

PERCEIVED RISK VS. INTENTION TO ADOPT E-COMMERCE – A PILOT STUDY OF POTENTIAL MODERATORS

ODNOS IZMEĐU PERCIPIRANOG RIZIKA I NAMJERE USVAJANJA E-TRGOVANJA – PILOT STUDIJA POTENCIJALNIH MODERATORA

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SAŽETAK

E-trgovanje nastavlja se razvijati kao važan kanal kupovine za potrošače. Ovo objašnjava sve veći interes za određivanje najvažnijih varijabli koje utječu na ponašanje potrošača na internetu, a posebice na percipirani rizik kao poznato bihevioralno zastrašivanje. Prethodne su studije dokazale negativan utjecaj percipiranog rizika na namjeru usvajanja e-trgovanja. No ovisno o vrsti proizvoda i istraživane populacije, rezultati su često bili kontradiktorni, a utvrđeno je da je ta povezanost jača, slabija ili nejasna. Tako dolazimo do zaključka da osim čimbenika koji imaju direktni utjecaj, vjerojatno postoje i moderatori

ABSTRACT

E-commerce continues to develop as an important channel for consumer purchases. This explains the growing interest in determining the most important variables which affect online consumer behavior, especially perceived risk as a well-known behavioral deterrent. Previous studies have proved a negative influence of perceived risk on the intention to adopt e-commerce. However, depending on the type of product and the population investigated, results were often contradictory and this relationship was found to be stronger, weaker or even inconclusive. This led us to conclude that, besides direct influence fac-

koji utječu na analizirani odnos. Moderatori su kvalitativne i kvantitativne varijable koje modificiraju odnos i utječu na smjer i/ili jakost odnosa između nezavisne i zavisne varijable.

Svrha našeg rada jest istražiti potencijalne moderatorske varijable koje bi mogle promijeniti odnos između percipiranog rizika i namjere kupovine na internetu. Promatrali smo tri varijable, tj. spol, iskustvo korištenja interneta i iskustvo kupovine putem interneta, i tri latentne, psihološke varijable: strah od neizvjesnosti, povjerenje u e-trgovanje i materijalizam. Istraživanje je provedeno anketiranjem na uzorku od 481 studenata poslovne ekonomije, nakon čega je slijedio pristup modeliranja strukturnih jednadžbi. Iako nije dokazan moderacijski efekt, djelomično zbog homogenosti istraživane pilot populacije, strah od neizvjesnosti i povjerenje u e-trgovanje otkriveni su kao prethodnici percipiranog rizika u e-poslovanju čineći percipirani rizik medijatorom između tih dviju varijabli i namjere kupovine putem interneta.

tors, there could be moderating effects for the analyzed relationship. Moderators are qualitative or quantitative variables which modify a relationship, and affect the direction and/or strength of that relationship between an independent and a dependant variable.

The purpose of our research was to investigate potential moderator variables which could change the relationship between perceived risk and the intention to buy online. We used three observable variables – gender, experience in using the Internet and experience with online shopping – and three latent, psychological variables – fear of uncertainty, trust in e-commerce and materialism. The research consisted of a survey conducted on a sample of 481 business students, followed by a Structural Equation Modeling approach. Although no moderation effect was proved, partly due to the homogeneity of the investigated pilot population, fear of uncertainty and trust in e-commerce were found to be antecedents of perceived risk in e-commerce, making perceived risk a mediator between these two variables and the intention to buy online.

1. INTRODUCTION

Perceived risk has been considered a major behavioral deterrent ever since Bauer (1960) investigated consumer behavior under the influence of risk. The identification of several types of risk was another milestone in marketing literature (Cox, 1967; Jacoby & Kaplan, 1972; Roselius, 1971). Dividing perceived risk into categories – product risk, physical risk, social risk, psychological risk, time risk and financial risk, researchers got a clearer view of how perceived risk could influence consumer behavior. Over the years, the interest in perceived risk has grown significantly. Certain studies have proved a negative influence of perceived risk on the intention to adopt e-commerce (Featherman & Pavlou, 2003; Pavlou, 2003; Crespo et al., 2009; Li & Huang, 2009; Hernandez et al., 2010). Researchers have also analyzed buying behavior and variables that influence it, such as product type and buying channel (Derbaix, 1983; Dholakia, 1997; Chauduri, 1998; Degeratu et al., 2000; Girard et al., 2003; Buttner et al., 2006). The adoption and usage of new technologies were also investigated (Venkatesh et al., 2003; Pires et al., 2004; Cunningham et al., 2004; Cocosila et al., 2009).

The present paper aims at summarizing variables that influence perceived risk and at further identifying the variables that might have a moderating role between perceived risk and the intention to adopt e-commerce.

2. LITERATURE REVIEW: TYPES OF RISK AND POTENTIAL MODERATING VARIABLES

2.1. Types of perceived risk

Perceived risk affects all types of purchasing activities, not only e-commerce ones. Hence, we

start our approach by quickly summarizing the main types and dimensions of perceived risk, in general, and then address the specificity of e-commerce.

A very important source of perceived risk in purchasing activities is the product itself. The type of product the consumer decides to buy in order to satisfy his needs has a major influence on the consumer's behavior and the level of perceived risk. Derbaix (1983) classified products into three categories – search goods, durable experience goods and non-durable experience goods – and identified what type of risk ranks higher in each category. For durable experience goods the financial risk scored the highest, whereas for non durable experience goods the physical risk was the most significant. As expected, the psycho-sociological risk was rated the highest in the category of search goods. Derbaix went further and associated a specific risk reliever (the most efficient) to each type of risk. His findings are in line with Cunningham (1967), who proved there is a specific perceived risk for each product category both in terms of the number of persons perceiving a high risk and in terms of the composition of risk. Derbaix's work was developed also under the influence of Jacoby and Kaplan's (1972) research, where they studied perceived risk on twelve different products. These two authors measured the five dimensions of perceived risk: financial, performance/functional, psychological, social and physical. Even though they did not use any clustering criterion, it was easy to observe a pattern: clothing items registered a high psychological and social risk, technical items involved high financial and performance risks, while food was more about the physical risk.

The variation of perceived risk for different types of products can also be explained by the consumer's level of involvement in a purchasing situation. It is obvious a consumer will have a higher involvement when it comes to buying a refrigerator than in case of a book or a CD. The increased level of involvement arises from the importance of the purchase, ownership and use of the product (Dholakia, 1997). The product cat-

egory can influence the perceived importance of a certain purchase, which can also vary at an aggregate level with the person's characteristics. The importance of the product is known to be an increasing factor for perceived risk (Bettman, 1973).

An interesting analysis was made by Chaudhuri (1998), who compared perceived risk by dividing products into necessities and luxuries. Considering the role that emotion might have in explaining the relationship between perceived risk and product type, the author analyzed 89 products and found that, in general, if a product is a necessity, then the handled risk is perceived to be lower in terms of choosing a brand from a product class. Yet, when controlling for product importance and negative emotion, there is proof of a positive connection between necessities and perceived risk. This means that there are products classified as necessities which can generate serious consequences if the right brand is not chosen. As far as luxuries are concerned, the relationship with handled risk is positive; thus, a luxury product will increase the level of perceived risk. The relationship is still valid when Chaudhuri introduces the negative emotion variable in the analysis. However, if controlled for positive emotion, it seems that the risk perceived for luxuries decreases as the consumer is faced with a brand choice in the product category. It is important to underline that the study did not take into account the inherent risk, just the handled one. If the risk had been measured on both dimensions, it could have revealed different results, as it is common knowledge that luxurious products are more expensive and perceived risk increases with the value of the product (Bhatnagar et al., 2000). Moreover, luxuries are very frequently considered technologically complex or satisfying ego-related needs, both characteristics being related to a boost in the product risk perceived by the consumer.

In conclusion, it makes sense to classify products in terms of associated risk, as perceived risk varies from one class to another in intensity, as well as in structure.

Another distinction is needed in analyzing perceived risk for goods versus services. While a good, having tangible attributes, has a physical presence and can be conceptualized, services raise serious problems for marketers. Intangibility is one of the most discussed issues when it comes to services, along with non-standardization and simultaneity of production and consumption. The fact that the consumer cannot examine or test the service before purchasing influences significantly the level of perceived risk. From this point of view, buying a service is similar to buying products online. Studying the difference between goods and services, as far as perceived risk is concerned, researchers have found proof that services are considered riskier than goods (Murray & Schlacter, 1990; Mitchell & Greatorex, 1993).

Perceived risk does not vary only with product category, but also with the shopping channel used by the consumer. Studies show that if a certain product carries a specific amount of risk, selling that product through a different environment than the traditional one will raise the risk perceived by the consumer (Cox & Rich, 1964; Spence et al., 1970; Van den Poel & Leunis, 1996; Bhatnagar et al., 2000; Korgaonkar & Karson, 2007).

The invention of home-shopping has brought not only a lot of convenience for the consumer, but also more concerns. Home-shopping is considered riskier than in-store shopping because the consumer cannot examine the product prior to purchase, it is difficult to return the product if faulty and there is always a worry about the retailer's credibility (Spence et al., 1970).

Cox and Rich (1964) were the first researchers to address the problem of perceived risk in a new retailing environment: telephone shopping. At that time, telephone shopping was considered the "ultimate" invention in the retail industry, allowing shops to cut costs and offer consumers more convenience. Still, it had to face a serious dilemma of how to handle perceived risk. Cox and Rich (1964) discovered that perceived risk is a major behavioral determinant as far as telephone shopping is concerned. Moreover, they

found that there is a difference between certain products when ordered by phone, explained by the authors through the frequency of purchase.

Another important study is that of Spence et al. (1970), who observed the difference in perceived risk caused by the shopping channel in purchasing certain items. Their results proved there was a significant difference between perceived risks in mail order versus traditional shopping (Table 1).

The significant difference between perceived risk in mail order and in-store shopping was found to be consistent over time, as further studies confirmed the results of Spence et al. (1970). Even after almost two decades, and using a different methodology in assessing perceived risk, a study by Festervand et al. (1986) was in line with Spence et al. (1970).

Van den Poel and Leunis (1996) compared perceived risk for six products, bought by mail order or directly in a traditional shop. Their findings suggest that consumers perceive buying by mail to be more risky than buying in a traditional store. In addition to that, when taking into account only the direct mail shopping channel, the data showed a difference in risk perception between buyers and non-buyers, with the latter category perceiving more risk; this implies that perceived risk can be considered a barrier for adopting the new direct mail shopping channel. E-commerce is under a similar influence of perceived risk to the previous shopping channels that were considered innovations at their time.

The main dimensions of perceived risk in traditional commercial activities, in general, include

Table 1: Mail order versus in-store shopping

Product	Perceived risk in mail order	Perceived risk in store purchase	*Difference between mail order and store shopping*
Fresh strawberries	3.67	2.31	1.36
Children's shoes	3.57	2.54	1.03
19 inch TV	3.57	2.74	0.83
Readymade drapes	3.71	2.97	0.74
Power lawn mower	3.40	2.85	0.75
Hospitalization insurance	3.89	3.22	0.66
Bourbon whiskey	3.69	3.04	0.64
Metal lawn chair	3.28	2.66	0.61
Aluminum siding	4.11	3.56	0.55
Christmas cards	3.13	2.58	0.55
Stationery	3.11	2.61	0.50
Mutual fund	3.84	3.34	0.50
Tulip bulbs	3.26	2.77	0.48
Double bed sheets	2.93	2.44	0.46
Hi-Fi album	3.74	3.30	0.45
Monopoly game	3.36	2.91	0.45
Life insurance	4.55	4.12	0.44
Sewing machine	4.26	3.88	0.38
Vitamins	4.06	3.70	0.36
Aspirin	3.65	3.40	0.25

* Significant at a 0.01 level

Source: Spence, H. E., Engel, J. F., & Blackwell, R. D. (1970). Perceived Risk in Mail-Order and Retail Store Buying. *Journal of Marketing Research*, 7(3), 366.

physical risk, social risk, financial risk, performance risk, technological risk and time convenience risk. For online shopping, three categories of risk are more important – product delivery, security and privacy (Roselius, 1971; Jacoby & Kaplan, 1972; Mitchell et al., 1993; Machado, 2005; Zhou et al., 2007).

Different variables were selected for analysis as potential influence factors for perceived risk and for the intention to buy online. Zhou et al. (2007) investigated income, gender, attitude, normative beliefs, online shopping experience, consumer satisfaction, shopping motivation, age, Internet experience and culture, finding mixed results. In a comprehensive literature survey, Machado (2005) classified influence factors into four categories – consumer socio-demographic characteristics (age, gender, education and income), situational factors (time pressure, purpose of shopping, lack of mobility and geographical distance), product characteristics and previous online shopping experience. Again, investigated studies showed mixed and, sometimes, contradictory results (Machado, 2005).

Gender is a behavioral variable of great interest for marketers, and previous studies are controversial as far as gender's influence on risk is concerned. Finucane et al. (2000) discovered a clear difference between men and women in a study about health, food and technology risks. Gabarino and Strahilevitz (2004) confirmed the results of previous studies which showed that gender influences perceived risk in e-commerce, women being more risk averse than men. Yet, results can be different based on the product bought. Bhatnagar et al. (2000) found that men buy more technology, while women buy food and clothing; this is why men perceived more risk. Venkatesh et al. (2003) stated that gender role in e-commerce adoption is crucial. Liebermann and Stashevsky (2002) observed that women perceive a higher risk than men when buying online because of the credit card theft risk and lack of human contact.

Age can also have an important influence on perceived risk. Bhatnagar et al. (2000) found that older people perceive lower risk than younger people when shopping online, due to their previous experience and higher trust in their own choices. Donthu and Garcia (1999) are in line with the previous studies, but they argue the financial status is actually the reason for which older people perceive less risk.

Liebermann and Stashevsky (2002) studied the influence of education on perceived risk. The study revealed that people with no academic education perceive higher risks, especially due to lack of human contact. More educated people have an elevated degree of trust in e-commerce (Hui & Wan, 2007). Moreover, education is positively related to online shopping for books or personal computers (Girard et al., 2003). Other studies investigated external factors, such as e-shop credibility, technical assistance, return policy and product trial period.

We did not find any studies investigating personal, psychological variables, such as materialism and fear of uncertainty, nor did we find any studies focusing on different moderating variables from this consumer traits category. Hence, we decided to investigate possible moderator variables, bearing in mind that these might explain some of the previous contradictory results.

2.2. Moderating variables

Moderators are part of the so called "third type variables" category, other than independent and dependent ones (together with antecedent, intervening-mediating and extraneous variables). They are a subset of a class of variables labeled in social sciences as 'test' or 'specification' variables, because they specify the form and the magnitude of the relationship between an independent (or predictor) variable and the dependent (or criterion) variable (Rosenberg, 1968). In the simplest way moderators are defined as the variables that modify the intensity of the rela-

tionship between a dependent and an independent variable. They can be qualitative or quantitative variables which affect the direction and the strength of a certain relationship, producing an interaction effect (Baron & Kenny, 1986). In the presence of a moderating variable, or more precisely for different levels of the moderator, the relationship between the independent and the dependent variable might change drastically. This could explain previous contradictory results of research on the influence of perceived risk on the intention to adopt online commerce and this is the main reason for our study – finding potential moderator variables.

As far as perceived risk and intention to adopt e-commerce are concerned, several variables can be tested for moderation effects. Internet experience, online shopping experience, attitude towards technology, age, gender, income, education, culture, normative beliefs, shopping motivation, time pressure or general attitude could be analyzed in connection with perceived risk and adoption intention. We selected six possible moderating variables, for both objective and subjective reasons. The rational motivation includes previous studies, while the subjective one focuses on testing possibilities; working on a student population, we do not expect variables such as the attitude towards technology, income, education and culture to vary sufficiently, so that different levels could be considered.

Gender could be a moderator as women usually perceive more risk than men, at least for the same product category (Liebermann & Stashevsky, 2002; Venkatesh et al., 2003). Thus, we expect the strength of the relationship between perceived risk and online adoption intention to vary on gender type. This is the basis for our first hypothesis.

The more experience a user has with the Internet, the greater our expectation for that user to perceive less risk. Thus, the Internet experience is expected to influence the relationship between perceived risk and adoption intention of e-commerce. In previous studies, both perceived

risk and perceived benefits of Internet shopping were found to be significantly associated with the amount and frequency of online purchases (Doolin, Dillon, Thompson & Corner, 2002; Lee & Turban, 2001). This is the fundament for our second hypothesis.

The same situation is present in the case of online shopping experience. A more experienced shopper will perceive less risk and should adopt e-commerce more easily. The Internet users who buy online more frequently were found to perceive less risk and to trust a website more, based on their previous satisfaction (Doolin et al., 2002; San Martin & Camarero, 2009; Su, Hsu & Wang, 2009). This is the basis for the third hypothesis of our research.

Fear of uncertainty is a psychological variable that characterizes a consumer. It is a latent variable used as a proxy for risk aversion, which can influence perceived risk and also its relation with the online adoption intention. A person who is more risk averse will perceive a higher risk in connection with any action that is uncertain (Pavlou, Liang & Xue, 2007; Kailani & Kumar, 2011). Fear of uncertainty as a moderator would be part of the psychometric paradigm of perceived risk, encompassing a theoretical framework that assumes risk as being subjectively defined by individuals; those individuals may be influenced by a wide range of psychological, cultural or social factors (Sjoberg, Moen & Rundmo, 2004). This is the basis of our fourth hypothesis.

Trust in e-commerce as a moderator has been intensively studied in relation with perceived risk (Chen, 2006; Buttner & Gortiz, 2008; Zhu et al., 2009). If the consumer trusts e-commerce, then the risk perceived will be lower and we expect an influence on the relationship with e-commerce adoption. General trust was a significant source of variation in perceived risk among different European countries (Viklund, 2003; Delbufalo, 2012). This is the fundament of our fifth hypothesis.

Materialism as a variable of interest is the main element of novelty for our research, since it has

never been used to test the relationship between perceived risk and e-commerce adoption intention. Materialism could be considered an antecedent of perceived risk, since materialistic tendencies are usually blamed for risky financial behaviors, as well as for gambling (Richins, 1994; Watson, 2003; Richins, 2011). Materialism was selected as a moderator in our study due to the fact that financial risk has always had a large weight in perceived risk, and we expect people who are more materialistic to perceive greater financial risk; as a consequence, the relationship between perceived risk and e-commerce adoption intention could be different for different materialism levels. This is the basis of our sixth hypothesis.

3. RESEARCH HYPOTHESES AND METHODOLOGY

3.1. Research hypotheses

After the literature review process, six variables were selected for the study to test their role as moderators between perceived risk and the intention to adopt e-commerce. The variables are gender, Internet experience and online shopping experience, on the one hand (observable), and fear of uncertainty, trust in e-commerce and materialism, on the other hand (latent, not observable). The research hypotheses tested were the following:

- H1: Gender moderates the relationship between perceived risk and e-commerce adoption intention.*
- H2: Internet experience moderates the relationship between perceived risk and e-commerce adoption intention.*
- H3: Online shopping experience moderates the relationship between perceived risk and e-commerce adoption intention.*

H4: Fear of uncertainty moderates the relationship between perceived risk and e-commerce adoption intention.

H5: Trust in e-commerce moderates the relationship between perceived risk and e-commerce adoption intention.

H6: Materialism moderates the relationship between perceived risk and e-commerce adoption intention.

3.2. Methodology

The research is based on a quantitative approach, using the survey as a method of data collection. The study first tests reliability and validity of the psychological variables, and then the interaction effects to see if gender, Internet experience, online shopping experience, fear of uncertainty, trust in e-commerce or materialism can be considered moderators of the relationship between perceived risk and intention to adopt e-commerce.

The sample was a convenience one, formed by 481 business students. The choice of students as investigated population was justified by both the fact they represent an important target market for online shops and the ease of contact. The method used was the questionnaire-based survey. We applied a questionnaire and we registered self-reported measures for all variables of interest. The latent (unobservable) variables were measured through constructs previously developed in other studies, using items on a 7-points Likert scale. A perceived risk scale and an e-commerce adoption intention scale were formed by items taken from previous studies: Featherman and Pavlou (2003), Crespo et al. (2009) and Forsythe et al. (2006).

Perceived risk was measured as a multi-dimensional construct with four dimensions: product (six items), financial (eight items), delivery (four items) and psycho-social risk (eight items). However, for a more parsimonious model perceived risk was measured using composite indicators of

the dimensions. Fear of uncertainty was used as a proxy for risk aversion and the scale we used was adapted from Cloninger (1987). The original scale had seven items, but after the reliability and validity analysis we only retained five items. Trust in e-commerce was measured using a three-item scale from Pavlou (2003) and materialism was measured using the scale from Richins and Dawson (1992). The materialism scale used in our study had 15 items, grouped on three factors – success, centrality and happiness. The survey instrument – questionnaire – had 53 items for the latent variables, to which three scales – one nominal and two interval type – were added for gender, Internet experience and online shopping experience (the observable variables). The final questionnaire is available on request, from the correspondent author of the study.

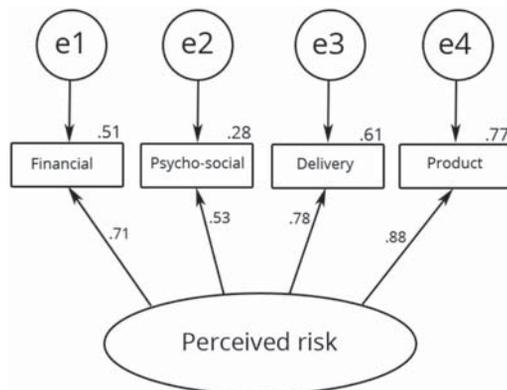
Psychometric properties were tested for each of the constructs. We performed a reliability check (Table 2) and all constructs presented acceptable levels of reliability. Reliability was also tested for the dimensions of perceived risk before being turned into composites.

Table 2: Cronbach alpha values

Construct	Cronbach Alpha	No. of items
Product risk	0.802	6
Financial risk	0.814	8
Privacy risk	0.680	3
Delivery risk	0.756	4
Psycho-social risk	0.798	8
E-commerce adoption intention	0.934	4
Trust in e-commerce	0.647	3
Fear of uncertainty	0.735	5
Materialism	0.877	15

After checking for reliability, we tested the first-order perceived risk measurement model using the composites (Figure 1).

Figure 1: Perceived risk first-order model



We applied confirmatory factor analysis using AMOS 18; results showed a good fit for the model (Table 3).

Table 3: Goodness of fit for perceived risk

Model	RMR	GFI	AGFI
Default model	.045	.975	.877

The other constructs were also tested by means of confirmatory factor analysis (Table 4). Most of the constructs had acceptable levels for goodness of fit of the model (RMR<0.05; GFI>0.9; AGFI>0.8 - Gefen & Straub, 2005). Due to the fact that trust was modeled with only three items, the model was just identified but goodness of fit indices could not be computed.

Table 4: Goodness of fit for constructs

Model	RMR	GFI	AGFI
E-commerce adoption intention	0.023	0.993	0.967
Trust in e-commerce	Insufficient number of items		
Fear of uncertainty	0.179	0.923	0.768
Materialism	0.171	0.857	0.809

4. RESULTS

Moderation occurs when a relationship between two variables depends on a third variable. If, in

the case of mediation, there is an indirect effect on the dependent variable by the independent variable through the mediator, in moderation we identify an interaction effect between the independent and the moderator variables.

The present study tested three observable variables (gender, Internet experience, online shopping experience) and three unobservable variables (fear of uncertainty, trust in e-commerce and materialism) as moderators between perceived risk in e-commerce and the intention to adopt e-commerce.

To test moderation due to gender, we performed a multi-group confirmatory analysis using AMOS 18.

The grouping variable was gender and the model tested was represented by perceived risk in e-commerce, as a first-order factor model, and adoption intention. If the models tested for the groups differ significantly in terms of estimates, then moderation by gender is present. To see if there are significant differences between parameters, pair-wise parameter comparison option was used. The z-test for differences between parameters yielded a value of 0.745, which is lower than 1.96 (z value significant at $p=0.05$). It means that there is no difference between men and women as far as the influence of perceived risk in e-commerce on adoption intention is concerned (Figure 2 and Figure 3). Therefore, we cannot say that gender moderates this relationship – hence, H1 is not confirmed.

Figure 2: Tested model for men

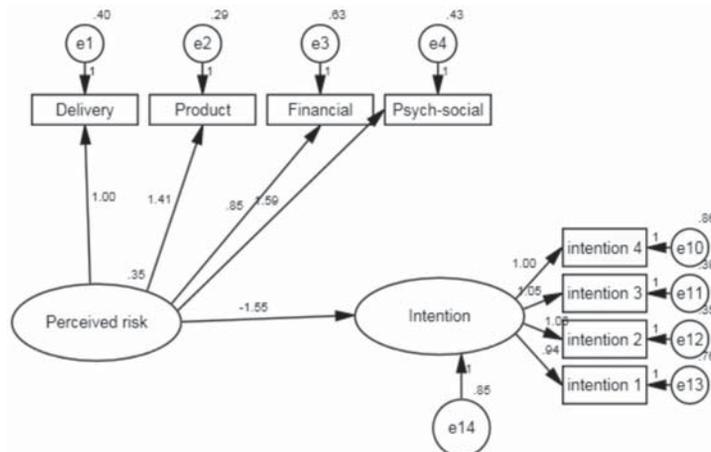
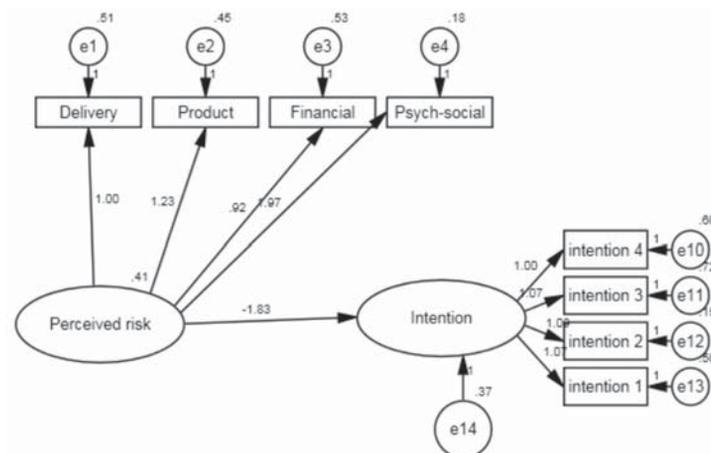


Figure 3: Tested model for women



Experience with the Internet was measured on five levels, but in our sample only one category was strongly present – with over 4 years of experience (Table 5); thus, the moderation effect could not be tested.

More variation across the sample was found in the case of experience with online shopping, which was measured by the number of purchases in the last six months (Table 6).

Table 5: Experience with Internet categories

Category	No. of respondents
Under one year	1
1-2 years	1
2-3 years	6
3-4 years	35
Over 4 years	438

Table 6: Experience with online shopping (last 6 months)

Category	No. of respondents
Never	189
Once	117
Twice	81
3-4 times	48
> 4 times	53

Figure 4: Respondents who never bought online

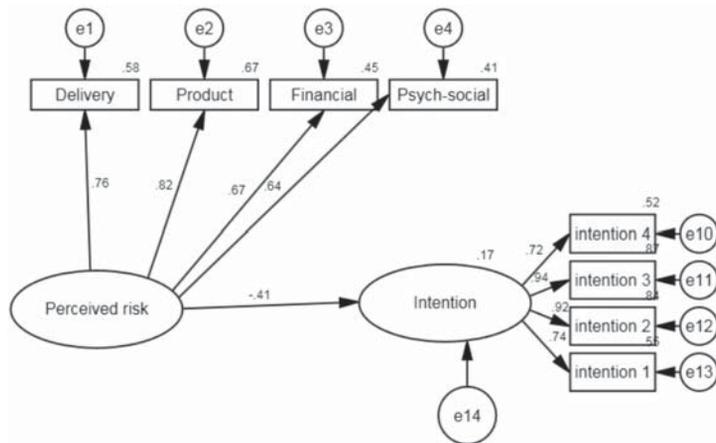
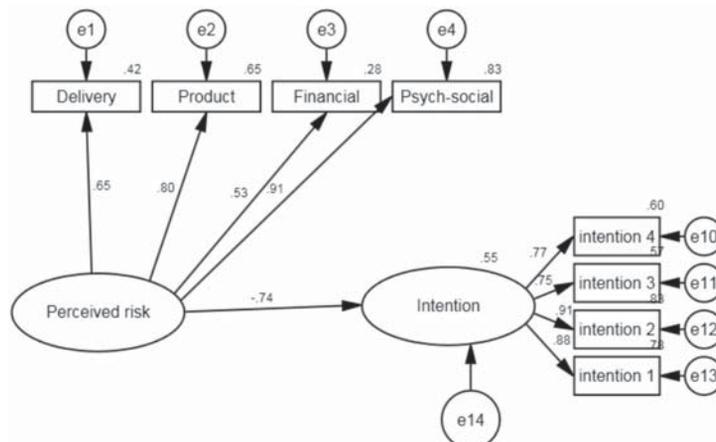


Figure 5: Respondents who bought once online



To test the moderation effect, we took into account only the first two groups who were large enough to be subjected to analysis. However, results showed no difference between people who never bought online and people who bought once in the last six months (Figure 4 and Figure 5).

The results obtained from testing moderation of the three observable variables did not support our hypotheses. The explanation could be related to the sample, formed by students which is, thus, very homogenous.

As far as latent variables are concerned, testing moderation assumes the use of more sophisticated measures. Kenny and Judd (1984) developed a procedure to test the interaction between latent variables based on the product between observable variables that define them. Thus, if V_1 is defined by observables X_1 and X_2 , and V_2 is defined by observables X_3 and X_4 , the interaction variable V_3 will have the following indicators: $X_1 * X_3, X_1 * X_4, X_2 * X_3, X_2 * X_4$.

The tested equation is: $V_4 = a0 + a_1V_1 + a_2V_2 + a_3V_3$. The presence of interaction is proved if V_3 is significant.

To test if fear of uncertainty is a moderator, a new observable interaction variable was formed from the items of perceived risk and fear of uncertainty (Figure 6).

Although fear of uncertainty could have been introduced as a latent variable, by applying the Kenny and Judd (1984) method, the interaction factor would have had 20 indicators and the model would lack parsimony. The model is presented in Figure 6. Data analysis revealed that the interaction factor is not significant ($p=0.702$), which means that the fear of uncertainty does not moderate the relationship between perceived risk and adoption intention. Thus, H4 is not confirmed.

The same method was applied to trust in e-commerce. The model tested is shown in Figure 7. The interaction factor was found to be insignificant at the $p=0.390$ level. H5 was not confirmed.

A similar result was obtained by Buttner & Goritz (2008), who further chose to test trust as a mediator of the relationship between perceived risk and adoption intention.

For materialism, we tested the relationship between perceived risk and adoption intention,

Figure 6: Fear of uncertainty moderator

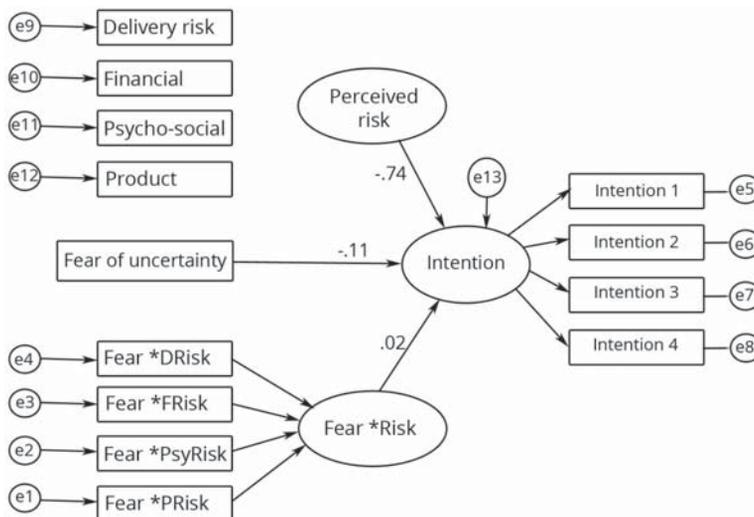
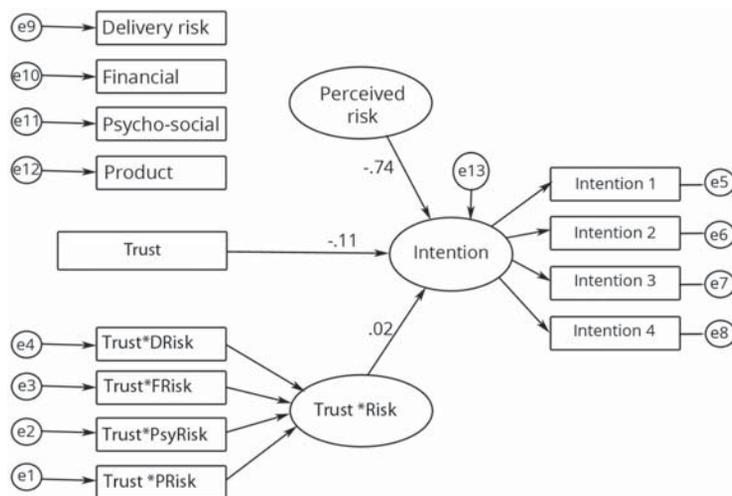


Figure 7: Trust in e-commerce moderator



but the interaction factor was also found no significant ($p=0.981$). Thus, H6 was not confirmed either.

Seeing that our hypotheses were not confirmed, therefore, moderation was not proved, we went further and tested the three latent variables as the antecedents of perceived risk. We used the confirmatory factor analysis to test the relationship between each latent variable, perceived risk and adoption intention.

Fear of uncertainty was found to be an antecedent of perceived risk. A 0.51 standardized coefficient defines the relationship between fear of uncertainty and perceived risk, whereas a negative -0.76 coefficient described the relationship between perceived risk and adoption intention. We also tested for a direct influence of fear of uncertainty on adoption intention, but it was found insignificant. Only an indirect effect of -0.390 was found for fear of uncertainty on adoption intention, which confirms the mediator role of perceived risk in the model tested.

There was no evidence to support materialism as an antecedent of perceived risk. One explanation could be that materialism is a characteristic that defines a person in general, while perceived risk refers to particular situations.

Next, trust in e-commerce was also found to be an antecedent of perceived risk, with a negative influence of trust on perceived risk of -0.78. The relationship between perceived risk and adoption intention was also found significant (-0.71), where no relationship between trust and adoption intention was proved, suggesting that perceived risk is a mediator in the model.

5. CONCLUSIONS: DISCUSSIONS, LIMITATIONS AND MANAGERIAL IMPLICATIONS

Although the sample employed was within recommendations – i.e. specialists suggest that in the case of 2-4 latent factors the sample should have at least 100 respondents (Loehlin, 1992), while Tabachnick and Fidell (1996) offer a minimum of 10 cases per parameter as a rule – the results were not favorable to our initial presumptions. However, we consider that our approach deserves attention, from at least two points of view:

- replication on a larger, more heterogeneous population might change results, applying the same methodology that we adopted;
- failure to prove hypotheses is as important to science as knowing what is confirmed.

No moderation effect was identified on the relationship between perceived risk in e-commerce and adoption intention. However, fear of uncertainty and trust in e-commerce were found to be antecedents of perceived risk in e-commerce, making perceived risk a mediator between these two variables and the intention to buy online. We consider these results important, even if they are negative, because scientists' failure to publish null results is a well-known issue in social research, marketing included (Rosenthal, 1978; Hubbard & Armstrong, 1992; Scargle, 2000). "Negative results now account for only 14% of published papers, down from 30% in 1990. Yet knowing what is false is as important to science as knowing what is true. The failure to report failures means that researchers waste money and effort exploring blind alleys already investigated by other scientists" (The Economist, 2013).

Research limitations refer mainly to the analyzed population and sample type. Having a convenience sample can be cost effective; however, when aiming to test for moderation, we have to assure a certain level of variation of the variables involved. This is difficult to obtain in the case of students, who represent a very homogenous

population. Further research should concentrate on replicating the study on a representative sample, with real consumers and also, if possible, real online purchase situations.

Even if our hypotheses were not confirmed, our study makes two important contributions:

- it suggests that further research is necessary for explaining inadvertencies and contradictions found in previous studies which analyzed the relationship between perceived risk and the intention to adopt online commerce, through the consideration of other possible moderating or intervening variables;
- it is the first one testing materialism and fear of uncertainty as the psychological variables which could act as moderators.

Being a pilot study, on a convenience sample from a particular population (business students), managerial implications of the results should be cautiously considered, since a replication of the study on a larger population might lead to different results. At this point, our results suggest that managers do not have to consider separate risk-mitigating strategies for online buyers based on gender, trust, fear of uncertainty and materialism.

The study is also important at a methodological level, offering suggestions for similar moderation testing for other variables of interest in explaining the relationship between perceived risk and intention to adopt online buying.

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