

# Investigating the Effect of Consumer Traits on the Relative Importance of TAM Constructs in an E-Commerce Context

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**Abstract** — This paper tests whether the Technology Acceptance Model (TAM) holds for different groups of customers. In doing so, we investigate the moderating effect of eight customer traits (socio-demographics, psychographics, and prior experience) on important relationships within TAM for an online shopping context. The results show that in general TAM is quite capable of predicting customers' online purchase intentions. For some moderators, however, the impact of a predictor is significantly different. Socio-demographics have the strongest influence on altering the relative importance of the predictors, while the moderating influence of prior online shopping experience is significant in some cases. Psychographics are found to be mostly unrelated to the extent to which TAM predictor impact purchase intentions. Theoretical and managerial implications are discussed.

**Keywords** — E-Commerce, TAM, Context-dependency, Online shopping experience, moderators.

## I. INTRODUCTION

### A. TAM and the E-Commerce Context

Prior research applied the Technology Acceptance Model (TAM) to predict Internet adoption and use. Researchers argue that TAM –originally developed to predict the adoption and use of information technologies such as computers and spreadsheet software programs [8], [9]– is capable of explaining online behaviors, as the E-Commerce context is heavily technology-driven [19]. Prior TAM studies performed in the Internet and E-Commerce context confirm that user's beliefs, perceived ease of use (PEOU) and perceived usefulness (PU) are key drivers of E-Commerce adoption and acceptance [10], [11], [14], [22]. However, similar to consumer behavior in general, the criteria to evaluate technologies (i.e., the Internet) are context-specific; that is, the nature and strength of relationships within TAM is likely to be dependent on the consumer, product and situation [25]. Early TAM research already suggested that the influence of PEOU may change over time, as individuals gain experience with the technology [9]. Also, customers differ in their capability to

use technologies, and these differences may result in differences in the evaluative criteria [18]. As the Internet is still growing and becoming more diverse, the question rises whether TAM holds under a variety of settings; that is, whether the TAM predictors are consistent predictors of online shopping intentions for different kind of customers.

### B. Adaptations of TAM to the E-Commerce Context

To further improve TAM predictions in E-commerce settings, several authors have proposed TAM extensions with constructs such as perceived enjoyment [6], [16], perceived risk [15], [19], and trust/reputation [11], [19].

To capture the intrinsic motivations of using a technology, as opposed to extrinsic motivations which are clearly captured by PU [9], [26], many authors (e.g. [6], [9] 16)) added perceived enjoyment to capture the pleasure and satisfaction derived from performing the behavior. The characterization of dual motivations is consistent with research on retail shopping behavior, which has supported the presence of both utilitarian (extrinsic) and hedonic (intrinsic) motivations [6].

Apart from extending the TAM with relevant constructs, researchers have adapted the measurements of PEOU and PU to the online shopping environment. Authors [15] have defined PEOU as the ease of information search, ease of ordering, ease of using customer service and overall ease of use, while PU has been referred to saving of money, saving of time, vast selection of products and services, and overall usefulness. In doing so, these researchers note that customers' evaluations of online shopping experiences go beyond the mere interaction with the website; consumers evaluate the total shopping experience in terms of what they receive (perceived quality) for what they give up (monetary and nonmonetary costs) [17].

Researchers in the domain of human-computer interaction are increasingly interested in modelling context-specific behaviors, as opposed to generic behaviors with computer technologies [27]. This shift towards focusing on contextual effects can also be noticed in the E-Commerce literature. After having identified the main criteria consumers use for their online shopping, researchers are now increasingly interested in modeling the effect of context-specific effects [7], [25], such as the influence of consumer characteristics (e.g., socio-demographics,

previous experience) and situational influences (weather, time pressure) on online perceptions and behavior [16]. This paper investigates whether the relative importance of TAM constructs differ according to specific consumer traits, including socio-demographics (gender, age, education), psychographics (privacy awareness, need for personal interaction) and previous experience (direct experience, Internet/online shopping experience, product knowledge). These issues are explored in the context of a comparison site for car insurances.

The main objective of this paper is to provide insights into the effects of these customer characteristics on the relative importance of TAM predictors. The investigation of the moderating influence of consumer characteristics yields important insights. From a theoretical perspective, insights into the influence of customer traits may help researchers in explaining inconsistent findings. From a managerial perspective, it can provide useful input for improvements in website design, based on the needs of different groups of buyers. Differences in the evaluative criteria between existent and potential customers, for instance, may be translated into customized pages.

## II. LITERATURE BACKGROUND ON CONTEXT-DEPENDENCY

Although TAM has proven to be a viable model for examining consumer acceptance and use of new technologies, it is necessary to incorporate additional factors that help explaining contextual effects [16]. There is increasing evidence that the importance of criteria to evaluate information technologies, and in particular the Internet as purchasing tool, is context-specific; that is, the importance is dependent on consumer, product, and situational factors. In this respect, it is argued that socio-demographics (gender, age, education), psychographics (privacy awareness, need for personal interaction) and prior experience (direct experience, Internet/online shopping, product knowledge) are key moderators of important relationships in the online shopping environment [4], [16], [27].

For example, women are expected to be more strongly influenced by PEOU than men [27]. Increased age has been shown to be associated with difficulty in processing information and using websites effectively. Older people are less interested in using new technologies, and for them, it is a hassle to overcome; therefore, they rely stronger on PEOU than younger people [16], [27]. Higher educated customers are more comfortable using nonstore channels, and may rely less strongly on PEOU, but more on PU as they have experienced the benefits of shopping online [27]. Previous research also highlighted the role of direct experience in adopting and using information technologies. Empirical evidence suggests that nonadopters (inexperienced users or novices) differ from adopters (experienced users or experts) in the criteria they use to evaluate information technologies [13], [21].

A widely discussed topic in TAM is whether PEOU has a direct effect on behavioral intentions, or whether its effect is fully mediated through PU. Empirical studies find support for the direct link between PEOU and intentions [1], [22], [23], [26], whereas others find insignificant results [12], [15], [19]. A possible explanation for these inconsistent findings is that PEOU tends to become less salient for individuals with higher levels of experience [27]. PEOU is more salient in the early stages, where the learning process represents hurdles to overcome, which later become overshadowed by instrumentality concerns [9],[20]. After adopting the technology, PEOU will only affect behavioral intentions indirectly through PU [10]. In line with this reasoning, one study [19] found that PEOU did not directly affect behavioral intentions in the Internet savvy student sample, in contrast to the consumer sample.

Some researchers theorize that the impact of PEOU on behavioral intentions also depends on situational factors, such as the nature of the task. PEOU directly affects intentions when the primary task for which the system is deployed is directly associated with intrinsic characteristics of the system's use (e.g., browsing). On the other hand, when the system is used as a means to fulfill tasks that are not solely intrinsic in nature (e.g., purchasing), PEOU only indirectly affects behavioral intentions through PU [12].

In sum, a number of consumer traits are expected to influence the strength of important relationships in TAM. In order to fully understand consumers' motivations to engage in online shopping, these consumer traits need to be taken into account (see Figure 1).

## III. METHODOLOGY

### A. Data Collection and Sampling Procedure

The data were collected through an online questionnaire targeted at visitors of a comparison website of car insurances. Invitations were sent to the email addresses of visitors who recently (within the past 6 months) made an inquiry by inputting their (car) data. In total, 400 usable questionnaires, yielding a response rate of 19%, were collected of which 251 respondents completed the purchase process through the comparison website, and 149 who merely made an inquiry about a specific car insurance offer.

### B. Research instrument

The research instrument contained items measuring the constructs of PEOU, PU and perceived enjoyment (see Table 1). The items were adjusted to the online shopping context. In doing so, PEOU refers to the ease or convenience of online shopping, based on a retail study [3]. PU refers to the degree to which consumers believe that online shopping is useful and increases their performance. This construct closely resembles perceived value [18]; i.e., perceived benefits and costs of using the website, including selection, price premium, time/effort required and level of control. Enjoyment was adapted from an existent scale [6], and represents the enjoyment experienced during the total

shopping process. In addition, background questions relating to socio-demographics (gender, age, income, education), previous experience and knowledge (internet, online shopping, car insurance), and psychographics (privacy/price/quality consciousness) were asked.

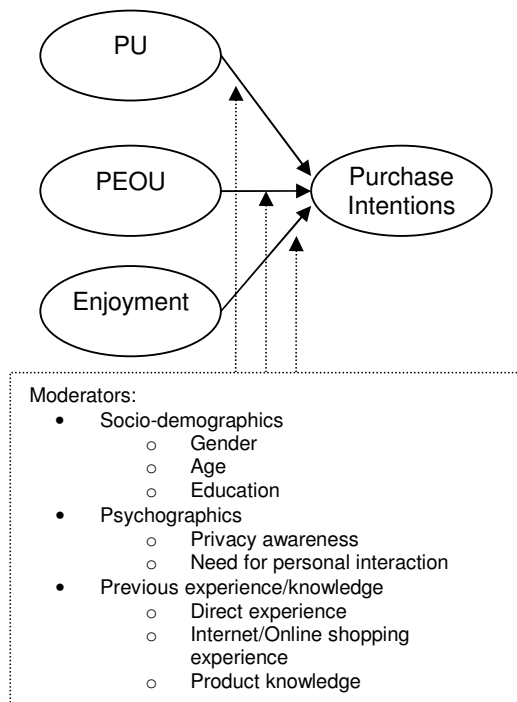


FIGURE 1: CONCEPTUAL MODEL

### C. Scale testing

After performing exploratory factor analysis, the items were subjected to confirmatory factor analysis using AMOS 5.0. The scales demonstrated unidimensionality, convergent and discriminant validity, as well as reliability. The measurement model produced satisfactory fit indices, indicating that the model fitted the data reasonably well ( $\chi^2/df=4.09$ ,  $GFI=.90$ ,  $CFI=.95$ ,  $NNFI=.94$ ,  $RMSEA=.090$ ).

## IV. FINDINGS AND IMPLICATIONS

In a first step, the structural model for the TAM is assessed. The results show that a reasonable proportion of variance ( $R^2=63\%$ ) is explained in customers' purchase intentions. Next, PU ( $\beta=.42$ ,  $p<.001$ ) and Enjoyment ( $\beta=.47$ ,  $p<.001$ ) are significant predictors of customers' purchase intentions, whereas PEOU ( $\beta=-.08$ ,  $p>.05$ ) is not. A possible explanation for insignificance of PEOU is the limited variance within the construct; most customers find the comparison website very easy to use, leaving little space to increase the intentions by making it easier. In addition to this, it seems that customers have acquired sufficient

experience in using websites for these activities, making PEOU less salient; for these customers intentions are only increased through improving PU and/or Enjoyment. An additional possible explanation is the increased professionalism of website design; as time has progressed defacto design standards emerged (e.g., regarding the use of buttons, the screen layout and the location and structure of menus).

In a second step, multi-group structural equation is used to testing for differences in the strengths of the structural relationships [2], [5]. In comparison to other methods, multiple group analysis is considered to be a good technique to test for interaction effects [7]. For each of the eight moderation tests, the dataset was split into two subgroups. Then, after establishing partial metric invariance, the increase in the Chi-square due to the constraining of a structural relationship was tested with one degree of freedom; a significant worsening of the fit indicates that the structural relationships are different between the two subgroups.

### Socio-demographics

Socio-demographics (gender, age, education) clearly impact the importance of the TAM predictors. In contrast to findings of the literature [27], this study finds that women rely stronger on PU and less strongly on Enjoyment compared to men ( $p<.05$ ); women appear to be more strongly affected by the outcome of the process, and tend to be less strongly influenced by the level of enjoyment offered by the website. This finding can be explained as women visit the comparison website more seriously, and really consider the actual purchase of a car insurance, whereas men appear to use the website more as a tool, and as a means to get an indication of the price offer. In this respect, men are more likely to be influenced by playfulness (i.e., Enjoyment).

Age also impacted the influence PU and Enjoyment; younger people (younger than 40) were more strongly affected by PU and less by Enjoyment in comparison with older people (40 years and older). Older people rely stronger on the process variable enjoyment; for them an increase in the level of enjoyment strongly increases future purchase intentions through the website. Younger people rely more on the outcomes of the process (saving time and effort, getting more value for money) rather than on the process itself.

Education was split into two subgroups (Primary/Secondary/College versus Graduate). Consistent with prior research [27], higher educated people tend to rely stronger on PU. They also appear to rely less strongly on the level of enjoyment. Lower educated persons are not so much affected by PU ( $\beta=.02$ ,  $p>.10$ ) but rely heavily on whether the purchase process is enjoyable.

### Psychographics

Psychographics (privacy awareness, need for personal interaction) have a limited effect on the relative importance of the TAM predictors. In contrast to our expectations,

customers that had privacy concerns were not more strongly affected by the TAM-related predictors than people with confidence in the website's capability to protect the customers' personal information. The expectation was that customers with privacy concerns have to be compensated for this; thus, the relationships for PU, PEOU and Enjoyment should be stronger. However, we did not find evidence for these differences.

The need for personal interaction reflects the customer's need to have direct and personal contact with employees during the purchase process. Those with a strong need for interaction favor a smooth shopping process, and are expected to rely more strongly on the level of enjoyment provided by the website. If the website succeeds in providing a more enjoyable shopping process, it will strongly influence their purchase intentions. The results indicated that those with a strong need for personal interaction were more concerned with Enjoyment than those with a weak need ( $\beta_{\text{strong}}=.66$  vs.  $\beta_{\text{weak}}=.25$   $p>.10$ ), but the difference was just outside the .05 significance level ( $p=.053$ ).

#### *Prior experience*

Finally, the moderating influence of direct experience with the service provider, Internet and online shopping, and product knowledge was investigated. Direct experience was measured as whether people had actually finalized the purchase process, or just made an inquiry. Customers who have finalized the purchase process have personally experienced each step in the process and acquired more experience with the service provider. In line with our expectations, customers who completed the online purchase process were more concerned with PU than customer who only used the website to get informed. However, although in the right direction, this difference was not statistically significant ( $p=.11$ ). Customers with direct experience were significantly less concerned with Enjoyment ( $p<.05$ ). These results indicate that customers with direct experience are more focused at improving their outcomes relative to improving the process; they have experienced the shopping process and become more directed at improving the instrumental outcome benefits (PU).

The level of both internet and general online shopping experience did not impact the relative importance of TAM predictors; all predictors were equally important for the low and high experience groups.

Product knowledge (i.e. knowledge about car insurances) moderated some key relationships. Customers with less knowledge of and experience with car insurances are more strongly influenced by the instrumental benefits offered (PU) by the website. For them, the website seems to function as an expert; they can improve their outcomes effectively as they themselves are uncertain about their own product knowledge. To them, the degree to which the website is perceived to be useful strongly influences their intentions. If the website is perceived to be useful they form strong intentions towards purchasing through the website.

## V. CONCLUSIONS

In this paper we tested whether the Technology Acceptance Model (TAM) holds for different groups of customers by investigating the moderating effect of eight customer traits (socio-demographics, psychographics, and prior experience) on important relationships within TAM. The results show that in general TAM is quite capable of predicting customers' online purchase intentions.

For some moderators, however, the impact of a predictor is significantly different. In particular, socio-demographics and (to a less extent) prior experience are likely to affect the importance of PU and Enjoyment on purchase intentions. Acknowledging the nature and impact of consumer traits on important relationships enables e-tailers to tailor the design of their web sites according to the needs of specific groups of customers.

## REFERENCES

- [1] Agarwal,R. & Karahanna,E. (2000) Time Flies When You're Having Fun: Cognitive Absorption and Beliefs About Information Technology Usage. *MIS Quarterly* **24**, 665-694.
- [2] Arbuckle J.L. & Wothke W. (1999) *Amos 4.0 User's Guide*. Smallwaters, Chicago, IL.
- [3] Berry,L.L., Seiders,K., & Grewal,D. (2002) Understanding Service Convenience. *Journal of Marketing* **66**, 1-17.
- [4] Burke,R.R. (2002) Technology and the Customer Interface: What Consumers Want in the Physical and the Virtual Store. *Journal of the Academy of Marketing Science* **30**, 411-432.
- [5] Byrne B.M. (2001) *Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming*. Erlbaum, Mahwah, NJ.
- [6] Childers,T.L., Carr,C.L., Peck,J., & Carson,S. (2001) Hedonic and Utilitarian Motivations for Online Retail Shopping Behavior. *Journal of Retailing* **77**, 511-535.
- [7] Dabholkar,P.A. & 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**, 184-201.
- [8] Davis,F.D. (1989) Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly* **13**, 318-340.
- [9] Davis,F.D., Bagozzi,R.P., & Warshaw,P.R. (1989) User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science* **35**, 982-1002.
- [10] Devaraj,S., Fan,M., & Kohli,R. (2002) Antecedents of B2C Channel Satisfaction and Preference: Validating e-Commerce Metrics. *Information Systems Research* **13**, 316-333.
- [11] Gefen,D., Karahanna,E., & Straub,D.W. (2003) Trust and TAM in Online Shopping: An Integrated Model. *MIS Quarterly* **27**, 51-90.
- [12] Gefen,D. & Straub,D.W. (2000) The Relative Importance of Perceived Ease of Use in IS Adoption: A Study of E-Commerce Adoption. *Journal of the Association for Information Systems* **1**, 1-30.
- [13] Karahanna,E., Straub,D.W., & Chervany,N.L. (1999) Information Technology Adoption Across Time: A Cross-Sectional Comparison of Pre-Adoption and Post-Adoption Beliefs. *MIS Quarterly* **23**, 183-213.
- [14] Lederer,A.L., Maupin,D.J., Sena,M.P., & Zhuang,Y. (2000) The Technology Acceptance Model and the World Wide Web. *Decision Support Systems* **29**, 269-282.
- [15] Lee, Dongwon, Park, Jinsoo, and Ahn, Jongho (2000). On the Explanation of Factors Affecting E-Commerce Adoption. Unpublished Working Paper.
- [16] Monsu w ,T.P.Y., Dellaert,B.G.C., & de Ruyter,K. (2004) What Drives Consumers to Shop Online? A Literature Review. *International Journal of Service Industry Management* **15**, 102-121.

- [17] Parasuraman, A. & Grewal, D. (2000) The Impact of Technology on the Quality-Value-Loyalty Chain: A Research Agenda. *Journal of the Academy of Marketing Science* **28**, 168-174.
- [18] Parasuraman, A., Zeithaml, V.A., & Malhotra, A. (2005) E-S-Qual: A Multiple-Item Scale for Assessing Electronic Service Quality. *Journal of Service Research* **7**, 213-233.
- [19] Pavlou, P.A. (2003) Consumer Acceptance of Electronic Commerce: Integrating Trust and Risk with the Technology Acceptance Model. *International Journal of Electronic Commerce* **7**, 101-134.
- [20] Szajna, B. (1996) Empirical Evaluation of the Revised Technology Acceptance Model. *Management Science* **42**, 85-92.
- [21] Taylor, S. & Todd, P.M. (1995) Assessing IT Usage: The Role of Prior Experience. *MIS Quarterly* **19**, 561-570.
- [22] Teo, T.S.H., Lim, V.K.G., & Lai, R.Y.C. (1999) Intrinsic and Extrinsic Motivation in Internet Usage. *Omega: The International Journal of Management Science* **27**, 25-37.
- [23] Vandenberg R.J., Lance CE (2000) A Review and Synthesis of the Measurement Invariance Literature: Suggestions, Practices, and Recommendations for Organizational Research. *Organizational Research Methods* **3**, 4-69.
- [24] Venkatesh, V. (2000) Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model. *Information Systems Research* **11**, 342-365.
- [25] Venkatesh, V. & Agarwal, R. (2006) Turning Visitors into Customers: A Usability-Centric Perspective on Purchase Behavior in Electronic Channels. *Management Science* **52**, 367-382.
- [26] Venkatesh, V. & Davis, F.D. (2000) A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science* **46**, 186-204.
- [27] Venkatesh, V., Morris, M.G., Davis, G.B., & Davis, F.D. (2003) User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly* **27**, 425-478.

Intentions	When I would need to renew my car insurance, I would use this website.	5.59 (1.41)
	There is a substantial chance that I would purchase my next car insurance through this website	5.74 (1.32)
	I recommend others to use this website	5.57 (1.37)

Moderators		
Privacy awareness	I believe the website keeps my personal information protected	4.05 (1.36)
Need for personal interaction	The personal contact with a live agent makes the shopping process more convenient	3.99 (1.74)
Online shopping experience	I have the knowledge and skills required to purchase a car insurance quickly and without hassles	6.01 (1.20)
	Compared to an average consumer, I am an experienced online buyer	5.15 (1.52)
Product knowledge	Compared to an average consumer, I am experienced in buying car insurances	3.99 (1.49)

Notes:

- a 7-point Likert scales were used, anchoring at 1= totally disagree and 7=totally agree.
- b Means and standard deviations were based on total sample, ranging with sample sizes from 391 to 399.

TABLE 1  
ITEMS AFTER CONFIRMATORY FACTOR ANALYSIS

Construct	Item wording <sup>a</sup>	Mean (standard deviation) <sup>b</sup>
PEOU	I can purchase an insurance, whenever the time suits me	6.20 (1.20)
	The shopping process through this website runs smoothly	5.88 (1.35)
	Making a purchase at this website is very easy	5.98 (1.31)
PU	The insurance premium I have to pay is economical, for what I receive from it	5.21 (1.47)
	I spend my time efficiently, when purchasing a car insurance through this website	5.72 (1.25)
	This website gives me the feeling of being in control	5.31 (1.33)
	Given the time and effort required to purchase an insurance through this website, I receive a lot	5.37 (1.26)
	I receive a lot of value by using this website	5.38 (1.26)
	The selection of car insurances provided by the website satisfies my needs	5.78 (1.15)
Enjoyment	I find the shopping process through this website enjoyable	5.66 (1.33)
	It feels good, when I purchase my car insurance through this website	5.37 (1.36)
	Shopping for a car insurance through this website is interesting	5.15 (1.55)