

Predicting e-commerce purchasing intention in Greece: An extended TAM approach

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ABSTRACT

This study develops and validates an extended model, to predict and explain consumers' intentions to transact with an internet-based business-to-consumer (B2C) e-commerce system, based on the technology acceptance model (TAM). TAM has been introduced and applied as a reliable and robust model for predicting the user adoption of different technologies. However, scholars usually integrate additional constructs to the original model in order to achieve an increased predictive power. Hence, in the augmented TAM of this study, in addition to ease of use and usefulness, perceived risk is also proposed to be a direct antecedent of intention to transact. The model was validated using data collected from 195 internet users and analysed using multiple regressions. The results provided substantial support for most of the proposed hypotheses and showed the significance of the extended constructs.

Key words: consumers' intention; e-commerce; TAM; perceived risk

1. INTRODUCTION

Organisations, taking advantage of information technology (IT) progress and the introduction of the WWW era through the use of Internet, find a way to reduce the operational and investment cost and increase the diversity of their accomplished business activities, with the intention of managing the augmented competition with a more efficient and effective manner (Hoffman *et al.*, 1995; Kalakota and Whinston, 1997; Kardaras and Papathanassiou, 2000). On the other hand, the rise of personal computer possession and the wide use of the Internet led consumers to exploit new opportunities by having access to information, products and services transactions through a virtual market (Choi and Lee, 2003). So, consumers and organisations, because of the simultaneous improvements in technology and communications, have commenced to deviate from traditional commerce methods, starting a new way of commerce, the electronic commerce (e-commerce) (Barbonis and Laspita, 2005).

E-commerce applications - first developed as Electronic Funds Transference (EFT) in the early 1970s - is the process of buying, selling, or exchanging products, services, and information via computer networks (Turban and King, 2003). However, its spectrum is not limited to these simple transactions but also encompasses a wide range of business activities of particular importance to modern companies such as new approaches to market research, sales support, product and knowledge sharing and financial transactions (Kardaras and Papathanassiou, 2000). E-Commerce is a business concept that has brought numerous changes to the way organisations conduct their business and to the way consumers make their purchasing decisions (Shih, 2004; Barbonis and Laspita, 2005). It helps organisations to reduce costs, expand their businesses to national and international markets, achieve high rates in sales growth, introduce effective pull-type supply chain management to reduce inventories and overheads, and maintain business processes re-engineering (BPR) efforts.

For consumers the advantages of internet retailing include saving of time, better prices, more product choices, faster order processing, availability of goods 24 hours a day, 365 days per year, from almost any location, quicker delivery of digital products, experience by receiving a wealth of product information etc. (Barbonis and Laspita, 2005; Vijayasathy, 2004; Turban and King, 2003). In addition, Turban and King (2003) underlines the benefits to society which stems from e-commerce such as allowing poor people to purchase products and services at lower prices, giving people from Third-World countries or rural and mountainous areas the chance to enjoy products and services which otherwise would be not available to

them, and providing better quality and more flexible public services in shorter periods of time. Nevertheless, there are also many challenges, ‘especially in the areas of store/interface design, order fulfillment, payment methods, and the safeguarding of customer information’ (Vijayarathy, 2004).

In spite of the rapid worldwide growth of the business to customer (B2C) e-commerce over the past few years, the rate of adoption of e-commerce varies from country to country, because of differences in personal characteristics of the consumers, different cultures, different framework of laws and different technical infrastructures (Cao and Mokhtarian, 2005; Barbonis and Laspita, 2005). In Greece, according to Xanthidis and Nicholas (2004, p. 356), “the progress of information technology (IT), the evolution of the tools available for the development of e-commerce sites and the overall growth of internet usage is of great concern”. A recent survey (Internet World Stats, 2007) showed that, despite growing numbers, Greece can’t follow the rates of adoption of internet and ecommerce which its fellow European countries achieve. For instance, the rate of internet usage in Greece is 33.5 per cent, a noteworthy 280-percentage increase since 2000, while in Europe these rates are 38.9 per cent and 199.5 per cent accordingly. Similarly, in the first quarter of 2006, the countries with the higher households’ internet access rates were Sweden (77 per cent), Denmark (79 per cent) and above all the Netherlands (80 per cent). Greece (23 per cent), Slovakia (27 per cent) and Hungary (32 per cent) were recorded as the European countries with the lowest levels (Internet World Stats, 2006). Finally, it is worth mentioning that the 8.9 per cent of Greek internet users aged 16 years and above have purchased online in the first quarter of 2006, indicating an increase of 4.2 per cent since 2002 (NSSG, 2006).

In the e-commerce environment, companies’ Web sites are provided with several functions and characteristics which can be classified into three core phases of marketing: pre, online, and after sales (Ahn *et al.*, 2004). This study will concentrate on online e-commerce and its main objective will be to explore the factors that influence consumers’ online purchase intention at e-commerce websites. A theoretically justified research model that extends TAM will be presented and empirically tested, using data collected from a sample of Greek consumers chosen from a population that includes both users and non-users of the Internet.

2. CONCEPTUAL FRAMEWORK

2.1 Technology Acceptance Model

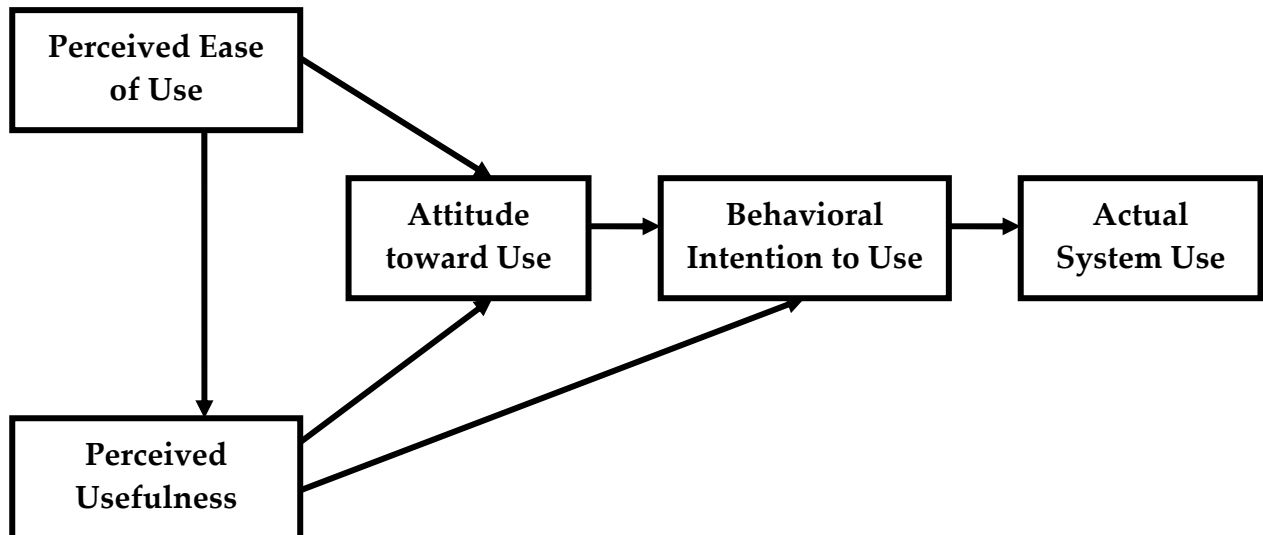
Up to date literature focuses on internet users' intention to buy their products or services via e-commerce. In this effort, the Theory of Reasoned Action (TRA) (Verhoef and Langerak, 2001; Fishbein and Ajzen, 1975), the Theory of Planned Behavior (TPB) (Choi and Geistfeld, 2004; Shim *et al.*, 2001; Ajzen, 1985), and the Technology Acceptance Model (TAM) (Ahn *et al.*, 2004; Van der Heijden *et al.*, 2003) have been proven valuable tools for predicting intention. In relation to the first two models, TAM has been found to have similar or greater explanatory power (Davis *et al.*, 1989; Mathieson, 1991). TAM is an adaptation of TRA (Lu *et al.*, 2005; Van der Heijden *et al.*, 2003), which hypothesised that behavioral intention is influenced by attitude and subjective norms. However, TRA's weak point was detected in the use of abstract concepts like 'belief' and 'evaluation' as constructs that affect attitude (Yu *et al.*, 2005). The TAM, introduced by Davis (1986), has received considerable attention in the information system (IS) field for predicting and explaining user behavior and IT usage (Shih, 2004; Yu *et al.*, 2005). For Davis *et al.* (1989, p. 985) the main goal of TAM was to 'provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behavior across a broad range of end-user computing technologies and user populations'.

2.2 TAM constructs

This study will focus on four major constructs of the original TAM (Davis *et al.*, 1989): the perceived usefulness (PU), the perceived ease of use (PEOU), the attitude and the intention (see figure 1). For Davis (1989), PU is the degree to which a person believes that using a particular system would enhance his or her job performance. In the context of e-commerce, Chau *et al.* (2000) declares that, in general terms, the 'purchase speed' and the 'convenience' of the websites are determinant factors of their usefulness. Additionally, Shih (2004) defined PU of e-shopping as the degree to which an individual believes that trading on the Web would enhance the effectiveness of his or her shopping. A second component of the TAM model is the perceived ease of use. Davis (1989) defined PEOU as the degree to which a person believes that using a particular system would be free of effort. Concerning e-commerce, PEOU is usually related to the navigational properties of the websites. Therefore, as the navigation around the site is getting better, the use of the site is getting easier (Van der Heijden *et al.*, 2001). Moreover, Doob (1947, cited in Vijayasarathy, 2004), defined attitude as a person's tendency to show a confident response towards a concept or object, while Pavlou and Fygenson (2006, p.118) defined it as "the consumer's evaluation of the

desirability of using a website to get information and purchase products from a Web vendor, respectively”. Finally, in TAM, an individual’s intention to use a system is proposed to be a precursor of actual usage (Venkatesh and Davis 2000; Vijayasarathy, 2004). The informational and purchasing related nature of the online transaction process, makes the description of the consumers’ behaviour by the ‘intention to use’ construct, rather incomplete and unclear. In relation to the B2C e-commerce, Pavlou (2001) notes that the ‘intention to transact’ with a system is the dependent variable in the technology acceptance model, and is defined as “the consumers’ intent to engage in any exchange of value with the B2C EC service provider” (Lui and Jamieson, 2003, p. 2).

Figure 1: Technology Acceptance Model



Regarding the relationships among the above factors, a relative complexity is revealed. First of all, TAM integrates a causal relationship between ease of use and perceived usefulness, advocating that a system would be perceived to be more useful if it is easier to use (Vijayasarathy, 2004; Lui and Jamieson, 2003; Van der Heijden *et al.*, 2001). In addition, Shih (2004) and Featherman and Pavlou (2003), mentioned that PEOU and PU significantly and directly impact the attitude toward using a system. More specifically, in line with the postulates and empirical results of TAM, there is a positive correlation between the PU and the attitudes of a user toward a system (Shih, 2004; Ahn *et al.*, 2004). Similar to PU, PEOU was found to be a positive and significant predictor of attitude (Vijayasarathy, 2004; Childers *et al.*, 2001). Furthermore, Davis *et al.* (1989), Gefen and Straub (2000) and Liu and Wei (2003) stated that the PU would be positively related to the intention to transact with a system

and disregarded the impact of the mediating variable, attitude toward using. Lastly, attitude has long been shown through substantial empirical support to influence the behavioral intentions to use (Ajzen and Fishbein 1980; Ahn *et al.*, 2004; Van der Heijden *et al.*, 2001; Lui and Jamieson, 2003). As shown in figure 2, the following hypotheses regarding technology acceptance are proposed:

H1: Perceived ease of use of a B2C e-commerce system is positively related to the perceived usefulness of the system

H2: Perceived usefulness of a B2C e-commerce system is positively related to attitude toward using the system

H3: Perceived ease of use of a B2C e-commerce system is positively related to attitude toward using the system

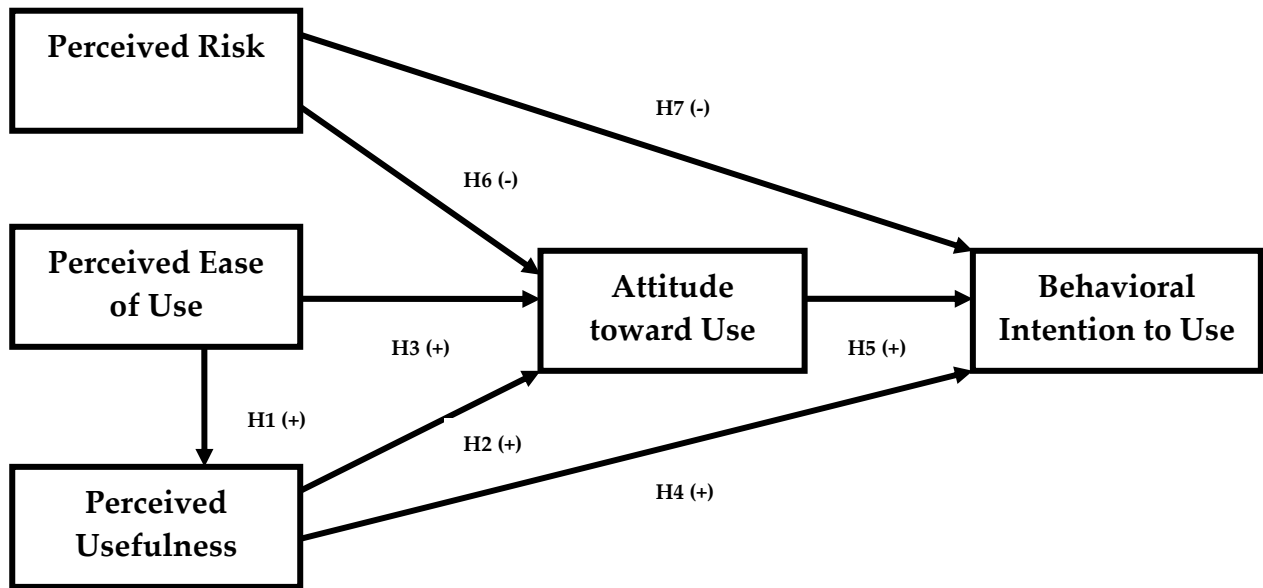
H4: Perceived usefulness of a B2C e-commerce system is positively related to the intention to transact with the system

H5: Attitude toward using a B2C e-commerce system is positively related to the intention to transact with the system

2.3 Extended Model

Despite the fact that TAM has emerged as a well-developed, powerful, reliable, robust, and commonly employed model for predicting and explaining user behavior and IT usage, as technology has continued to change continuously in the internet era, researchers have proposed many extensions to the original TAM model, incorporating more belief-related variables in their quest for increased predictive power (Lu *et al.*, 2005; Yu *et al.*, 2005; Vijayasarathy, 2004). For this reason, Venkatesh and Davis (2000), proposed a second version of TAM which included additional factors such as subjective norm, voluntariness, and cognitive instrument processes (Yu *et al.*, 2005; Cao and Mokhtarian, 2005).

Figure 2: Research Model



In this study a model has been proposed extending TAM to predict consumer e-shopping behavior. The model, except from PEOU, PU, attitudes toward e-shopping and user intention to buy online, includes another multi-dimensional construct, the perceived risk (PR) (Lu *et al.*, 2005). PR has originally been introduced by Bauer (1960) and his definition has been adopted, with some modifications, by several posterior consumer researchers (Kogan and Wallach, 1964; Cunningham, 1967; Sjoberg, 1980). Bauer (1960) defined risk in terms of the uncertainty and consequences associated with a consumer's actions (Lu *et al.*, 2005), and he was concerned only with the subjective (perceived) risk and not with the 'real world' (objective) risk, making the risk assessment a non accurate process (Mitchell, 1999). In a more recent definition, Featherman and Pavlou (2003) mention that PR "is commonly thought of as felt uncertainty regarding possible negative consequences of using a product or service". Dowling (1986) and Choi and Lee (2003) argued that the PR is composed of two components which are typically combined multiplicatively:

$$PR = b_i * e_i$$

Where,

PR= Perceived Risk

b_i = belief of uncertainty toward online shopping

e_i = evaluation of the importance of each uncertainty.

So, Mitchell (1999) underlined that PR is an influential tool for explaining consumers' behaviour, because the consumers' mistakes-avoidance motivation is more powerful than the maximisation of the purchasing utility. Thus, PR in addition to PU and PEOU is another factor that has a significant but negative influence on the attitude toward using (Van der Heijden *et al.*, 2003; Jarvenpaa *et al.*, 2000; Teo and Liu, 2007). Moreover, many scholars proposed that PR determines the intention to use in a negative way, too (Liu and Wei, 2003; Pavlou, 2001; Javenpaa and Tractinsky, 1999; Van den Poel and Leunis, 1999). Hence, the following hypotheses are developed and proposed:

H6: The perceived risk in transacting with a B2C e-commerce system is negatively related to the attitude toward using the system

H7: The perceived risk in transacting with a B2C e-commerce system is negatively related to the intention to transact with the system

3. RESEARCH METHODOLOGY

3.1 Sample and Survey Instrument

The survey participants were adults (18-44 years old), internet users, residing in a city of northern Greece, Kavala, with a population of about 100,000. The sample was chosen based on the findings of National Statistical Service of Greece (2006) report which stated that approximately 82 per cent of the overall e-commerce transactions in Greece were accomplished by people aged 18 to 44 years old.

As a research instrument, it used a three-page questionnaire which consisted of three sections. The first section contained basic demographic characteristics including gender, age, education level, marital status, measures for assessing the level of Internet usage, e-shopping experience, etc. In the second section, respondents were asked to indicate the level of their risk perception relative to the usage of e-commerce. The perceived risk was measured according to the formula adapted from Choi and Lee (2003) by multiplying the belief of uncertainty toward online purchasing and the evaluation of the importance of each uncertainty. In the third section, the survey participants were asked to respond to questions on the other four constructs of the model: perceived usefulness, perceived ease of use, attitude toward using, and intention to use. For each construct, a five-point Likert scale, ranging from strongly disagree (1) to strongly agree (5), was used. The majority of this survey's questions were adopted from previous research instruments that have proved their validity and reliability (Vijayasarathy, 2004; Shih, 2004; Ahn *et al.*, 2004; Yu *et al.*, 2005).

Since the survey has been conducted in a non English-speaking country, the survey instrument (questionnaire), originally written in English, was translated into Greek. In order to allow researchers to use comparatively the results of this survey with the results obtained from other similar e-commerce surveys, the translation of all terms has been done in the most accurate way possible.

Prior to administering the survey, a pre-test took place in a small sample (30 respondents) of IT academics and practitioners, colleagues, students, and other consumers drawn from the general public. In their comments, they mainly dealt with the relevance of the questionnaire items, the questionnaire's layout, the wording of some questions and the time which is required to complete it (Vijayasarathy, 2004).

Finally, of the 250 questionnaires distributed, we received 208 responses and 195 were usable. 47.7 per cent of the final sample were men and 53.3 per cent women, while the marital status of 87.2 per cent was single. Regarding the education level of the sample, it must be stated that approximately half of them (54 per cent) has a lyceum degree and 46 per cent hold a university degree. A noteworthy percentage of the sample (45.6 per cent) had used the internet for over 5 years with a usage mean of 10.5 hours per week. 37.9 per cent of the survey participants had used the internet for online shopping purposes, while the mean of their online purchases for the last year was 2 (spending about an average of 158 euros).

3.2 Reliability and Validity

Reliability is one of the most important criteria for evaluating research instruments and refers to the internal consistency of the factors (Chu & Murrmann, 2005). Firstly, the reliability of each scale of perceived risk and of the other four factors of the model (perceived usefulness, perceived ease of use, attitude toward using, and intention to use) was estimated by calculating Cronbach's alpha (α). None of the items was eliminated since, in all constructs, the value of α fluctuated from 0.703 to 0.874 (see table 1), which is higher than the minimum limit (0.70) that is proposed by Nunnally (1978).

Validity is the extent to which the items accurately measure what they are supposed to measure (Hair *et al.*, 1998). A high reliability is a necessary but not sufficient condition for a valid scale. The scale, also, needs to satisfy other conceptual and empirical criteria to be considered as valid (Chu & Murrmann, 2005). The most basic type of validity is content validity (Zikmund, 1997). Content validity refers to the representativeness and comprehensiveness of the items used to create a scale (Bock and Kim, 2002). As mentioned

earlier, the content validity of this study was confirmed from previous studies (Vijayasathy, 2004; Shih, 2004; Ahn *et al.*, 2004; Yu *et al.*, 2005).

Another important type of validity is the construct validity that constitutes of three components: *unidimensionality*, *convergent validity* and *discriminant validity* (Kaynak, 2003). To establish the unidimensionality of factors, an exploratory factor analysis (E.F.A.), based on the principal component method and using varimax rotation and the eigenvalue criterion (greater than 1) for the factors extraction, was separately performed for the perceived risk and the other four constructs. The K.M.O measure and Bartlett's test of sphericity were used to ensure that the data have sufficient correlation to perform E.F.A. The factor analysis for perceived risk extracted two factors (transaction security, and product delivery and services)², which explained the 51.7 per cent of variance. The K.M.O statistics was 0.737, higher than 0.7 and the Bartlett's test of sphericity was significant at a 0.00 level, which justified the use of E.F.A.

Table 1: Factor Analysis for Perceived Risk

Items	Component		Cronbach a
	Transaction Security	Product Delivery and Services	
PR1	0.875		0.753
PR2	0.766		
PR3	0.659		
PR4		0.786	0.703
PR5		0.442	
PR6		0.712	
PR7		0.663	
PR8		0.575	
K.M.O = 0.737 > 0.7			
Bartlett's test of Sphericity = 326.279 df = 28 Sig. = 0.000 < 0.05			
Total Variance Explained = 51.685% > 50%			

The factor analysis for the original TAM (PU, PEOU, attitude, intention) extracted four factors, which explained the 70.8 per cent of variance. The K.M.O statistics was 0.895 (see table 2) and Bartlett's test of sphericity was significant at a 0.00 level. All items in the factor analysis had loadings greater than 0.45, which are acceptable considering the sample size (Hair *et al.*, 1998).

² The designation of these two factors of perceived risk was based on the study of Choi and Lee (2003)

Table 2: Factor Analysis for original TAM

Items	Component				Cronbach a
	Perceived Ease of Use	Perceived Usefulness	Attitudes toward using	Intention to Use	
PEOU1	0.846				0.874
PEOU2	0.641				
PEOU3	0.719				
PEOU4	0.827				
PEOU5	0.834				
PU1		0.790			0.713
PU2		0.727			
PU3		0.681			
ATTITUDE1			0.747		0.841
ATTITUDE2			0.588		
ATTITUDE3			0.557		
ATTITUDE4			0.462		
INTENTION1				0.871	0.839
INTENTION2				0.817	
INTENTION3				0.806	
K.M.O = 0.895 > 0.7					
Bartlett's test of Sphericity = 1,580.63 df = 105 Sig. = 0.000 < 0.05					
Total Variance Explained = 70.806% > 50%					

Discriminant validity deals with the concept that dissimilar factors should be different (Burns and Bush, 1995). If two factors are distinct in nature, the instrument used to measure these two factors should share a minimal correlation (Chu and Murrmann, 2005). An indicator of Discriminant validity occurs if the correlation coefficients of each pair of constructs are less than the Cronbach's Alpha of each construct. This would indicate that there is a higher correlation within the construct than between the constructs (Churchill, 1979). The results of the Discriminant validity test are shown in Table 3.

Evidence of convergent validity is presented if all items load significantly into their respective factors (Anderson and Gerbing, 1988). In this study, all observable indicators loaded significantly at 0,05 significance level.

Table 3: Test for Discriminant Validity

	1.	2.	3.	4.	5.	6.
1. Transaction Security	0.753^a					
2. Product Delivery/Services	0.456**	0.703^a				
3. Perceived Ease of Use	0.054	-0.065	0.874^a			
4. Perceived Usefulness	-0.061	-0.096	0.424**	0.713^a		
5. Attitude toward Using	-0.055	-0.129*	0.502**	0.609**	0.841^a	
6. Intention to Use	-0.143*	-0.204*	0.422**	0.503**	0.681**	0.839^a

^a Cronbach's alpha, ** Correlation is significant at 0.01 level, * Correlation is significant at 0.05 level

3.3 Data Analysis and Results

Table 4 presents the basic factors' statistics (the mean and the standard deviation) of our model. The perceived usefulness of the online shopping for the users has the higher mean (3.75, $\sigma=0.90$) among the other original TAM factors. As for the extended TAM construct (perceived risk), it scores a mean of 12.29 ($\sigma=3.62$), since this value is the product of the belief of uncertainty toward online shopping and the evaluation of the importance of each uncertainty ($PR=b_i*e_i$). More specifically, the transaction security construct scores a remarkable higher mean of 13.50 ($\sigma=4.89$) in relation to the product delivery and services construct (11.56, $\sigma=3.82$).

Table 4: Basic Statistics for Factors

Factor	Item	Mean	St. D
Perceived Risk	8	12.29	3.62
Transaction Security	3	13.50	4.89
Product Delivery and Services	5	11.56	3.82
Perceived Ease of Use	5	3.62	0.90
Perceived Usefulness	3	3.75	0.90
Attitudes towards using	4	3.53	0.99
Intention to Use	3	3.04	1.11

The hypothesised relationships illustrated in figure 2 were tested using regression analysis. Tables 5 and 6 present the summary results of the tested hypotheses. Initially, hypotheses 1 to 5 evaluate the links between the four constructs of the original TAM. Regarding the impact of the perceived ease of use of a B2C e-commerce system in the perceived usefulness of the system, it observed a considerable positive influence ($\beta=0.424$, $p<0.01$), leading us to accept hypothesis 1. As far as hypothesis 2 is concerned, perceived usefulness has a strong and positive ($\beta=0.483$, $p<0.01$) influence on the attitude toward using the system. Therefore, hypothesis 2 can be accepted, too. Moreover, examining hypothesis 3, it is found that attitude is strongly and positively determined by the perceived ease of use ($\beta=0.297$, $p<0.01$). Hypothesis 4 is also supported as the β between the two constructs (PU and intention to use) is equal to 0.140 ($p<0.05$). Finally, the attitude toward using a B2C e-commerce system is positively related ($\beta=0.596$, $p<0.01$) to the intention to transact with the system. Thus, all five hypotheses, related to the original TAM constructs, can be fully accepted and are in line with the literature's findings.

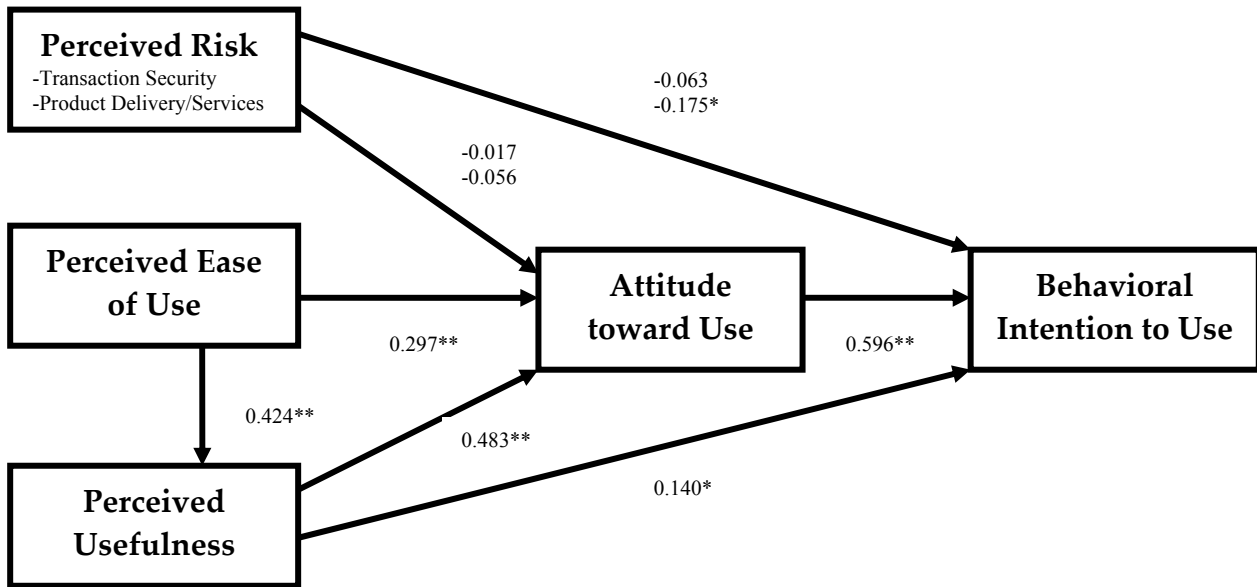
Table 5: Regression Analysis

Independent Variables	Dependent Variables			
	Model 1 Intention to Use	Model 2 Intention to Use	Model 3 Attitudes towards using	Model 4 Perceived Usefulness
	β	β	β	β
Transaction Security	-0.063		-0.017	
Product Delivery and Services	-0.175*		-0.056	
Perceived Usefulness		0.140*	0.483**	
Attitudes towards using		0.596**		
Perceived Ease of Use			0.297**	0.424**
R²	0.045	0.477	0.448	0.180
Adj. R²	0.035	0.471	0.436	0.176
F –Values	4.497*	87.439**	38.489**	42.372**

* p < 0.05, **p < 0.01

Hypotheses 6 and 7 are complicated and they evaluate the direct effect of the perceived risk for an online transaction on the attitude and the intention of an internet user to transact using an e-commerce system. The effects of the perceived risk construct as a whole were negative but not significant, indicating that the perceived risk was poorly related to online shopping adoption. Particularly, hypothesis 6 was partially supported, since transaction security-focused (beta=-0.017), and product delivery and services-focused (beta=-0.056) perceived risk, are negatively linked with the attitude toward using a B2C e-commerce system, but this linkage is definitely not statistically significant. In addition, both the transaction security-focused (beta=-0.063) and the product delivery and services-focused (beta=-0.175) perceived risk have a negative impact on the intention to transact with a B2C e-commerce system. However, only the latter was significant at the 0.05 level. Thus, similarly to hypothesis 6, hypothesis 7 is partially supported, too.

Figure 3: Regression results with significant standardized b coefficients



In conclusion, the relatively large adjusted R^2 values for the four regression analyses indicate that sizable portions of variances in the dependent variables were explained by the chosen independent variables. By expanding TAM, our study has shown the relevance of the perceived risk.

Table 6: Hypothesis test results

Hypothesis	Decision
H1	Accepted
H2	Accepted
H3	Accepted
H4	Accepted
H5	Accepted
H6	Partially supported
H7	Partially supported

4. DISCUSSION OF RESULTS

In the present study, it attempted to remind that the perceived ease of use is a major variable for online shopping. Despite the standardisation and convenience of the current technologies for accessing and using the Internet, the online shopping issue occasionally faces many problems and difficulties in connection with designed interfaces, navigational structures, web-searching effectiveness, information renewal, linkability, and checkout procedures (Vijayasarathy, 2004). For that reason a very strong relationship between

perceived ease of use and attitude toward using online shopping is revealed in this study, underlined the importance of careful, analytical and high-quality design principles in the construction of their virtual shops. Additionally, the widely proved positive linkage between perceived ease of use and perceived usefulness was confirmed, emphasizing the unbreakable relationship of these two constructs in the broad research area of B2C e-commerce.

Furthermore, the perceived usefulness of e-commerce for the online purchasing process is positively related to attitude and intention, demonstrating the fact that online retailers, in order to achieve their financial and sales targets, should focus on creating competitive advantage and differentiation of their offered products relative to their competitors (Vijayasathy, 2004). Finally, the attitude toward using a B2C e-commerce system for purchasing products or services was found to be notably associated with intention to transact with the system, consistently with intention based models.

The results somewhat confirm the argument that in addition to perceived usefulness and perceived ease of use, there is another factor that explains the attitude and the intention to use B2C e-commerce. Overall, the perceived risk factor appears to be a significant predictor of attitude and intention. More specifically, as mentioned above, the perceived risk was divided into two new separate factors, namely transaction security, and product delivery and services. Initially, these two factors present a notably average difference. Taking into account that each item for these factors was measured by the level of uncertainty toward online shopping multiplied with the importance of each uncertainty, these differences prove that e-commerce users have perceived as more important the risks that are connected to security issues (mean= 13.50) than risks concerned with the delivery and services of the purchased products (mean= 11.56). This finding can be interpreted as the following; as long as the majority of our sample consisted of inexperienced participants, it can be argued that the transaction security issues will be more comprehensive and meaningful than the product delivery and services issues. A respondent who has never performed a transaction, is difficult to realize the risks and inconsistencies which come from product delivery and services. On the contrary, one of the major inhibitors of on-line shopping has been the perception of poor security associated with payment methods, confidentiality and the credibility of the online vendors.

Strangely, this high risk perception of the transaction security is not connected to a significant negative association between beliefs about the extent of transaction security with the attitude and intention. On the other hand, the product delivery and services risks are linked

with a strong and negative relationship with the attitude toward using an e-commerce system, but its negative relationship with the intention to transact is rather weak and the relative hypothesis not fully supported.

An explanation for the partial acceptance of the two final hypotheses (6 and 7) can be found in the insufficient e-commerce knowledge and practice background of Greek internet users. Because their level of experience with the B2C e-commerce systems is still immature, the attempt of this study to find and analyse their subjective and not well-practiced beliefs about the e-commerce risk and their impact on their attitude and intention to use online shopping, is really a difficult matter.

5. CONCLUSION AND LIMITATIONS

User acceptance of B2C EC systems remains a complex and dynamic phenomenon in information systems research (Lui and Jamieson, 2003). This study examines it, by using the original TAM model and adding another important factor, the perceived risk. Consistent with previous studies, perceived risks are found to influence online shopping acceptance. However, the contributions of this study are that it suggests a “narrower view” of the overall level of perceived risk dividing it into two basic sub-factors: the transactional security and the product delivery and services.

Furthermore, only 37.9 per cent of the respondents had e-shopping experience. That means that a comparatively large proportion of the sample was made up of inexperienced online shoppers. This piece of information about the sample structure reveals a core limitation of this study, considering the weakness of generalisation of the results, in comparison with researches which use a sample with more experienced participants (Van der Heijden *et al.*, 2003).

Consequently, researches with more experienced online shoppers are encouraged to replicate and extend this study, so as to extract more precise, meaningful and reliable results about the intention to transact with e-commerce systems.

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