studies, but will also be able to identify limitations and *lacunae*. Moreover, TAM is still very much limited to workplace settings and work-related software and information systems (cf. Lederer, Maupin, Sena and Zhuang, 2000). In order to further explore the external validity of TAM its application to other technological innovations is essential. Obviously, applying TAM to a new setting might lead to an adaptation of TAM (e.g., Moon and Kim, 2001). In two studies we have attempted to replicate and extend TAM in different contexts: mobile commerce and online marketing research. In the first study TAM was applied to mobile financial services. In the conceptual framework two determinants of attitude were added: perceived costs and perceived systems quality. Moreover, social influence was included in the conceptual framework as an additional determinant of behavioural intention. In contrast to the original TAM we conceptualized external factors not as having direct effects, but as moderating effects. As external factors we included age, computer skills, technology readiness and social influence. Dabholkar and Bagozzi (2002) suggest that hypothesizing direct effect may be somewhat redundant and obvious. They propose that it is much more meaningful to investigate the moderating effects of the external factors. Obviously, it is desirable to compare the direct effects model with the moderating effects models. Preliminary results using partial least squares provided empirical support for our conceptual framework. In addition, our



analysis revealed the moderating effects of age, computer skills and social influence.

In a second study we applied TAM to the participation in online marketing research. In the conceptual framework we added perceived enjoyment as a determinant of attitude. Moreover, incentives, self-efficacy, innovativeness and topic salience were added to the model as external factors and specified as moderators. Preliminary results using structural equation modelling supported our conceptual framework. Moreover, our results showed significant direct effects of self-efficacy and innovativeness on perceived ease of use and moderating effects of incentives and topic salience.

Apart from focusing on TAM from a customer perspective, marketing employees have been increasingly confronted with technology infusion in their jobs (e.g., Schillewaert, Ahearne, Frambach and Moeneart, 2000). With the advent of wireless information technology the degree of technology infusion in sales force and field service settings is expected only to increase. In a field service setting we explored the usefulness of TAM for the acceptance of wireless technology for field service employees. Apart from individual-level variables, such as innovativeness and computer self-efficacy, and organizational-level variables, such as user support and training, we will also explore team-level variables, such as team climate. Moreover, we feel that multilevel analysis will provide additional insights into technology acceptance (cf. Klein and Kozlowski, 2000). This is especially important for technology acceptance regarding computer-mediated communication systems used at a group-level (e.g., Karahanna, Ahuja Srite and Galvin, 2002).

Individual-level factors, such as innovativeness, (computer) self-efficacy and experience have been identified as important determinants of information technology acceptance (Dabholkar and Bagozzi, 2002; Karahanna, Ahuja, Srite and Galvin, 2002; Venkatesh and Davis, 2000). Recently, Parasuraman (1999) proposed a conceptual framework regarding individual-level factors affecting technology adoption and use. The core construct in his framework is technology readiness.

On the basis of a conceptualization into four dimensions, optimism, innovativeness, discomfort and insecurity a measurement instrument consisting of 28 items, the Technology Readiness Index (TRI), with favourable psychometric properties was developed. TRI can be both applied in a business-to-business (B2B) and in a business-to-consumer

(B2C) context. Finally, in the USA the TRI has also been applied at the national level (Colby and Parasuraman, 2000). It might be interesting to see whether these findings could be replicated in the European Union (EU) and whether differences exist among different EU countries and between the EU and the USA.

Although TAM has been applied to a wide variety of settings both in a private and work context, its origins and the majority of the empirical studies can be found on the North American continent. Several authors have explored the effect of national cultures on technology use (e.g., van Birgelen, De Ruyter, De Jong and Wetzels, 2002). Therefore, we need to cross-validate TAM in different cultural settings. For this purpose we could use multigroup invariance analysis or multilevel analysis.

More recently, researchers have introduced concepts from the field of relationship marketing (Morgan and Hunt, 1994) to TAM (Gefen, Karahanna and Straub, 2003). It is interesting to note that Gefen, Karahanna and Straub (2003) conceptualize trust as a determinant of perceived usefulness and usage intention and find empirical support for this conceptualization. Moreover, Bauer, Grether and Leach (2002) emphasize the importance of commitment, trust and customer satisfaction regarding building buyer-seller relationships over the WWW; thus underlining the relevance of the customer satisfaction and relationship marketing paradigms for TAM.

In conclusion, I hope that this inaugural lecture has substantiated the relevance and urgency of finding an answer to the question “To accept or not to accept?” and that indeed it is a question of utmost importance not only in the field of marketing, but in many related fields, such as information systems, organization studies, organizational behaviour, operations management, and other relevant disciplines.

Dankwoord



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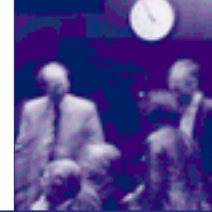
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References



- 1 Adams, D. A., Nelson, R. R., and Todd, P. A. (1992). Perceived Usefulness, Ease of Use, and Usage of Information Technology: A Replication. *MIS Quarterly*, 16 (2), 227-247.
- 2 Agarwal, R., and Prasad, J. (1997). The Role of Innovation Characteristics and Perceived Voluntariness in the Acceptance of Information Technologies. *Decision Sciences*, 28 (3), 557-582.
- 3 Ajzen, I., and Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, NJ: Prentice Hall, Inc.
- 4 Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*, 50 (2), 179-211.
- 5 Bandura, A. (1982). Self-Efficacy Mechanisms in Human Agency. *American Psychologist*, 37 (2), 122-147.
- 6 Bauer, H. H., Grether, M., and Leach, M. (2002). Building Customer Relations over the Internet. *Industrial Marketing Management*, 31 (2), 155-163
- 7 Birgelen, M. Van, Ruyter, K. De, Jong, A. DE, and Wetzels, M. (2002), "Customer Evaluations of Service Delivery Modes: An Empirical Analysis of Culture's Consequences", *International Journal of Research in Marketing*, 19 (1), 43-64
- 8 Brown, S. W., Van Bennekom, F., Goffin, K., Hahn, A., and Alexander, J. A. (2001). *S-Business: Defining the Services Industry*. Fort Myers, FL: AFSM International.
- 9 Colby, C. L. and Parasuraman, A. (2000). 2000 *National Technology Readiness Survey: Research Report*. Great Falls, VA: Rockbridge Associates.
- 10 Dabholkar, P. A., and Bagozzi, R. P. (2002). An Attitudinal Model of Technology-Based Self-Service: Moderating Effects of Consumer Traits and Situational Factors. *Journal of the Academy of Marketing Science*, 30 (3), 184-201.
- 11 Davis, F. D. (1986). *A Technology Acceptance Model for Empirically Testing New End-User Information Systems: Theory and Results*. Doctoral dissertation, Sloan School of Management, Boston: Massachusetts Institute of Technology.
- 12 Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13 (3), 319-340.
- 13 Davis, F. D., Bagozzi, R. P., and Warshaw, P. R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science*, 35 (8), 982-1003.
- 14 Davis, F. D., Bagozzi, R. P., and Warshaw, P. R. (1992). Extrinsic and Intrinsic Motivation to Use Computers in the Workplace. *Journal of Applied Social Psychology*, 22 (14), 1111-1132.
- 15 Fishbein, M., and Ajzen, I. (1975). *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*. Reading, MASS.: Addison-Wesley.
- 16 Gefen, D., Karahanna, E., and Straub, D. W. (2003). Trust and TAM in Online Shopping: An Integrated Model. *MIS Quarterly*, 27 (1), 51-90.
- 17 Green, P. E., and Srinivasan, V. (1990). Conjoint Analysis in Marketing: New Developments With Implications for Research and Practice. *Journal of Marketing*, 54 (4), 3-19.
- 18 Hunt, S. D. (1991). *Modern Marketing Theory: Critical Issues in the Philosophy of Marketing Science*. Cincinnati, OH: South-Western Publishing.



- 19 Hunter, J. E., and Schmidt, F. L. (1990). *Methods of Meta-Analysis: Correcting Errors and Biases in Research Findings*. Newbury Park, CA: Sage Publications.
- 20 Karahanna, E., Ahuja, M., Srite, M., and Galvin, J. (2002). Individual Differences and Relative Advantage: The Case of GSS. *Decision Support Systems*, 32 (4), 327-341.
- 21 Keen, C., Wetzels, M., Ruyter, K. De, and Feinberg, R. (in press). E-Tailers versus Retailers: Which Factors Determine Consumer Preferences. *Journal of Business Research*.
- 22 Kleijnen, M., Ruyter, K. De, and Wetzels, M. G. M. (in progress). Consumer Adoption of Wireless Services: Discovering the Rules, while Playing the Game. Submitted to *Journal of Interactive Marketing*, first revision.
- 23 Kleijnen, M., Ruyter, K. De, and Wetzels, M. G. M. (2003). In: B. E. Mennecke and T. J. Strader, *Mobile Commerce: Technology, Theory and Applications* (pp. 202-217). Hershey, PA: Idea Group Publishing.
- 24 Klein, K. J., and Kozlowski, S. W. J. (2000). *Multilevel Theory, Research and Methods in Organizations: Foundations, Extensions and New Directions*. San Francisco: Jossey-Bass.
- 25 Lederer, A. L., Maupin, D. J., Sena, M.P., and Zhuang, Y. (2000). The Technology Acceptance Model and the World Wide Web. *Decision Support Systems*, 29 (3), 271-278.
- 26 Mathieson, K. (1991). Predicting User Intentions: Comparing the Technology Acceptance Model with the Theory of Planned Behavior. *Information Systems Research*, 2 (3), 173-191.
- 27 Moon, J.-W., and Kim, Y.-G. (2000). Extending the TAM for World-Wide-Web Context. *Information and Management, Information & Management*, 38 (4), 217-229.
- 28 Moore, G. C., and Benbasat, I. (1991). Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation. *Information Systems Research*, 2 (3), 192-222.
- 29 Morgan, R. M., and Hunt, S. D. (1994). The Commitment-Trust Theory of Relationship Marketing. *Journal of Marketing*, 58 (3), 20-38.
- 30 Parasuraman, A. (1999). Technology Readiness Index (TRI): A Multiple-Item Scale to Measure Readiness to Embrace New Technologies. *Journal of Service Research*, 2 (4), 307-320.
- 31 Rogers, E. M. (1983). *Diffusion of Innovations*. New York: The Free Press.
- 32 Rosenbloom, B. (2003). Guest Editorial: Behavioral Dimensions of E-Commerce: Augmenting Technology and Economics. *Psychology and Marketing*, 20 (2), 93-98.
- 33 Rust, R. T., and Kannan, P. K. (2002). The Era of E-Service. In: R. T. Rust and P.K. Kannan, *E-Service: New Directions in Theory and Practice* (pp. 3-21). Armonk, NY: M. E. Sharp.
- 34 Ruyter, K. DE, Wetzels, M., and Kleijnen, M. (2001). Customer Adoption of E-Service: An Experimental Study. *International Journal of Service Industry Management*, 12 (2), 184-207.
- 35 Schillewaert, N., Ahearne, M. J., Frambach, R. T., and Moenaert, R. K. (2000). *The Acceptance of Information Technology in the Sales Force*. eBusiness Research Center Working Paper 7-2000. University Park, PA: eBusiness Research Center, Penn State University.
- 36 Sheppard, B. H., Hartwick, J., and Warshaw, P. R. (1988). The Theory of Reasoned Action: A Meta-Analysis of Past Research with Recommendations for Modifications and Future Research. *Journal of Consumer Research*, 15 (3), 325-343.



- 37 Taylor, S., and Todd, P. A. (1995). Understanding Information Technology Usage: A Test of Competing Models. *Information Systems Research*, 6 (2), 144-176.
- 38 Teo, T. S. H., Lim, V. K. G., and Lai, R. Y. C. (1999). Intrinsic and Extrinsic Motivation in Internet Usage. *Omega*, 27 (1), 25-37.
- 39 Ven, A. H. Van De (1989). Nothing s Quite So Practical as a Good Theory. *Academy of Management Review*, 14 (4), 486-489.
- 40 Venkatesh, V., and Davis, F. D. (1996). A Model of the Antecedents of Perceived Ease of Use: Development and Test. *Decision Sciences*, 27 (3), 451-481.
- 41 Venkatesh, V., and Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*, 46 (2), 186-204.

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