Trust, Risk, Privacy and Security in e-Commerce

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Trust, Risk, Privacy, and Security in e-Commerce

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Abstract — **The concepts, Trust, Risk, Privacy and Security, are widely used in various studies done by multiple disciplines, and they are often incorrectly referred to almost as synonyms. The aim is to clarify the concepts from the consumer viewpoint in e-commerce. The findings of our qualitative study suggest several relationships between the four concepts and serves as building blocks for further research.**

Keywords — **trust, risk, privacy, security.**

I. INTRODUCTION

E-commerce has gained wider popularity among consumers during the 20th century. The domain area is researched in many alternative ways and by multiple disciplines. However, there seems to be confusingly many studies of trust and trusted third parties, of trust and risk, of privacy and security in e-commerce. These concepts of trust, risk, privacy, and security are used for many purposes and with many meanings. It is important to understand that these concepts serve different purposes: trust and risk are human-related concepts, while security is mainly used in a technical way. Security in that sense is the means to achieve and support consumer privacy. Security could also mean a consumer's feeling of being secure, safe. So, there is a need for clarifications.

Studies concerning consumer trust, privacy, and security are often theoretical in nature [1]. Therefore, there is a lack of empirical evidence to support different models. Furthermore, according to [2] there is no unified view on the relationship between the concepts of consumer trust and risk, even though they are seen as the two key concepts of the phenomenon of consumer trust [3].

The aim of our study is to generate an understanding of what meanings consumers give to the concepts. This objective will be reached through three goals. The first goal is to review literature concerning the four concepts. The second goal is to empirically investigate the meanings that consumers give to the four concepts. The third goal is to provide theoretical building blocks for further

research based on the integration of our empirical findings and current literature. Achieving these three goals will result in an advanced understanding of the four concepts, which will provide researchers opportunities for further research.

The paper is structured as follows. Firstly, the theory of trust, risk, privacy, and security are discussed. Secondly, data collection, methodology, and the analytical approach are introduced. Thirdly, the findings of our study are presented. Lastly, the paper concludes with a theoretical discussion, indications for further research, and managerial implications.

II. THEORIES OF TRUST, RISK, PRIVACY, AND SECURITY

A. Trust

The concept of trust has been heterogeneously defined by many authors in the fields of economics, social psychology, sociology, management, marketing, and information systems [4]-[5]. One of the most accepted definitions of trust is stated as follows: "the willingness of a party to be vulnerable to the actions of another party, based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party." [3, pp. 712]. In this paper, trust is approached based on this definition.

Literature concerning consumer trust in e-commerce treats trust as a multidimensional construct including three elements; 1) institutional, 2) interpersonal, and 3) dispositional trust [6]. *Institutional trust* refers to an individual's trust in institutions, like the laws in a society or in the case of e-commerce, the technology itself [7]. *Interpersonal trust* refers to an individual's trust in another specific party or the trustworthiness of a third party, like an e-vendor, a newspaper publishing an article concerning an e-vendor, or a friend who gives recommendations about an e-

vendor. [6], [8]–[9]. The concept of *dispositional trust* is based on research in the area of psychology [10]. Dispositional trust means an individual's ability to trust in general, and is based on an individual's belief that other people are well-meaning and reliable [6], [11]. The disposition to trust is usually considered to be a personality-driven feature of an individual. That is, an individual's personality determines his/her propensity to trust in general. Furthermore, an individual's disposition to trust may be endogenous or it may develop during life experiences [12]. The disposition to trust is especially important in novel situations, such as using e-commerce [11].

B. Consumer- Perceived Risks

The nature of the specific relationship between trust and risk is poorly understood, and it has escaped theoretical detailing. Although the field has made important advances in defining trust and conceptualizing trust from different theoretical perspectives, future research may scrutinize the role of risk and trust in the context of consumer-based electronic commerce [1].

What is consumer-perceived risk and why it is important in terms of trust? First, risk is defined as a consumer's subjective experience of an uncertain consequence regarding an action the consumer took [13]. Secondly, if we take apart the definition of trust, we can see that it starts with the notion that trust is "the willingness of a party to be vulnerable to the actions of another party.." [3, pp. 712]. This willingness to be vulnerable means willingness to engage in a relationship that includes an element of uncertainty, that is, to take a risk. Thus, the concepts of trust and risk seem to be tied together, which makes the concept of risk important in terms of trust. More specifically, consumer-perceived risks could be seen as an antecedent of trust, because the need for trust arises only in a risky situation as [3] argue. For that reason, the concept of consumer-perceived risk is important in terms of trust.

C. Privacy

The literature includes several definitions of privacy. Privacy can be understood as a legal concept and as the right to be let alone [14]. Privacy can also mean "the claim of individuals, groups, or institutions to determine for themselves when, how, and to what extent information about them is communicated to others" [15, pp. 83]. From a privacy standpoint, trust can be viewed as the customer's expectation that an online business will treat the customer's information fairly [16].

There are four basic categories of privacy: information privacy, bodily privacy, communications privacy, and territorial privacy [17]. Internet privacy is mostly information privacy. Information privacy means the ability of the individual to control information about one's self. Invasions of privacy occur when individuals cannot maintain a substantial degree of control over their personal information and its use.

People react differently to privacy problems. One reason for these differences might be a cultural viewpoint. For example, researchers have pointed out that consumers in Germany react differently to marketing practices that people in the USA might consider the norm [18]. It is also important to understand their views regarding privacy in general, their personal expertise in Internet technologies, and how they view the role of the government and the role of companies in protecting consumer privacy. An individual's perceptions of such external conditions will also vary with personal characteristics and past experiences [19]. Therefore, consumers often have different opinions about what is fair and what is not fair in collecting and using personal information.

D. Security

Different threats in e-commerce, like data transaction attacks and misuse of financial and personal information, generate security threats [1]. Thus, security is protection against such threats [20].

Information security consists of three main parts: confidentiality, integrity, and availability. CIA as an abbreviation is a widely used benchmark for evaluation of information system security also in the e-commerce environment [21]. All three parts of security may be affected by purely technical issues, natural phenomena, or accidental or deliberate human causes.

Confidentiality refers to limitations of information access and disclosure to authorized users and preventing access by or disclosure to unauthorized users. In other words, confidentiality is an assurance that information is shared only among authorized persons or organizations. Authentication methods, like user IDs and passwords that identify users, can help to reach the goal of confidentiality. Other control methods support confidentiality, such as limiting each identified user's access to the data system's resources. Additionally, critical to confidentiality (also to integrity and availability) are protection against malware, spyware, spam and other attacks.

Confidentiality is related to the broader concept of information privacy: limiting access to individuals' personal information.

The concept of *integrity* relates to the trustworthiness of information resources. It is used to ensure that information is sufficiently accurate for its purposes. The information should be authentic and complete. For example, forwarding copies of sensitive e-mail threatens both the confidentiality and integrity of the information. *Availability* refers to the availability of information resources. The system is responsible for delivering, processing, and storing information that is accessible when needed, by those who need it. An information system that is not available when you need it is at least as bad as no system at all. It may be much worse if the system is the only way to take care of a certain matter.

III.
METHOD, DATA COLLECTION, AND
ANALYTICAL APPROACH

In order to bring out consumers' views on the introduced theoretical concepts, we decided to adopt a qualitative method, namely a semi-structured theme interview. Furthermore, our decision to adopt a qualitative method is supported by the fact that a qualitative method is useful in a situation where a rich amount of data is needed to generate possibilities to understand the phenomenon as broadly as possible and to generate new insights.

Since electronic commerce includes many different contexts, we decided to conduct the interviews in three different contexts: electronic grocery shopping, electronic health care services, and electronic media. The reason to choose these contexts was that we expected that trust, risk, privacy, and security would attain different meanings in different contexts. For example, electronic health care services can be assumed to be services where consumers' privacy and data security concerns could emerge more than in the context of electronic media. By conducting the interviews in different contexts, we wanted to gain a wider point of view concerning the four concepts than would be possible by only interviewing consumers in one context.

The data for the analysis was collected during the summer of 2004. Three interview sets included altogether 30 informants. Eighteen of the informants were women and twelve were men. Six were under 30 years old, twenty were between 30–50 years, and four were over 50.

The informants were recruited by advertising on the web sites of a local newspaper and an electronic grocery shop, through the mailing list of a local health care district, and in one seminar. The informants had different backgrounds and experiences with e-commerce.

The duration of the interviews varied from 30 minutes to two hours. The interviews were conducted in the interviewees' workplaces and homes. The interviews started from a general discussion about the interviewee's background as an e-commerce consumer and continued to a discussion about e-services in the specific area (grocery, health, media). All the interviews were tape recorded and fully transcribed, and the findings were discussed in a multidisciplinary research group.

The analysis of the empirical material was conducted as follows. First, the transcriptions were read several times. Secondly, the empirical material was sorted according to the themes (concepts of trust, risk, privacy, and security) presented earlier in this paper. Thirdly, in order to clarify the concepts from a consumer viewpoint, we compared the literature and our findings from the interviews. Lastly, the quotations and our analysis were sent to the informants in order to confirm that we had interpreted their thoughts correctly.

IV. FINDINGS

In this section the findings of our study are introduced. Starting with consumer trust and risk in e-commerce, we will discuss what meanings the consumers gave to the four theoretical concepts. The relationships between the different concepts are also discussed.

A. Trust and Risk

In the theoretical part of this paper, consumer trust in e-commerce was divided into three different elements, namely interpersonal, dispositional, and institutional trust. Furthermore, we discussed that consumer-perceived risks and trust are seen to be close concepts and that risk is a prerequisite to trust [3]. For that reason, in the empirical part we treat these two concepts as a whole. Next, we present the informants' views on interpersonal, dispositional, and institutional trust. Furthermore, the relationship between the three elements of trust and risk is also discussed.

The following quotation illustrates interpersonal trust. The informant's view on the e-vendor's strong brand is presented in more detail.

"Researcher: Well.. Have you any experience in using e-commerce.. Have you ordered or paid anything via the Net?"

"Informant: I have not ordered anything.. paid mostly via the e-bank.. well, of course it is not the same as ordering products.." (Jaana, 43, female)

The quotation illustrates the informant's trust in banks. The informant has not used any other e-services than bank service. The quotation also presents the role of perceived risks, although the informant does not directly say she has not used any other e-services than bank service because she perceives too many risks related to e-commerce.

The next quotation is quite similar to the former.

"Researcher: Have you ordered anything via the Net? You know.. like products?"

"Informant: No, I have not.."

"Researcher: Ok.. I see."

"Informant: "And if I think carefully.. well, I have used Finnkino's e-service.. bought some movie tickets via their service.." (Viljami, 27, male)

First the informant does not remember ordering anything via the Internet, but then he remembers that he has used Finnkino's (Finnish movie agent) e-service. In this case, the strong brand influenced the informant so much that the level of perceived risks was surpassed, which enabled the informant to engage in a risky relationship. More specifically, the informant trusted the brand and had the courage to use the e-service, although he does not usually use e-services.

Despite the fact that the two preceding quotations emphasize the role of a well-known brand in building trust in an e-vendor, these two quotations could also be interpreted as manifestations of low dispositional trust, because the two informants did not want to use e-services they were not familiar with, and thus they perceived the risks related to less-known e-vendors to be relatively high.

Compared with the preceding two informants, who perceived risks related to e-services and used only e-services offered by a well-known e-vendor, the next two quotations from two other informants offers quite a contrary point of view in terms of risk perception and trust.

"Researcher: Ok. Well, would you usually like to test an e-shop when you get to know about it? You know, before actually using it?"

"Informant: Well, No. I believe they function if they are put on the Net." (Heidi, 39, female)

Researcher: Mmm.. well.. What is your opinion about e-services that gather your information?

Informant: I do not know.. I do not really care. It does not stress me, you know.. If someone knows what I use and has my information. (Kari, 30, male)

What is interesting in the informants' views is that they are not interested in the possible risks included in e-services. The first informant believes if an e-service is on the net, then it is functioning properly. The second informant is not stressed if his information is available to someone.

One possible explanation for the informants' opinions could be high dispositional trust. In other words, the informants do not perceive risks related to e-service as strongly as some other informants.

The next quotation illustrates how the informant perceives risks associated with registration. The informant does not understand why some e-services demand registration. It is interesting that, although she understands that registration is not a bad thing, there still remain some thoughts that something harmful could happen if she registers with the e-service. This could be interpreted as low dispositional trust, because the informant displays some unexplainable and perhaps irrational fears concerning registration. She mentions that even an e-vendor with a strong brand (Keltainen Pörssi) does not convince her about the trustworthiness of the e-vendor.

"Informant: I do not generally, I do not know.. if a service demands registration.. In such cases I do not understand why, but I just do not want to register, even if it is the Yellow Pages or Keltainen Pörssi or something like that.. Then I feel that in some way I am noticed.. and even though it would not be so horrible if they notice me.. but somehow I just feel that if I register, then I am attached to that service in some way.. And I feel much more comfortable if I can just check the service without joining it.. And in some services I do not understand what the registration means.. " (Maija, 27, female)

The next quotation illustrates institutional trust from one informant's point of view. The informant does not want to give his credit card number to foreign companies. This could be interpreted as a manifestation of institutional (dis)trust, because the informant does not consider foreign e-vendors as trustworthy. One explanation for her view could be the strict Finnish consumer protection law that protects consumers.

"Informant: No, I do not want to give my credit card number to foreign companies in any case.. It is never a good thing. From a customer's point of view it is always better to charge with an invoice.. You know, then you can pay it later.. but I don't know what the companies' attitude is towards the matter.." (Seija, 39, female)

The informant's thoughts furthermore reveal the relationship between institutional trust and consumer-perceived risks. It is logical to interpret her unwillingness to use foreign e-services as a perception of too high risks related to e-services. In other words, the informant is not willing to engage in a risky relationship with a foreign e-vendor, that is, she is not willing to trust in foreign e-services because of the level of perceived risks.

Also the next quotation serves as evidence of institutional (dis)trust. More specifically, trust in technology.

"Informant: But I am concerned about how it functions in practise.. Is it just like that, you check a box and then the bill comes home or.. Then you have to give your personal information.. addresses and everything.. You could also put someone else's address.. that concerns me.. You know, how it really works in practise.. And how trustworthy it is.. but if I want to buy something, then of course you have to believe that the product will come home in some way.. you know… And when you get the product, then you pay.. that is a fair deal.."

"Researcher: Ok…"

"Informant: And you do not have to pay it in advance from your bank account.." (Maija, 27, female)

The informant experiences a lack of trust in technology. She is not convinced that the ordering system will function properly. In addition to that,

she is concerned that someone else could use the technology in some harmful way, such as ordering products using someone else's address. It seems the informant perceives many risks associated with the technology. Furthermore, the quotation illustrates well the relationship between institutional trust and risk. More specifically, the informant perceives many risks related to the technology, and for that reason she is not convinced about the trustworthiness of e-commerce.

C. Privacy

The third theoretical concept we discussed in addition to trust and risk was privacy. In this chapter, the informants' views on privacy are discussed. Furthermore, the relationship between privacy, trust, and risk are addressed.

The following quotation illustrates the most common privacy concern: e-mail addresses and personal information can be used for marketing or other purposes without the informant's permission.

"Researcher: What did you think about this kind of registration?"

"Informant: Of course, there are always risks… Those ads come after that, but few…" (Mikko, 42, male)

Some informants said there can be hackers (as they referred to teasers on the Internet) or the e-vendor may not take care of their information, but they trusted their own e-vendor in privacy questions. It is interesting that the problems with privacy seem to generate risks. It raises a question of the interrelationship between the two concepts. At least some relationship seems to exist, which serves as evidence that an interrelationship between the two concepts may exist. The next quotation illustrates the interrelationship between privacy and risk.

"Informant: Well, I really do not like to visit these sites… sometimes, when this kind of mail comes that I have not ordered, I just delete them without opening…" (Sirkka, 51, female)

The informant said she does not open some e-mail that she has not ordered. Her opinion could be interpreted as a manifestation of the relationship between privacy (right to be left alone) and risk, because the unwanted e-mail generates risks related to e-commerce and its trustworthiness.

Some of the interviewed consumers commented that sometimes changing personal information given

to an e-service is difficult, remembering user accounts and passwords is not easy, and e-vendors ask things that are not essential. They felt there is a risk in giving this kind of personal information, and it can be troublesome.

"Informant: There are many forms for registration: fill in this area, fill in this area, fill in this area, then I don't. I think, let it be. However, I don't have the energy to write my whole curriculum vitae in some registration." (Eveliina, 29, female)

In these situations it is easier from the consumer point-of-view not to give any information to the e-vendor. Besides the risk of losing personal information, there is a risk of wasting time. The informants were so concerned about giving personal information to e-vendors that almost all of them said they sometimes give incorrect personal information. The following quotation presents the most common way to ensure privacy and avoid risks if the consumer does not trust enough in the e-vendor.

"Researcher: Do you give your personal information?"

"Informant: I cheat."

"Researcher: Ok, can you tell me more?"

"Informant: Well, I write wrong dates of birth and so on. I do not know how long they allow that… --- I have that Hotmail, I use…" (Sari, 45, female)

The informants liked to have more surveillance on the web so hackers can be caught. But, at the same time they wish for more privacy for themselves. The next quotation illustrates how registration is important in preventing financial risk, although there can be privacy problems.

"Researcher: What do you think about this kind of electronic newspaper that requires registration?"

"Informant: …If you pay, for example --- you should have some sort of password and that. If I pay and everybody sees the newspaper with this same price, it is not ok…" (Eveliina, 29, female)

Some of the interviewed consumers noted that ordering from abroad is not safe, or they would not give their personal information abroad. The

informants had very strong views on security in different countries and the opinions were alike. Some also wanted to reveal that they had knowledge from media. The next quotation from one informant illustrates this issue.

"Informant: I take this somehow very carefully, for example this bank matter. By the way, I looked that… yeah, it was on the Finnish Broadcasting Network's pages… I looked at a kind of manuscript of a program where they tell precisely about these cheatings on the Internet (-), from everything I have read, so I have understood that you cannot very easily give your personal information just anywhere." (Marjatta, 57, female)

The informant's thoughts revealed her interest in privacy hazards. The increased knowledge concerning privacy increased her understanding of what kind of risks are related to e-commerce. More specifically, the quotation illustrates the interrelationship between privacy and perceived risk.

D. Security

In the theoretical part of this paper the concept of security was divided into confidentiality, integrity, and availability. In the interviews, confidentiality is mainly a problem when a consumer is afraid of using a credit card because of the risk of intercepting the credit card number. The nature of this security problem seems to be very technical. The next quotation illustrates how one informant relies on a familiar brand and her own banking systems (not a credit card) in her homeland.

"Researcher: In this Anttila's (Finnish e-Shop for clothes and home goods) order, how does this (payment) happen?"

"Informant: Well, there is a link to bank services and you can pay it there

"Researcher: What do you think about it?"

"Informant: It is really convenient --- I like this, however, Finnish services are secure. I would not go to really strange foreign shops. Of course, there are also known shops but… However, everyone cannot give there all of their personal information." (Eveliina, 29, female)

The preceding quotation serves as a manifestation of the interrelationship between institutional trust and security. The informant considers that the security threats are handled more or less efficiently based on the e-vendor's nationality.

According to the informants, because of viruses, integrity problems can occur in e-services. The next quotation presents one opinion about information leaking to suspicious third parties.

"Informant: For some reason, I got an e-mail from somebody I have never met, but that happens --- There is this risk when there are these viruses and… They can come and when many of them are classified documents --- it is somehow risky." (Sirkka, 51, female)

The informant's thoughts can be interpreted as a manifestation of the relationship between security and perceived risks. More specifically, the informant is not sure about the security of her system in a situation where a virus attacks her computer. This kind of possibility generates risks.

The third element of security is availability. As an example of availability, one informant highlighted a problem related to logging in to e-services.

"Informant: On a couple of occasions I have sometimes entered the wrong password, and I have not remembered the right one." (Eveliina, 29, female)

This availability problem concerns privacy, because the password should not be so easy that others can guess it. There is a risk of losing personal information or, for example, personal account services. The next quotation presents another kind of registration problem.

"Researcher: Have you visited a place where you should give personal information? "

"Informant: I have tried --- It wasn't a long time ago --- But I understood, that I cannot go forward from here if I do not have something. I do not know what it is that I should have." (Marjatta, 57, female)

In the preceding quotation, the availability problem was that the informant did not know how to register. This kind of security threat can have an influence on the level of dispositional trust, because bad experiences related to the functionality of e-commerce might decrease the consumer's trust in e-commerce in general.

Additionally, technical problems can block availability.

"Informant: I have not been very frustrated with these, but I know many others who are. For example, when you cannot get in some registration or if there is something wrong with the server or the user's own computer. And the second is: when that Messenger makes an update, you cannot go on the net for some time. And when a Windows Update comes to these controls, there are many days when it doesn't work." (Sari, 45, female)

The preceding three quotations illustrate how security affects perceived risks and trust in e-commerce. For example, the problems with the availability of the technology could be interpreted as generating risks related to technology. Furthermore, the consumer's disposition to trust might decrease if problems with technology emerge continuously.

V. DISCUSSION

Our findings revealed several issues concerning consumers' views on trust, risk, privacy, and security. According to our findings, all four concepts are somehow linked together. For instance, our findings indicate that consumers' perception of the trustworthiness of the e-vendor is related to perceived risks. Furthermore, perceived security and privacy are also linked to the concept of perceived risks and thus, indirectly to the concept of trust. Our findings also indicate that security might have a direct influence on trust, as the quotation related to the e-vendor's nationality addressed. So, there is nothing to wonder about in the confusion related to these concepts.

In order to organize these concepts, we could broaden our insights and also borrow something from disciplines other than IS. The literature related to consumer-perceived risks could be useful in generating an understanding of these complex concepts and the relationships between them. For example, the concept of perceived risks is quite well defined and organized in the literature on consumer research. Already in the 1960s, researchers in consumer research divided the concept of perceived risks into four categories, namely financial, time, social and performance risks [22]. Later the categories of physical and psychological risks were included [23]. In the past two decades, when technological products and especially the use of the

Internet became widespread, the technological dimension was also included in the concept of perceived risks [24]-[26]. Nowadays, the concept of risk in the context of e-commerce has been seen to include five dimensions, namely financial, social, psychological, technological and physical risks [26].

What is interesting in the concept of perceived risk is that in consumer research literature it includes the concepts of privacy [26]-[27] and security [28]. For instance, privacy is considered a dimension of psychological risk and security a dimension of financial risk [29]. Our findings indicate the same. Our informants said they are concerned about privacy and security. These concerns were mainly related to technology, but the concern about privacy was also addressed to, for example, financial risk. Thus, our findings and current literature indicate that security and privacy have some relationship with risk. It seems that security and privacy can have an effect on different dimensions of risk, like financial and psychological risks. For that reason, we suggest that the concepts of privacy and security should be understood as elements that have an influence on risk, not only on technological risk as is usually thought, but also on other dimensions of risk. For that reason, security and privacy have an indirect effect on consumer trust in e-commerce too, because it seems that security and privacy influenced the risks that our informant perceived. Thus, in line with [3] thoughts, which indicate that perceived risks are a prerequisite to trust, the effect of privacy and security on risk perception might also have an influence on consumer trust in e-commerce.

Figure 1. presents a model based on our findings and current literature, which illustrates the relationships between the different concepts. As discussed in the previous chapter, privacy and security have a relationship with the concept of perceived risks. Thus, they have an indirect effect on consumer trust in e-commerce. More specifically, privacy and security have an effect on institutional and interpersonal trust, because consumers perceive risks related to technology (institutional aspect) and the e-vendor (interpersonal aspect). It could also be argued that security has a direct effect on trust, as our findings indicate. More specifically, our findings indicated that security has a direct effect on dispositional (consumers might feel some suspicions related to e-commerce in general, which may lead them to not trust in e-commerce without any specific reason), and institutional trust (security is perceived based on the e-vendor's nationality). Our model also suggests that trust and risk have a duplex relationship. The logic behind this is that trust could be seen as dynamic construct. For example, the consumer might trust in an e-vendor, but if something harmful happens in the relationship, trust might decrease and risk increase.

VI. INDICATIONS FOR FURTHER RESEARCH

This paper deals with four important concepts in e-commerce research. In the current literature, these concepts have been used as synonyms and there has been confusion between the concepts and their relationships. In the current study, a qualitative method was used to reveal consumers' views on different concepts.

Figure 1. Relationships between Trust, Risk, Privacy, and Security
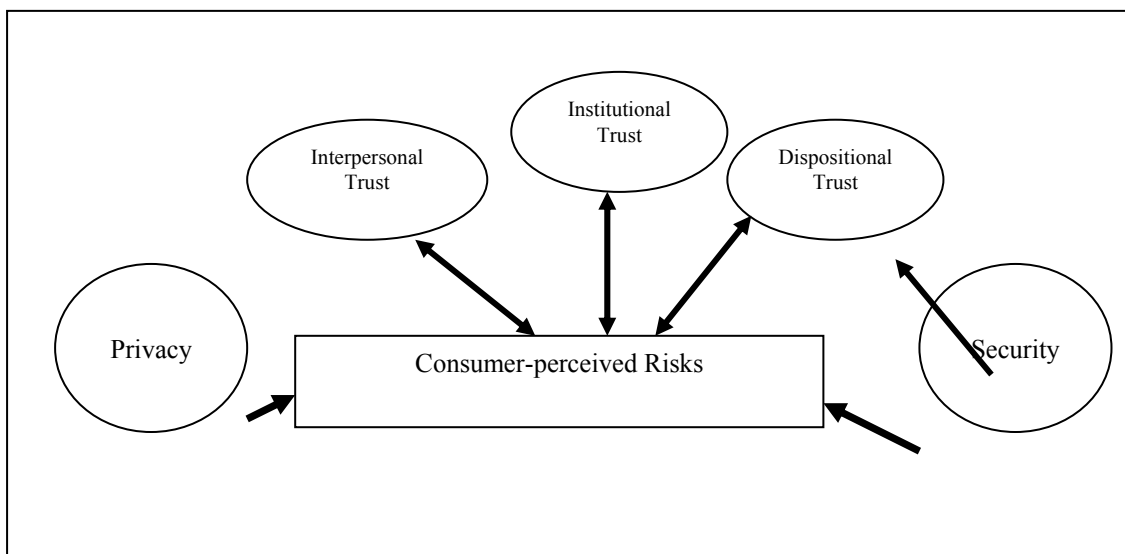
Our findings indicate that the concepts of perceived risk, security, and privacy are not very different. It seems that privacy has direct effect on perceived risks and indirect effect on trust via perceived risks. Security has direct effect on risk and on trust.

Security and privacy are usually linked to technology and technological risk. This raises a question of why we should treat the concepts of privacy and security as technology-related? As our findings revealed, there seem to be links to other dimensions of risk, too. Thus, future research could concentrate more on the relationship between security, privacy and, for example, psychological risk.

The same applies to the relationship between security, privacy, and trust. In our opinion, more research is needed to understand the relationship between consumer trust, risk, security, and privacy. For example, in [1] research concerning an integrative model of consumer trust in Internet shopping the concept of risk was excluded, but perceived security and privacy control were treated as attributes of the trustworthiness of the Internet merchant. The exclusion of risks makes evaluation of the results quite difficult, because risks have such a powerful impact on consumer trust. For that reason, we suggest that when trust is an issue, then the concept of risks should be included in the study.

What is common to the research on trust and risk in e-commerce is that they miss the social and psychological side of the issue. For example, how does the perception of social risk in using an e-service affect trust, or how does the psychological risk in (for example, hurt feelings) e-commerce affect the perception of trustworthiness? Yet, these issues have not been studied much, although they could have a significant effect on the relationship between trust and risk.

Understanding consumers' views on these conceptions is also important in research. For example, [1] claim that their findings did not provide empirical support for the effect of perceived privacy control of Internet merchants on consumer trust in Internet shopping. They have proposed a theoretically-grounded integrative model of consumer trust in Internet shopping and they have collected data using a questionnaire. However, they have concentrated on the vendor (giving or selling personal information to other parties), but our results showed that only a minor part of fears of invasion of privacy was directly focused on the

vendor. For example, the informants were afraid of anonymous surveillance, spam (other than that related to their vendors) and hackers using viruses. For that reason, it could be useful to use more qualitative methods in order to gain a deeper understanding of consumers' views concerning the different concepts.

VII. MANAGERIAL IMPLICATIONS

Trust, risk, privacy, and security are concepts that are seen to affect consumers' willingness to use e-commerce. Because of fierce competition and the ease with which consumers can change the e-vendor they are using, e-vendors have to develop services that consumers see as trustworthy. One way to do this is to build a strong brand, as our findings indicate. There are also other ways to convince consumers about the safety of the e-service. For example, in order to alleviate the risks consumers perceived as being related to e-services, e-vendors can offer a secure way to pay for the products or services offered (perhaps not the most convenient, but the most secure way is to provide an opportunity to pay by invoice), which can allure those consumers who perceive the most risks in e-shopping. Also, third party verifications, by Visa or a bank, for example, can decrease risks and increase trust.

In the sense of security and privacy, consumers do not want to register in every service, because they fear what will happen to their personal information. For that reason, if registration is not absolutely obligatory, then perhaps it is not needed. The misunderstanding of why consumers have to register could cause some suspicious about the trustworthiness of the e-vendor. Of course, in some services it is necessary to collect consumers' information in order to complete the order, but in these services too, it could be useful to offer a possibility for consumers to get familiar with the service (i.e. to test the service's functionality, to browse the products) without registering. This kind of possibility could increase consumers' perception about the trustworthiness of the e-service.

Consumers might also perceive social and psychological risks related to e-services. For instance, consumer might feel that using an e-service could be socially harmful, which leads to declining the purchase. In order to decrease these kinds of risks, e-vendors could, for example, offer a discussion forum related to their service and products. When the consumer can take part in a

discussions s(he) might feel the e-service is more socially preferable, which can alleviate the social risks. Furthermore, e-vendors could also take part in the discussions and provide answers to consumers' questions. This kind of action could make consumers feel appreciated and create a positive perception about the trustworthiness of the e-vendor, on condition that the e-vendor is really trying to serve consumers, not advertise it's service or products.

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