The Conceptualization of Trust, Risk and Their Relationship in Electronic Commerce: The Need for Clarifications

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Abstract

In recent years, significant advances have been made in the understanding of trust and risk in electronic commerce. However, in examining the published research, some troublesome trends surface. These trends include (a) the tendency to treat conceptualizations of trust and risk as unidimensional constructs, ignoring the large body of literature suggesting that they are complex, multidimensional constructs, (b) the tendency to ignore whether trustworthiness is part of trust or a possibly different construct, and. (c) the tendency to articulate relationships between trust and risk idiosyncratically without attention to prior articulations. These trends are troublesome because they have the potential to hamper the field's ability to do cumulative research in the long run. The goal of this article is to highlight these trends and call for greater attention to the issues raised in future research.

1. Motivation

Following the growing interest of social scientists in the concept of trust and its centrality to human endeavor (e.g. Sztompka, 1999; Fukuyama, 1995), there appears to be a similar trend in the areas of management and technology. For example, special issues of leading journals were devoted to the study of trust (AMR special issue, 1998), and to the development of trust technology (CACM special issue, December 2000). The popular press, as well as researchers of electronic commerce, and especially in the domain of Business to Consumer (B2C), are also paying significant attention to the role of trust in alleviating some of the risks attributed to Internet-based transactions. In fact, trust has been adopted very quickly by the technology business sector (e.g., Microsoft's "Trustworthy Computing" campaign, as its new buzzword.[1] Recently, several research reports in the field of information systems have tackled the issue of trust and its effect on consumer behavior (Kim and Prabhakar, 2000; Gefen, 2000; Jarvenpaa, et al., 2000; Stewart, 1999; Noteberg, Christiaanse; Wallage, 1999). Further, in light of the commonly accepted premise that trust presupposes a situation of risk (Luhmann, 1979, 1988), the role of risk (e.g., Gefen, 2002a; Jarvenpaa et al, 2000; Stewart, 1999) and trust's relations with the concept of risk (e.g., Kim and Prabhakar, 2000; Olson and Olson, 2000; Jarvenpaa et al, 1999, 2000) are also frequently discussed.

In examining the published literature on trust and risk in electronic commerce to date, there are several trends that become evident. Trust is for the major part viewed as a unidimensional construct(e.g., Cheung and Lee, 2000; Borchers, 2001), ignoring earlier conceptualizations of trust as a possibly multidimensional construct (see Gefen (2002b) for a

[1] http: //www.eweek.com/article/0,3658, s=701&a=23516,00.asp
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detailed discussion of earlier literature). Similarly, risk is viewed as unidimensional (e.g. Grazioli and Wang, 2001; Jarvenapaa et al. 1999) without reference to the discussions of its complex nature (e.g., March and Shapira, 1987). Conceptualizations of the relationship between risk and trust tend to be idiosyncratic. For instance, Kim and Prabhakar (2000) ignore the relationship between the two constructs, while Jarvenpaa et al (1999; 2000) suggest that risk mediates the role between trust and the willingness to buy and Gefen (2002a) examines whether trust is mediated by risk or directly increases behavioral intentions. Lastly, there is no published report incorporating trustworthiness as a construct in the studies, with the exception of Gefen (2002b), despite the Mayer et al's (1995) conceptual emphasis on its importance.

Competing conceptualizations are not uncommon in the developmental stages of research in an area. However, continued divergence in thinking without any attempt to examine why such differences exist can lead to chaos and thwart any attempt to do cumulative research. We believe it is time to pause and take stock of the thinking and the empirical evidence to date on the treatment of trust and risk in electronic commerce. The major purpose of this article is to identify potential conceptual and theoretical problems in the current body of trust-risk literature in electronic commerce, and to argue for theoretical and experimental approaches that will help in generating a cogent body of research as opposed to a set of free-standing idiosyncratic studies.

In presenting our arguments, we have limited ourselves mostly to the articles published in ICIS, AMCIS, HICSS in the past 4 years, and a few journal articles. The journal articles included are not comprehensive. Our rationalization is that the lag time for the publication of articles in conference proceedings is much smaller than the lag time in the publication of articles in journal and thus conference publications tend to reflect the latest thinking and approaches in the field.

The rest of the article is structured as follows. We discuss the potential problems with the conceptualizations of trust and trustworthiness in section 2. In section 3, we discuss the conceptualization of risk. In section 4, we discuss the inconsistent articulations of the relationships between risk and trust. Concluding remarks are offered in Section 5. In sections 2, 3, and 4, the discussion is structured to present conceptualizations of the respective issues in non-IS literature, followed by how researchers in electronic commerce are dealing with it. Then we indicate why it is important to expand the conceptualizations in each of the areas.

2. Conceptualizations of trust and trustworthiness

2.1 The discussion of trust and trustworthiness in non-IS Literature

The complexity of trust and related concepts is evident in the distinctly different understanding of what trust is across disciplines and researchers and the frequent attempts to review, integrate and clarify earlier literature (e.g., Mayer, Davis and Schoorman, 1995; McKnight, Cummings and Chervany, 1998). While several streams of thinking are offered as needing attention, such as the distinction between trusting beliefs, attitudes, intentions and behavior, and, the distinction between initial and ongoing trust, we will limit our discussions to a discussion of the need for distinction between trust and trustworthiness.

The distinction between trust and trustworthiness was articulated by Mayer et al (1995). They indicated that *perceived trustworthiness,* is the trustor's perception of how trustworthy the trustee is, while *trust*, is the trustor's willingness to engage in a risky behavior that stems from the trustor's vulnerability to the trustee's behavior. Trustworthiness is a characteristic of the trustee, and may stem from several perceptions of the trustor about the trustee. According to Mayer et al, the perceptions of the trustor, that affect his/her perception of the trustee, are the trustee's ability, integrity and benevolence. Trust on the other hand refers to the trustor's intentions or behavior with respect to the transaction.

Marketing literature, however, tends to view dimensions similar to those proposed by Mayer et al as dimensions of trust. For example, Ganesan (1994) and Ganesan and Hess (1997) drew on the definitions of trust attributed to Rotter (1971) and Deutsch (1973) to come up with benevolence and credibility as dimensions of trust, in contrast to the Mayer *et al* conceptualization of benevolence, integrity and ability as dimensions of trustworthiness. This is no exception. Doney and Cannon (1997) treat trust as a single construct dealing with trustworthiness, integrity, ability, and benevolence. Kumar et al. (1995) see trust as honesty and benevolence. These aspects of trust generally overlap with the characteristics of trustee, which would correspond to the Mayer et al. (1995) conceptualization of trustworthiness. For example, the item, *This resource [trustee] considers our[trustor's] interests when* *problems arise,* used in the in the trust scale (Ganesan and Hess, 1997) is reflective of the trustee's characteristic than the intention or attitude of the trustor. To make things even more complicated, psychology research adopts the same conceptualization as marketing. For instance, Larzelere and Huston (1980) treat trust as benevolence and integrity, while Rempel (1985) regards trust as a combination of integrity, benevolence, ability, and trustworthiness, resembling Doney and Cannon (1997).

The issue at hand is not whether Mayer et al. (1995) and McKnight et al. (1998) are correct or whether marketing research is correct. Rather, the issue is that MIS research has to decide. Regardless of the eventual resolution whether the dimensions are dimensions of trust or dimensions of trustworthiness, it should be noted that the attention to the dimensions yields significant insight. For instance, Ganesan and Hess frame their study in terms of the credibility and benevolence of the individual salesperson and the credibility and benevolence of the organization. They found that the credibility of the individual salesperson affects long-term commitment in inter-organizational relationships while individual salesperson benevolence does not. In contrast, it is organizational benevolence that that leads to long-term customer commitment and not organizational credibility.

2.2 How IT addresses trust and trustworthiness

In addressing the concepts of trust and trustworthiness, few IT/IS researchers have paid attention to trustworthiness as a concept in empirical studies. In some instances it has been subsumed by the trust construct, while at other times, it has been dealt with as a separate construct, with multiple dimensions.

There are two issues related to trust and trustworthiness that are worthy of mention. First, several researchers have included items which explicitly include trustworthiness in their scale for trust (e.g., Gefen, 2000; and Tung et. al, 2001; Grazioli and Wang, 2001; Pavlou, 2001). The specific wording of the items varies in different studies. For example, Tung et al (2001) use the phrase "trustworthiness of vendor, while Grazioli and Wang (2001) inquire "whether the subject felt that the store was trustworthy. Gefen (2000) included the item, *I believe that Amazon.com are trustworthy,* in the initial conceptualization of trust, but dropped it in the LISREL analysis, because of the shared residual variance. Thus, there is no distinction or insufficient distinction being made between trust and trustworthiness and there is little stated reason why the items were chosen.

Second, items, which are reflective of integrity, competence and honesty creep into measures of both trust and trustworthiness. Overall, it would appear that the confusion that existed in other fields may be slopping over into the IS field. Thus, while each individual IS researcher is being careful to base his/her work on established literature, the collective work is in danger of being chaotic because of the inconsistencies in the work that they are drawing from. While IS researchers may not be in a position to resolve earlier inconsistencies, we hope that they will see fit to agree on a common basis to proceed.

2.3 The importance of trust conceptualization to IS researchers

Mayer et al (1995) developed and demonstrated the distinction between trust and trustworthiness in the domain of organizational behavior. In marketing the two constructs have not been separated out clearly, possibly because the distinction that exists in an organizational context is less relevant in the marketing context. Researchers in information systems appear to have borrowed from both disciplines, resulting in several diverse uses of the conceptualizations. In our opinion, the definitional and conceptual distinction offered by Mayer et al (1995) is clear and related verified scales have been published in MIS research (Gefen, 2000; Gefen, 2002b; Jarvenpaa, et al., 1998; Jarvenpaa & Tractinsky, 1999; Jarvenpaa, et al., 2000). Trustworthiness is a characteristic of the trustee, while trust is the trustor's willingness to engage in risky behavior that stem from the trustor's vulnerability to the trustee's behavior. The clarity of the conceptual distinction notwithstanding, the day-to-day usage of the terms may not be equally precise. "I trust the store" and "the store is trustworthy" may convey the same meaning in everyday parlance. It is easy to see why researchers would make the mistake of letting this semantic overlap contaminate the scales being created for trust. Our first reaction is to say that the challenge is to come up with scales comprising items, which are able to capture the distinction between the two constructs consistently and reliably. Alternately, the need to distinguish between trust and trustworthiness itself could be challenged, as per the marketing research. Either way, the issue needs to be addressed and a consensus arrived at in the interests of cumulative research. Having said that it is clear that the definition of trust is context dependent (Gulati,

1995) and that it is doubtful whether any operationalization can capture its full complexity.

The second issue that needs resolution is whether the dimensions related to benevolence, ability and integrity are dimensions of trust or dimensions of trustworthiness. Our personal bias is to view these as characteristics of the trustee, and hence they are dimensions of trustworthiness, and should be treated us such. If one accepts our view that benevolence, integrity and ability are dimensions of trustworthiness, then a related issue is whether corresponding dimensions of trust (e.g., goodwill trust, predictability trust and competence trust, such as proposed by Ratnasigham and Kumar (2000) and Ratnasingham and Klein (2001) are warranted. On this issue, we have mixed thoughts. At a conceptual level corresponding dimensions of trust may be warranted, but given the difficulties we have experienced in operationalizing stable measures to distinguish between trust and trustworthiness, we are skeptical of the likelihood of successful simultaneous operationalization of the three dimensions of trust along with three dimensions of trustworthiness. But that is not to say that it should not be attempted or that the attempts will not succeed. At any rate, we recommend that any new measures be based on a strong theory base.

3. Conceptualizations of risk

3.1 The discussion of risk in non-IS literature

The discussion of risk in non-IS literature can be divided along three themes: conceptualization of risk, operationalization of risk and the effects of risk.

3.1.1. Conceptualization of risk. The concept of risk plays central role in decision theory. It was broadly defined as an attribute of a decision alternative that reflects the variance of its possible outcomes. However, there may be two perspectives / terminologies on the conceptualization of risk: (1) The traditional decision theory and finance reference to the uncertainty of outcomes. (2) The more recent terminology, originated in the fields of risk assessment and risk management which relate risk with the costs of those outcomes. Practical definitions of risk, however, differ substantially from the theoretical definition (March and Shapira, 1987). Managers appear to define risk more by the magnitude of the value of the outcome, rather than by taking its likelihood into account. This may be so, perhaps, because it is easier to estimate the cost of an outcome than its probability estimates (March and Shapira, p. 1411-2)]. Risk is present in a situation where the possible damage may be greater than the advantage that is sought (Luhmann, 1988). This has been the case since the first study of trust by Deutsch (1958).

Researchers have mixed approaches to considering the positive and negative aspects of outcome. Some researchers include consideration of both positive and negative outcomes in their conceptualization of risk, while others include only the negative aspect. For instance, Mayer et al. suggest that "If a decision involves the possibility of a negative outcome coupled with a positive outcome, the aggregate level of risk is different than if only the possibility of the negative outcome exists" (p. 725). In contrast, Rousseau et al. (1998) define risk as the perceived probability of loss. For Sztompka (1999) estimation of risks involves both the potential negative consequences and the probability (risk) of failure.

3.1.2. Operationalizations of risk. Given the differences in conceptualizing risk and trust, it is not surprising that differences can also be found in the literature in the way actual or proposed operationalization and measurement of risk perception took place. As mentioned earlier, risk can and has been operationalized in various ways. (1) One such measure is the probability of a negative outcome of an event. (2) Another is the magnitude of that negative outcome, regardless of its likelihood (e.g., March and Shapira, 1987). (3) A third operationalization can be to separate the positive and the negative outcomes of the event and then to calculate the difference between them [(e.g., Kim and Prabhakar, 2000, based on agency theory (e.g., Williamson, 1993)]. This operationalization is in line with Mayer et al., who suggest that "If a decision involves the possibility of a negative outcome coupled with a positive outcome, the aggregate level of risk is different than if only the possibility of the negative outcome exists" (p. 725). However, it is not clear how the calculation of the "net" risk should be done here. (4) Finally, a holistic weighing of the outcome on a positive-negative continuum can be used (e.g., Sitkin and Weingart, 1995, Jarvenpaa et al. 2000). For example, Jarvenpaa et al use items such as, *How would you characterize the decision whether to transact with this Web retailer (Significant / Insignificant Risk).* The advantage of this approach relative to the previous one is that the calculation of the final risk measure is left to the user/consumer rather then the researcher and that it is more parsimonious.

3.1.3. Effect of risk. In general, it is accepted that the higher the risk the lower is the likelihood of transaction. For example, Ajzen (1991) in his Theory of Planned Behavior predicts that consumers would be willing to transact if their risk perceptions were low. Variations of this thinking are present in the views of other researchers. For example, Sitkin and Weingart (1995) argue that the higher the perceived risk, the greater the perceived chance of experiencing a loss, therefore, the lower the consumer's expected value from the transaction.

3.2 How IT addresses risk

The IT/IS literature clearly sees a central role for risk along with trust in ecommerce. Most researchers acknowledge the presence of both the likelihood and magnitude dimensions in their conceptualization of risk (Gefen & Pat, 2001; Grazioli and Wang, 2001; Cheung and Lee, 2000; Jarvenpaa et al, 1999). For instance, Grazioli and Wang (2001) view risk as a consumer's perceptions of the uncertainty and adverse consequences of engaging in an activity, and Cheung and Lee (2000) view risk has having two dimensions: one related to an uncertainty or probability of loss notion and the other related to a consequence or the importance of the notion of loss.

However, when it comes to conceptualization, little attempt to distinguish either between likelihood and magnitude or between likelihood of positive and negative outcomes. For the major part, the scales for perceived risk reflect a composite of all these different dimensions. For instance, Jarvenpaa et al (2000) use items reflecting likelihood, such as, *There is too much uncertainty associated with shopping,* along with items reflecting (relative) magnitude, such as *How would you characterize the decision to buy a product from this Web retailer (high potentential for loss/gain)?*. Also, the likelihood of a positive/negative outcome is mixed into the same item, *How would you characterize the decision of whether to transact with this Web retailer (Very Negative/Positive Situation)?*. The same trends are observed in several other articles (e.g., Pavlou, 2001).

The issue of greater concern for the IS researchers (e.g., Stewart, 1999) appears to be to distinguish between channel risk (also referred to as internet risk or web risk) and store risk (also referred to as vendor risk). This is a useful and important distinction to make. In general, perception of internet risk has proven to have significant effect on the willingness to buy over and beyond any effect of perceived store risk. There is also an attempt to distinguish between product risk and vendor risk (e.g., Tung et al, 2001). This can be argued to be equally important in internet and non-internet retail situations.

3.3 The importance of risk conceptualization to IS researchers

The inclusion of risk itself in the study of behavior in ecommerce is important, because there is a whole body of literature based in rational economics that argues that the decision to buy is based on a risk-adjusted cost-benefit analysis. Thus risk should command a central role in any discussion of ecommerce, as it does in the present body of literature.

The need to distinguish between likelihood and magnitude is seen in the empirical evidence that the likelihood of a web-based sale is lower as the cost of the product gets higher. For higher cost items, the web tends to be used as a medium for providing information, but not as a medium for purchase. For lower cost items, the web has been more successful as a channel of purchase. Presumably, the likelihood of a negative outcome is the same for both high and low cost items, but the magnitude of loss will be higher for the high cost items. Thus the relative reluctance of customers to buy high cost items on the internet as compared to lower cost items, would be consistent with the idea that in practice (March and Shapiro, 1987), the magnitude of potential loss appears to define perception of risk, and not the likelihood of loss.

The distinction between the role of perceived negative and positive outcome will help in explaining why perceived internet (channel) risk plays such a significant role in explaining the intention to buy from an internet store. The result would support those researchers (e.g, Stewart, 1999) who argue that risk is the perceived likelihood of negative outcome rather than a perception of unbiased likelihood. The internet channel does not introduce any uncertainty into the positive nature of the outcome, but it does introduce a great deal of uncertainty in the negative nature of the outcome. Extraneous agents such as hackers lurking in cyberspace, who contribute to the perception of internet channel risk, do not in any way make it likely that the customer will gain anything unexpected, but they do increase the probability that the customer may suffer unexpected losses. The question of interest would be to examine if the conceptualization of risk as the likelihood of negative outcome is the true in all situations or only in specific situations, such as internet shopping.

4. The relationship between trust and risk

A common thread in the trust-risk literature is that trust is only meaningful in a risky situation. This is based on the original work by Deutsch (1958) who laid the ground about trust. Yet, literature reviews by both Mayer et al. (1995) and Rousseau et al. (1998) found different approaches with regard to the relations between risk and trust. For example, the literature is unclear whether risk is an antecedent to trust, is trust, or is an outcome of trust (Mayer et al., 1995).

4. 1 The discussion risk-trust relationships in non-IS literature

The relationship between trust and behavior and risk and behavior has been discussed in sections 2 and 3. In this section we address the relationship between trust and risk, and how that relationship affects behavior. In effect, the discussion can be seen as an examination of the relationship between trust, risk and behavior. The confusion in the relationship between risk and trust is best expressed by Mayer et al (1995): "it is unclear whether risk is an antecedent to trust, is trust, or is an outcome of trust" (p.711). Mayer et al imply causality between the two variables without being clear about the direction of the causality. Rouseau et al (1998) on the other hand imply a reciprocal relationship without implying causality: "risk creates an opportunity for trust, which leads to risk taking." The confusion in the relationship between trust and risk is further compounded when their effect on behavior is also considered. Literature offers three models: (i) risk mediates the relationship between trust and behavior, (ii) risk moderates the relationship between trust and behavior, and (iii) the relationship between risk and trust is explained by the "threshold" model. Each of these is discussed below.

4.1.1. The mediating relationship. The mediating relationship (see Figure 1b) argues that the existence of trust reduces the perception of risk, which in turn increases the willingness to engage in a transaction. Luhmann (1979, 1988) has argued that trust reduces information complexity and lowers the perceived risk of a transaction. He goes on to add that trust is one of the key factors for reducing the perceived risk of a negative outcome in a given situation. This is echoed later by Mayer, Davis, and Schoorman (1995), who expect that the trust should have a positive influence on risk taking in a relationship because trust is likely to alleviate concerns regarding these types of possible negative consequences. In effect, this model proposes that the effect of trust on behavior is not direct, but is achieved by reducing the perception of risk in the transaction. The belief in the mediating role of risk in the relationship between trust and behavior has been affirmed by many researchers over time (e.g., Blair and Stout 2000; Noorderhaven 1996; Morgan and Hunt 1994; Limerick and Cunnington, 1993). For example, Limerick and Cunnington (1993) state that trust can reduce uncertainty about the future and is a necessity for a continuing relationship with participants who have opportunities to behave opportunistically.

No article appeared to argue trust as mediating the relationship between risk and behavior.

4.1.2. Moderating relationship: In this relationship, it is believed that the effect of trust on behavior is different when the level of risk is low versus when the level of risk is high (see Figure 1c). This is reflected in the statements of many scholars. The primary belief is that when risk is high, trust is relevant; when risk is low, then trust is not relevant. For instance, McKnight et al. (1998) suggest that when perceived risk is high, "high trusting intention is likely to be very fragile" (p. 483). That is, perceived risk moderates the relations between trusting beliefs (perceived trustworthiness) and trusting intention (trust). According to Kollock (1994), the theoretical basis for this resides in Akerlof's seminal work on the market for lemons (Akerlof, 1970). Kollock demonstrates the moderating effect of risk on the trust-behavior relationship in an experimental study, in which subjects trade with each other under conditions of high uncertainty (high risk) and low uncertainty (low risk). The results showed that trust between trading partners was higher in the high-risk condition than trust between trading partners in the low-risk condition.

4.1.3. Threshold model. The threshold model assumes that trust is formed independent of risk perceptions. If the level of trust surpasses the threshold of perceived risk, then the trustor will engage in a risk taking relationship. According to Mayer et al. trust affects the trustor's risk taking behavior (which they term "risk taking in relationship" - RTR): "the level of trust affects the amount of risk the trustor is willing to take in a relationship" (p.725). In a specific situation, the trustor compares the level of trust in the trustee to the level of perceived risk. If the level of trust surpasses the threshold of perceived risk, then the trustor will engage in RTR. If the level of perceived risk is greater than the level of trust, the trustor will not engage in the RTR" (p. 726). Similarly, Friedman et al. (2000)

suggest that "the more confidence users have in a well-designed mechanism limiting their financial risk, the less trust they must demand of the commercial party in question" (p.39). Thus, risk requires trust to enable action, the less the perceived risk, the less the required trust. For example, lending money is a risky action that requires the lender to trust the receiver. For a given level of trust, less risk (e.g., smaller amount of money) would increase the tendency to lend.

In sum, it would appear that the non-IS literature has proposed three different models. It should be noted that while researchers have studied the effect of trust on behavior without consideration of risk, and the effect of risk on behavior without consideration of trust, we did not locate a study where the effects of both risk and trust on behavior are studied without examining the relationship between risk and trust also. This is mentioned in anticipation of our discussion of several studies in the ecommerce area where this is done.

4.2 How IT addresses the relationship between risk and trust

There are three primary models that are observable in the IT/IS (ecommerce) literature: a model that suggests risk and trust act independently on behavior, the mediating relationship, and the moderating relationship. None of the ecommerce research suggests a threshold model.

4.2.1. Trust and risk act independently on behavior. Several studies in IS focus primarily on the effect of trust on behavior, without attention to risk (e.g., Gefen, 2000; Chricu, Davis and Kauffman, 2000). Both studies show that trust has a direct positive effect on the adoption intention. For the present, we do no wish to examine this further, because we feel that while the effect of trust on behavior is an important area of study, the absence of a discussion of the role for risk is not appropriate.

Among the studies that include both risk and trust, there are some that hypothesize an effect of trust and risk on behavior without hypothesizing a relationship between risk and trust, i.e. trust and risk are not related in a specific cause-effect relation (although they can covary), but that both simultaneously affect behavior. This conceptualization is similar to that of Kim and Prabhakar (2000). Kim and Prabhakar (2000) suggest that perceived risk and trust affect trusting behavior in the Internet banking context, without specifying what relations exist between risk and trust. In the context of B2B e-commerce (level of EDI use), Son et al. (1999) suggest that trust affects electronic cooperation directly. They do not include risk in their model, although they do consider uncertainty, which is hypothesized to affect the level of electronic cooperation directly.

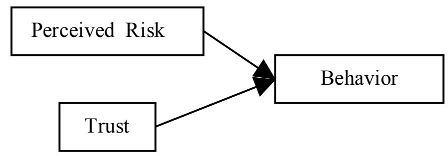

Fig. 1a. Model 1: Risk perception and trust affect behavior independently.

4.2.2. Mediating relationships. The mediating relationship suggests that trust affects perceived risk, which affects behavior. This is posited by Jarvenpaa et al. (1999, 2000), who suggest trust affects the perceived risk of the situation, which, in turn, affects behavior. For example, the perceived risk of lending money to a trusted friend will be lower than that of lending money to a stranger. This conceptualization of the trust-risk relationships corresponds to Sztompka (1999) view that trust "suspends" the risk (p. 31) as if it were not existence. However, Sztompka's view is that trust affects perceptions of risk in a dichotomous way (i.e., risky or not risky), whereas Jarvenpaa et al. suggest that the degree of trust affects the degree of risk perception. It should be noted that whereas the previous model suggests that risk perception and trust are formed independently, this model suggests that they are connected by an explicit causal relationship. Similar relationships are put forth by Stewart (1999) and Ratnasingham and Kumar (2000). Stewart (1999) suggests that trust affects risk perceptions of an Internet store, but not the systemic risk of Internet shopping. Ratnasingham and Kumar (2000) indicate that trust affects both perceived benefits and perceived risks of ecommerce. Cheung and Lee (2000) and Einwiller et al (2000) also subscribe to the belief that trust reduces consumers' perceived risk. Pavlou (2001) states that perceived risk is shown to be a direct negative antecedent of intention to transact, while trust is an indirect antecedent acting through risk perception, "…trust … is hypothesized to reduce perceived risk and indirectly influence intentions to transact". (Pavlou, 2001). Thus, among ecommerce researchers, there appears to be an overwhelming subscription to the mediating role of risk in the relationship between trust and behavior.

Fig. 1b. Model 2: Risk perception mediates the effect of trust on behavior

There is one article in which trust is conceptualized as being the consequence of perceived risk (Olson and Olson, 2000). They state that "we trust more when the stakes are relatively low… or when the potential loss is miniscule" (p.43).

4.2.3. Moderating relationships. There is one test of the moderating relationship (Grazioli and Wang, 2001). They hypothesized that when trust is high, risk considerations have less of an impact on the formation of attitudes about the site. However, this hypothesis was rejected. This is curious in view of the work of Kollock (1994), and warrants further investigation.

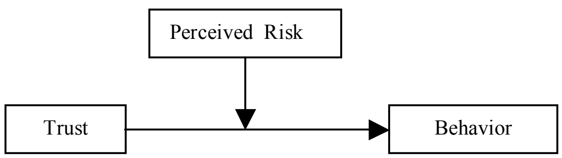

Fig. 1c. Model 3: Risk perception moderates the effect of trust on behavior

4.2.4. A test of competing models. Gefen (2002a) reports a test of competing models of trust-risk-behavior relationships. Gefen (2002a) showed that in the context of low touch low risk items it is trust and not perceived risk that determines purchase intentions. Having said that, Gefen questions whether in the case of higher risk items the same relationship holds. Gefen speculates that it does not. Rather, as the inherent risk in the product increases, risk becomes more important and trust takes a more secondary role as a reducer of risk instead of directly affecting purchase intentions. Additional research is needed there.

4.3 The importance of trust-risk-behavior relationships for IS researchers

At a practical level, the need for clarifying these relationships could be termed unnecessary. The ultimate goal for an organization is to understand what leads individuals to engage in a transaction, e.g., in the case of B2C ecommerce, what leads a consumer to buy. It cannot be challenged that reduced risk and increased trust are both likely to increase the likelihood of engaging in a transaction. Many of the stimuli that increase trust are the same stimuli that reduce perceived risk. Thus, at a practical level since the levers or mechanisms to increase engagements in transactions are known, the mechanism by which the engagement is achieved is not of great relevance.

However, as scholars, we are compelled to examine the relationships further, partly driven by intellectual curiosity, partly driven by the belief that only if we look will we find the unexpected. For our part, we believe that perceived risk and perceived trust affect behavior to different extents in different stages of the relationships. Perceived risk is the dominant factor in the early stages of a relationship and in one-time relationships. Perceived trust is the dominant factor in long-term relationships, in which the parties have multiple transactions over a period of time (Fukuyama, 1995). Theoretical assertions of this nature require clear conceptualizations of the constructs involved and reliable, robust operationalizations of the same. Further, while some antecedents of trust and risk may be the same, there are others, which are not. For instance, a legal contract between two parties enables a transaction by reducing risk, but does not affect trust any. Thus, both from a practical and a theoretical perspective, the IS field needs to continue to strive to clarify the concepts and the relationships between the concepts. And this effort on the part of IS scholars will be fruitful only if the discipline is able to converge on common conceptualizations and operationalizations.

5. Conclusions

The primary goal of this article was to alert researchers in ecommerce that we are in imminent danger of expending a great deal of effort to produce a chaotic mess of empirical evidence, without the means to integrate all the evidence to get a defensible view of the role of risk and trust in ecommerce. To this end, we have addressed three important areas, in which the confusion is already rampant: the distinction between trust and trustworthiness, the conceptualization of risk, and the relationships between risk, trust and behavior. For each of these areas, we have reviewed and summarized the non-IS literature, then done the same for the IS treatment of the area, and finally emphasized why we believe it was necessary to address the issue. In each case, there is some consistency, but there is also evidence of divergence in thinking, both between the non-IS literature and the IS literature, and among the IS researchers. As we stated in the introduction, it is appropriate to have competing conceptualizations and models in the early phases of development of an area. But we believe, that we are approaching a point, where the field needs to stop and take stock, and work towards building a cumulative body of knowledge.

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