

ANALYSIS OF E-COMMERCE ACCEPTANCE USING THE TECHNOLOGY ACCEPTANCE MODEL

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Abstract: *The adoption of e-commerce by a population requires an analysis of its social, cultural and economic environment, so it is necessary to propose and validate models based on the particularities of each region. From this need arises present research with the objective to examine the factors of the E-Commerce adoption in university students of the Medellin city, through the technology acceptance model, adding the variables of Perceived Security and Trust. The quantitative methodological design consisted of a cross-sectional exploratory research study in order to validate the model. A quantitative self-administered questionnaire was applied to 369 university students from the city of Medellin. To check the validity of the measurement scale used, it was developed to confirmatory factor analysis. Various hypotheses were collected and the degree of association was measured by the statistical Somers' D and Cramer's V. In this study, the attitude is correlated in 0.61 with the intention, being the variable with the greatest impact. Furthermore, the ease of use, perceived usefulness and trust, are antecedent of online shopping intention*

Keywords: *E-commerce; Technological Acceptance Model; Online Shopping Intention; TAM.*

JEL Classification: *M10, O33.*

Introduction

The use of technology and internet in many fields is becoming stronger with the passing of time (Venkatesh, et al., 2016). Besides, technology has significantly impacted the lifestyle of people, their preferences, customs and habits, changing radically their behaviors (Hassan, et al., 2015). In this sense, communication technologies have revolutionized the global economy of all types of companies during the last decades (Martin & Vasilciuc, 2011), forcing to rethink their marketing strategies (Anato, 2006). Therefore, internet has become an essential platform to establish all kinds of links (O'reilly, 2007), including marketing, distribution and sales (Corbitt, et al., 2003).

Moreover, the increasing availability of Internet-enabled devices (such as smart phones and Tablet PC) has promoted changes in the behavior of online shopping (Wagner, et al., 2013; Madden, et al., 2016). For that reason, (Rapp & Islam, 2003) introduced the term "*multichannel e-commerce*" to describe a retail sale system based on Internet, mobile phones and multimedia kiosks in retail stores. In this type of trade, various activities are included such as the exchange of goods, services and information, online delivery of digital content, electronic fund transfers, promotional activities, advertising of products and services, among others (Wagner, et al., 2017).

Electronic commerce does not replace traditional commerce but creates a new type of trade combining both. It means, traditional trade will never cease to exist, since even large chain stores offer and sell their products in different geographical locations

through their websites (Shim, et al., 2013) (Nadeem, et al., 2018). To promote the use of e-commerce and use all its advantages, it is necessary to understand how and why people choose to adopt technology (Schuster, et al., 2015; Villa, et al., 2018). Therefore, this paper presents an application of Technology Acceptance Model (Davis, 1989; Ruiz, et al., 2011), in order to address the phenomenon of technological acceptance of e-Commerce in university students of Colombia. First, this paper presents the fundamental theory, followed by the model; then, the results and conclusions of the study are presented.

1 Statement of a problem

In recent years, many studies have focused on electronic commerce and its adoption (Al-Alawi & Al-Ali, 2015; Chaparro-Peláez, et al., 2016). Electronic commerce is defined as any commercial transaction where the parties interact in an electronic way instead of physical contact (Nezamabad, 2011). This type of commerce includes various activities such as the exchange of goods, services and information, the online supply of digital content, the electronic transfer of funds, promotional activities and advertising of products and services, among others (Wen, et al., 2001). Different transmission channels via internet or other computer networks can be established in different ways such as business to business, consumer to consumer, business to government, and business to consumer (Gorla, et al., 2015).

1.1 Motivation in the Decision of Buying on Internet

Within the context of electronic commerce, there are several factors that encourage or discourage a person to make a purchase. Understanding what motivates the purchase of goods and services by electronic ways, including internet, allow companies to focus their e-marketing strategies (Cao & Yang, 2016). The literature review shows two types of motivations: utilitarian and hedonic (Blas & Mafé, 2006).

Many conveniences can be found when looking at utilitarian motivations: time savings, variety and wide assortment, access to products not available in the local market, price reduction, easy access to information and lower costs (Blas & Mafé, 2006; Delafrooz, et al., 2011). Furthermore, studies conclude that convenience and comfort are factors that drive the online purchase anytime and anywhere (Ruiz, et al., 2011; Ndayizigamiye & McArthur, 2014).

In the literature, it has been found that for men the most important component of the purchase is low price and for women is convenience and timesaving (Blas & Mafé, 2006). In general, researches show that the most influential factor in purchasing decisions is trust (Abyad, 2011). Researches also present the aspects in the electronic media that companies should consider, i.e., customer service, quality, timely delivery, persuasive presentations, shipping and handling, reasonable prices, company reputation, transaction security and information privacy (Abyad, 2011). In the same way, economic incentives and value added -in terms of money, time and energy- are used to reduce the levels of risk (Nezamabad, 2011).

In that sense, there are two theories that support the topic. The Theory of Reasoned Action (TRA), which states that beliefs and perceived benefits in online shopping are mediated by attitudes (Delafrooz, et al., 2011); and the Technology Acceptance Model (TAM), which allows to identify two specific beliefs that affect the acceptance of

innovations in computer science: perceived usefulness and perceived easiness of use (Ruiz, et al., 2011). It is important to have in mind these models and how they can be used during the research.

In contrast to those theories, (Blas & Mafé, 2006) developed a study where it was observed that the principal reason why consumers use the Internet to buy is convenience. This is because internet brings several advantages like perform various activities simultaneously during the purchasing process, purchasing 7 days a week 24 hours, and it also avoids travelling to the dealer. Furthermore, it was established that there is also a positive and statistically significant relationship between the motivations of purchase and the volume of spending on Internet (Sila, 2019). With respect to customer loyalty, researchers have found that buyers who are guided by the price, exhibit less loyalty when purchasing and are unwilling to pay high prices. It was also shown that consumers, who maintain a positive attitude towards online shopping, maintain their purchase intentions (Delafróoz, et al., 2011). While another study has found that there is a direct effect between convenience and usefulness of the Internet as a means of purchase (Ruiz, et al., 2011).

Finally, it is recommended that companies guide their efforts to try to capture more consumers through the network, by strengthening their motivations to make more visible the act of purchase (Smith, et al., 2014). To accomplish this, companies must ensure an easy, simple and convenient online shopping process because it is less confusing to the potential customers (Delafróoz, et al., 2011).

1.2 Technology Acceptance Model

The Technology Acceptance Model (TAM) is a behavioral model that describes the background of the adoption of information technology (Davis, 1989). The model proposes that behavior is a product of Perceived Usefulness and Perceived Ease of Use, and a causal relationship of these two elements with the intended use of Technology (King & He, 2006; Diez, Valencia & Bermudez, 2017)

Perceived Usefulness is associated with the degree to which a person believes that using technology will improve its performance. On the other hand, Perceived Ease of Use is associated with the degree to which a person believes that using technology will have less effort to do an activity (Davis, 1989; Chalela, Valencia, Bermúdez & Ortega, 2016). These two variables have direct influence in the attitude towards the use of technology, and according to (Fishbein & Ajzen, 1975), the attitude is a learned predisposition to answer favorable or unfavorably with respect to a given object. It is considered that the attitude is a result of subject beliefs regarding the behavior and its results, and the importance given to such beliefs (Wagner, et al., 2013; Moreno-Agudelo & Valencia-Arias, 2017).

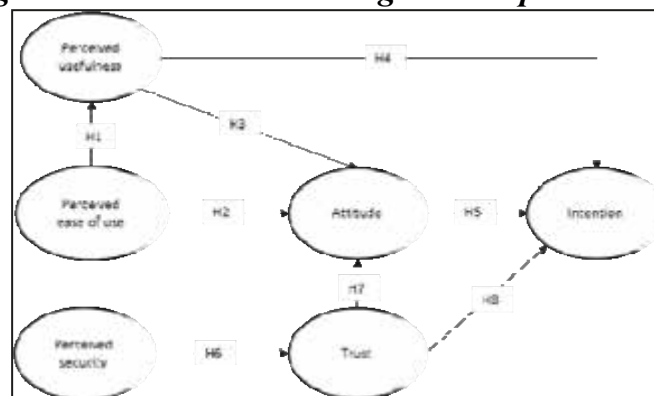
2 Methods

An additional element to the TAM model -fundamental in online shopping- is the Perceived Security and Trust. Security or control that individuals perceived from a transaction will be crucial for the generation of trust. Thus, Perceived Security is an important antecedent of trust (Kim , et al., 2011). And trust is understood as the certainty that an individual perceives that the expectations on the behavior of the other side will be satisfied (Gefen, 2000). Lack of trust leads individuals to inhibit their

intentions to develop behaviors (Gefen, 2000; Tavera, et al., 2011). According to the above, the following hypothesis and model (Fig. 1) are considered as presented in the work of (Tavera, et al., 2011):

- H1: Perceived Ease of use influences Perceived Usefulness.
- H2: Perceived Ease of use influences the attitude towards virtual transactions.
- H3: Perceived Usefulness influences the attitude towards virtual transactions.
- H4: Perceived Usefulness influences the intention of use Internet for transactions.
- H5: Attitude towards virtual transactions influences the Internet use intention for transactions.
- H6: The Perceived Security influences the Perceived trust.
- H7: Trust influences the attitude towards virtual transactions.
- H8: Trust influences the Internet use intention for transactions.

Fig. 1: E-commerce technological acceptance model



Source: (Tavera, et al., 2011)

To this transversal exploratory research, a quantitative self-administered questionnaire was applied to 369 students of the Instituto Tecnológico Metropolitano – ITM, Institución Universitaria Escolme and Universidad Nacional de Colombia. The sample selection was for convenience and for presenting characteristics of a homogeneous population, suitable for statistical studies and reliability tests (Becker, et al., 1987). The university population was used because their training and age makes them an attractive group to promote e-commerce (Vromen, 2007; Gupta, et al., 2008). To measure the factors of the model, a Likert Scale of five positions was proposed, where respondents indicated the level of agreement or disagreement for each element. All the items were on a five-point scale ranging from completely in disagreement (1) going from neutral (3) to strongly agree (5).

The data was collected in a virtual way, from a structured survey that contained the standard TAM scales adapted from Davis'scales (1989) and adapting some questions previously shown in the research of Gafen, Karahanna and Straub (2003) focused in capture interaction and perception of the students.

The questionnaire consists of four sections: Initially informed consent is presented, the objective of the study, the type of participation and the use of data. In a second section, three demographic variables are asked (occupation, age and level of studies).

In the third section, three filtering questions (dichotomous) are asked about Internet shopping experience, e-commerce recommendation and security perception. Finally, the fourth section is composed of 18 questions in Likert Scale, which are divided in groups of three questions in order to measure each of the variables stipulated in the model from different perspectives through the following constructs: perceived easiness of use, Perceived Utility, Attitude towards e-Commerce, Perceived Security, Perceived Confidence and Intention to use e-Commerce.

The intention to use factor is the output variable, so it is measured from several perspectives: intention to use e-commerce platforms, the use of additional mobile banking services for purchase and online purchase preferences versus physical goods purchases, in order to contrast these 3 perspectives of online purchase.

3 Problem solving

3.1 Validity Analysis

To check the validity of the measurement scale used, it was developed a confirmatory factor analysis using the statistical software SPSS. This analysis was performed in order to assess the validity and reliability of each variable -question- (Batista-Foguet, et al., 2004).

To achieve the convergence model was necessary to remove the SP2 indicator, since its standardized weight factor was less than 0.6. On the other hand, the average obtained from weight indicators on each factor was greater than 0.7 for all the constructs, indicating the presence of convergent validity (Tab. 1), as suggested by (Hair, et al., 2001).

Tab. 1: Convergent validity of standardized factors

Construct	Item	Standardized factorial weights	Average of standardized factorial weights
Perceived Ease of use	FUP1	0,876	0,845
	FUP2	0,892	
	FUP3	0,768	
Perceived Usefulness	UP1	0,910	0,910
	UP2	0,910	
Attitude towards e-commerce	ACT1	0,944	0,944
	ACT2	0,944	
Perceived security	SP1	0,857	0,708
	SP2	0,451	
	SP3	0,815	
Perceived trust	CP1	0,876	0,878
	CP2	0,874	
	CP3	0,885	
e-Commerce use intentions	IU1	0,931	0,931
	IU2	0,931	

Source: (Hair, et al., 2001)

Then, two indicators were obtained to determine whether the factor analysis could be done. First, Bartlett's sphericity test was calculated to detect the presence of correlation between variables, providing the probability that the correlation matrix collects significant values; therefore, p should be less than 0.05 or 0.01 critical level (Lévy, et al., 2006).

This analysis was complemented with one analysis of convergent validity and a discriminatory validity by check the confidence interval in the estimation of the correlation between each pair of factors. It should not contain a value of 1 (Anderson & Gerbing, 1988).

Subsequently, it was identified the reliability of the measurement model, and for that, the Cronbach's alpha for the respective scales of each construct was calculated having an adequate internal consistency of the measurement scale, as all Cronbach's alpha values are higher than the recommended 0.70 value (Manzano, et al., 2010)

3.2 Hypothesis Testing

The estimation of the structural model adapted to the use of e-commerce was conducted. Various hypotheses were collected and the degree of association was measured by the statistical Somers' D and Cramer's V. The first is a measure of association between two ordinal variables that takes a value between -1 and 1, where values close to 1 in absolute value indicate a strong relationship between the two variables, and values close to zero indicate that there is little or no relationship between the two variables (Kaplan, 2008). Furthermore, the statistical Cramer's V gives the degree of association between the variables taken into account in the formulation of hypotheses. The coefficient can take values between 0 and 1, where 0 indicates independence and 1 indicates dependence between variables (Malhotra, 2004). The values obtained from SPSS software for each statistical evaluated are presented in the Tab. 5. It has coefficients with higher associativity than 0.3.

Tab. 2: Hypothesis contrast

Hypothesis	Somers' D	Cramer's V
H1: Perceived Ease of use → Perceived Usefulness	0,582	0,429
H2: Perceived Ease of use → Attitude towards online shopping and transactions	0,548	0,429
H3: Perceived Usefulness → Attitude towards online shopping and transactions	0,61	0,452
H4: Perceived Usefulness → E-commerce use intention	0,529	0,385
H5: Attitude towards online shopping and transactions → E-commerce use intention	0,61	0,447
H6: Perceived security → Perceived trust	0,393	0,369
H7: Perceived trust → Attitude towards online shopping and transactions	0,429	0,387
H8: Perceived trust → E-commerce use intention	0,592	0,452

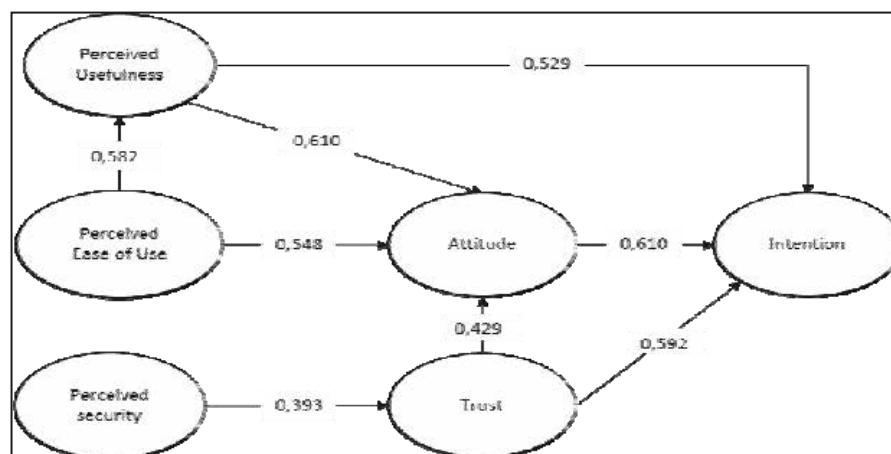
Source: (The authors)

The definitive model of this study (Fig. 2) was built with the relationships discussed above and the values of degree association of Somers's D. (Göktaş & İşçi, 2011). The results of the analysis of association of the variables showed that the Perceived Ease of Use, Usefulness and Trust are the variables that have direct influence on the attitude of using e-commerce. The instrument showed that 49.32% of respondents believe that it is simple to use internet when shopping / transactions. The ease of use has also direct influence on the perceived usefulness. It is consistent with the results of (Ruiz, et al., 2011) in another study on TAM, and the attitude towards the use of these platforms. According to the literature reviewed and our results, the perceived usefulness causes satisfaction leading to the perceived factors of ease of use and attitude about a state of the favourability over the use of e-commerce (Muyllea, et al., 2004).

In relation with the Perceive of security the trust is the factor with the weakest coefficient, explained as the variable that most affects the non-use of online financial services. According to Ventura (2019) although since 2009 there is legislation on computer crimes, the complexity of the rule and the lack of clarity make the processing of these crimes complicated administrative processes, maintaining little confidence in virtual operations by of the users.

The level of relationship between perceived ease of use and perceived usefulness is 0.582. It means that if the website offers a friendly platform to the user, the user will feel affinity and satisfaction, and later it will frequently access to the website. This is confirmed with a 38.25% of respondents according to the proposal before. On the other hand, an associativity degree of 0.548 between perceived ease of use and the attitude factor is evidenced, indicating that if the use of the technology is simple, people are more willing with the website. If the user easily understands a website, this will ensure non frustration and demotivation for visit the site.

Fig. 2: Definitive model



Source: (The authors)

In this study, the attitude is correlated in 0.61 with the intention, being the variable with the greatest impact for acceptance and intention to use e-commerce by respondents. Furthermore, attitude is also conditioned by the ease of use, perceived usefulness and trust, which place it as a direct and principal antecedent of online shopping intention. Perceived security is correlated in 0.393 with the perceived trust. Thus, as there are two predictors of online shopping, it is crucial to focus on them as external variables in the model.

4 Discussion

The strongest positive relationship was found between perceived usefulness and attitude towards use, showing the need to propose better strategies that show users the usefulness and advantages of e-commerce, since it is the most influential factor in the attitude towards the e-commerce and attitude is in turn the most influential factor in the intention to use. Therefore, it could be the most appropriate strategy to achieve a better adoption of the e-commerce. These findings are (Crespo, et al., 2013) who found that perceived usefulness has a positive influence on attitudes towards the use of electronic commerce, and on the perception of usefulness and ease of use of e-commerce, both with and without prior experience with web transactions. Faced with this, (Chen & Chen, 2014) suggest that factors such as the perceived quality of the product as a predictor for perceived usefulness in e-commerce should be included. In addition, (Ergün & Kuşcu, 2013) suggest that proactive market orientation and innovation orientation have positive impacts on perceived usefulness, and it is considered appropriate to deepen research these variables in future studies.

Faced with the positive relationship between the attitude and the intention to use e-commerce, studies such as (Bhati, 2016) suggests that this attitude depends on the knowledge that potential clients have about the risks of theft, information privacy and reliability of the provider. However, in the case of users with previous experience in online shopping, (Oliveira, et al., 2017) found that in addition to attitude, satisfaction must be included as a predictor of purchase intention, since factors such as interactivity, the clarity of information and convenience in the use of e-commerce platforms are elements that this population takes into account when making the decision to re-make a new purchase.

It is also found that exist a strong relationship between trust and intention to use, showing the need to implement strategies that generate security and confidence in users, in such a way that they feel comfortable giving their personal data and the quality of the products they will receive and use. This is consistent with the findings of (Azam, et al., 2012), who showed that trust has a strong impact on the decision to make online purchases, since security, privacy and compliance in the offered service are closely related to aspects such as confidence and satisfaction of making purchases online. In addition, (Tavera & Londoño, 2014) suggest that perceived trust constitutes the construct with the greatest empirical influence on the intention to use e-commerce, which implies that companies wishing to implement e-commerce as a channel to sell their products must generate computer and communication mechanisms that show users the reliability of online transactions on an e-commerce platform.

In developed countries it has been shown that trust depends on security and other variables because it has already been demonstrated in large studies with replication strength (Palvia, 2009; Shreya & Chatterjee, 2019; Ruppel, et al., 2003). However, in underdeveloped countries the weight of each condition is different due to particular macroeconomic situations and political stability and more unstable.

Conclusion

There is no doubt that development of markets and revolution of new information and communication technologies, especially the internet, has changed significantly the

behaviour of companies and consumers, which places electronic commerce in the target of studies and current research markets. This research has applied the technology acceptance model to study the phenomenon of acceptance of e-commerce. Specifically, this study designed and applied a questionnaire in order to research the components and variables that are part of the motivations and intentions of online shopping by the university population of the city of Medellín. In this sense, the study carried out becomes a valuable tool for the scientific community, to the extent that it makes use of TAM models previously validated by other authors, applied to groups of interest in a developing country, where the conditions of confidence have a variability different from those originally proposed in models applied in developed countries with different cybersecurity situations.

A reliable model was adjusted. Perceived ease of use and perceived trust constructs were the variables that had direct influence on the attitude of using e-commerce, which had an impact on the intention of purchase. Perceived security is reflected in the trust, which also generates a direct impact on the e-commerce use intentions.

According to the model results, if a company wants to sell its products successfully via internet, it must ensure a platform as simple as possible. In this sense, buyers can easily detect the added value or additional benefits of doing the purchase in this way, and not in the traditional one. Additionally, this case, with the university population, has a fundamental variable: the necessity of users' trusts in the use of the platform to do payments. The confidence is affected by the security that users perceive about platform. Therefore, the model shows a direct relationship between trust and perceived use intention constructs, indicating that companies should invest resources to make their customers feel confident to pay their products online.

With regard to the practical implications of the research carried out, its results provide key information for entrepreneurs seeking to impact university students, where they should consider factors such as confidence and ease of use perceived by them compared to the platforms available for electronic commerce, key aspect for those organizations that seek to reach their customers through different channels.

In addition, with the realization of the study it is possible to identify a new contribution to the field of knowledge, given that unlike most studies available on e-commerce, it has been prepared in the context of a developing country. that implies different positions on the part of the students and, therefore, diverse factors that affect the acceptance of new technologies, for this case, the incorporation of electronic commerce; what leads to the creation of knowledge from different social, economic and political contexts, and therefore, that nurture the investigative exercise in this field.

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