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A HOLISTIC FRAMEWORK FOR TRUST IN ONLINE TRANSACTIONS

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ABSTRACT

This paper systematically reviews previous studies of trust from social, economic and technological perspectives and develops a holistic framework for trust, which can be used to analyse the establishment and maintenance of trust in online transactions, and identify the mechanisms that can be utilized to increase trust. Trust plays a crucial role in the formation of dependent relationships represented by online transactions, and a holistic treatment of trust is necessary because of the gap that exists between the developments in information systems and our understanding of their social and economic implications, and the impact on the perceived trust of the transacting parties. This review enables us to depict an online transaction through its attributes and context, and systematically map these to identified trust antecedents. We outline the key components and processes of the framework and discuss three strands of empirical work to further develop it. The framework highlights the critical role of institutions in the establishment and maintenance of trust in online transactions, which informs the development of e-Commerce and e-Business platforms and the underpinning information systems, and facilitates the establishment of mechanisms to induce additional institutions to increase trust in online transactions.

Key words: Trust, Trust antecedent, e-Commerce, e-Business, Online transaction, Trust measure, Institution; Transaction attribute, Transaction context

INTRODUCTION

The nature of commercial transactions on the Internet is rapidly evolving. From an e-commerce model driven by goods offered on websites, it now incorporates e-markets (such as eBay) and e-business solutions, such as RosettaNet (RosettaNet 2010), as well as cloud computing solutions, such as Software as a Service (SaaS) and Infrastructure as a Service (IaaS). That is, from buying and selling goods online, mimicking the offline world, online transactions are now also about services which themselves are produced and consumed online. With this changing world of online transactions comes a variety of technological developments that make such online services possible (Marimuthu and Dean, 2008; Daskpan and Costa, 2008). For the further proliferation of such technologies and the services they enable, it is essential to gain a deeper understanding of trust issues in such online transactions. The importance of trust as a catalyst for the formation of dependent relationships between different parties (individuals or organizations) in online transactions, and the complicated relationship between technology and trust, justify strongly the creation of a holistic framework for trust (Rose, *et al,* 2011; McKnight, Carter and Clay, 2009; Pennanen, Paakki and Kaapu, 2008; Grabner-Krauter and Kaluscha, 2008).

A useful perspective to frame the issues at stake is that of transaction cost theory. The Internet has the potential to significantly reduce transaction costs for the search, negotiation and settlement in a transaction, which motivates a migration from offline, face-to-face transactions to online, virtual transactions (Butler, 1999; Margetts, 2009; Kim *et al.* 2010). However, online transactions are subject to a potentially greater set of uncertainties due to factors such as the unfamiliarity of parties, the cultural, social and regulatory disparity of parties, the intangibility of online services, and often the unreliable manner in which services are delivered. This can lead to real or perceived vulnerability to exploitation, and discourage online transactions between parties. To establish and maintain trust, and facilitate online

transactions, it may be necessary to create and deploy safeguards to reduce the uncertainty of parties, often with new organisations required to define, monitor and enforce these safeguards. The provision of such safeguards can, however, significantly increase transaction costs. Such increased costs can offset the decreased costs which motivate the migration from offline to online transactions. From the transaction cost perspective, if safeguards can be created and deployed to increase the level of trust that parties have in an online transaction, the benefit of such safeguards in terms of reduction of uncertainty must outweigh their cost.

This calls for the development of a holistic framework of trust to systematically illustrate the links between technology and the safeguards for online transactions, their resulting impact on the trust of parties, and the willingness of one party to cooperate in an online transaction with another party. This will require the identification of key attributes of an online transaction, the relevant elements of its context, and the perception of these safeguards by human or computer agents acting on behalf of parties. This perception will then translate into a level of trust and a decision to participate or not to participate in an online transaction. The resulting framework highlights the role of institutions in defining safeguards and establishing and maintaining trust in online transactions. It also identifies situations where additional safeguards are required in order to generate sufficient trust between parties for an online transaction to take place. Such a framework will enable us to systematically understand trust in general and in online transactions in particular, pinpoint potential barriers and propose solutions to building and maintaining trust, inform the development of e-Commerce platforms, and identify the underpinning information systems needed to realize such platforms.

In the next section, we will briefly illustrate the background and methods used in this research, before systematically reviewing previous studies on trust from different perspectives. This is then followed by a discussion of the attributes which define a

transaction and the context in which transactions are performed. A holistic framework for trust is then presented, with particular reference to online transactions. The implications of the framework for theory and practice are then explored. Finally, we highlight areas requiring further research and discuss how the framework can be further developed through new empirical work.

ABOUT THIS RESEARCH

This paper is based on our research project funded by the UK Engineering and Physical Science Research Council (EPSRC) on using economically-inspired mechanisms to establish and maintain trust in online transactions. We conducted a comprehensive literature review of trust, with particular reference to online transactions. Based on our previous knowledge and peer recommendations, we started by identifying and selecting key references from known authorities on the subject, which was then extended through references and a preliminary search of recent publications in business management, e-Business and e-Commerce, computing and information systems, and social and behavioural studies. This was then followed by a more systematic search on the ISI Web of Knowledge, which pools four indices: Science Citation Index (SCI), Social Sciences Citation Index (SSCI), and Arts and Humanities Citation Index (A&HCI) since 1970, plus Conference Proceedings Citation Index- Science (CPCI-S) since 1990.

The topic search term 'trust' generated a total of 31950 returns (26112 excluding conference proceedings) (Table 1). Since 1970, the number of publications increased steadily each year, but the growth has been particularly fast since the mid-1990s, exceeding 1000 publications for the first time in 1999 (in 2001 if conference proceedings are excluded), which further increased to almost 4000 pear year by 2008 and 2009 (2644 and 2777

excluding conference proceedings). The publications are scattered in a large number of disciplines.

Insert Table 1 about here

Refining the search results with the key word 'online' in the topic area, 1298 results were generated, almost all of them published after the year 2000, exceeding 100 for the first time in 2005, with 260 (161 excluding conference proceedings) in 2009. The top four disciplines for trust in online transactions are, 46.60% in Computer Science, 27.80% in Business & Economics, 16% in Behavioural Science, and 16% in Information Science & Library Science (N.B. some papers appear in more than one category). No other discipline exceeded 10%.

A closely related concept to trust is 'risk', so a further search was carried out. Of the 31950 publications on trust, 5325 also addressed the issue of risk. 192 of the 1298 publications on online trust also dealt with risk, with 52.08% in Computer Science, and 37.50% in Business & Economics.

An initial filtering of the search results were carried out. For trust in online transactions, we focused particularly (but not exclusively) on publications since 2005, when e-commerce fully recovered from the dot.com crash, and when the number of publications on the subject exceeded 100 in this year. Each paper was judged by the relevance of title to our research questions. Only scholarly publications in English were selected; and given the nature of this research, we gave special attention to publications in Business & Economics and in Behavioural Science. A list of papers that were judged as directly relevant to the research were selected for further reviewing. Special attention was paid to conceptual papers dealing with trust in online transactions, and empirical papers that address mechanisms and new institutional safeguards for increasing trust in online transactions. These papers were

combined with key references identified during the initial stage of the research. A full bibliography is provided at the end of this paper.

UNDERSTANDING TRUST

Trust is an important factor affecting all social interactions and exchanges and is a very important mechanism to reduce the complexity of human conduct in situations of uncertainty (Luhmann, 1979). '*Trust has been viewed through diverse disciplinary lenses and filters: economic, social/institutional, behavioural/psychological, managerial/organizational, and technological. Trust is considered essential in exchange relations because it is a key element of social capital.'* (Kim *et al*., 2008, pp545). The rapid development of the Internet and e-Commerce since the late 1990s has resulted in an increased interest in trust in online transactions. However, in online transactions, the typical offline, face-to-face trust cues such as gestures, or the ability to 'see and try products, i.e. to "squeeze the oranges", before he buys' (Jøsang et al., 2007, pp618) are generally absent (Rose, *et al,* 2011). Moreover, online transactions also cross cultural, social or regulatory boundaries more often than their offline counterparts.

It should be emphasised that online trust is, first and foremost, about trust. There is no fundamental distinction between the notion of trust in general and trust within an online environment. The differences are not in the notion of trust itself, but in the context in which trust is formed and maintained, because of the differences between characteristics of the online and offline environments.

Our literature review identified a large number of studies of trust in different disciplines. Since 2005 an increasing number of studies explored trust in online transactions in the context of e-Commerce. Some researchers focused on defining and understanding trust, exploring its key elements and dimensions by drawing on previous studies. Many studies

focused on identifying and empirically verifying factors that affect trust in online transactions, and some also offered advices on how to address those factors in order to establish and maintain trust and facilitate cooperation (in the case of business to business transactions) in online transactions.

However, despite recent progress there is still a remarkable lack of consensus on a holistic view of trust and a systematic conceptual framework for understanding, establishing and maintaining trust in online transactions. In this section, the definitions and key characteristics of trust will be reviewed, which provide the basis for such a framework.

Defining Trust

Several comprehensive reviews of the notion of trust revealed significant ambiguity and multifaceted nature of the concept (Gefen *et al.*, 2003b; Wang and Emurian, 2005; McKnight and Chervany, 2002a; Caldwell *et al.*, 2009; Ebert, 2009; Fehr, 2009). A common view is that of trust as a subjective belief that one party (the trustee) will behave in a manner which is in the interest of another party (the trustor) within a transaction (Gambetta 1988; Dasgupta 1988) such that `there is a level of trust associated with a relationship' (Grandison and Sloman, 2003). Accordingly, it encapsulates a measure of unpredictability and vulnerability for the trustor in the trustee, reflects the uncertainty arising from factors such as asynchronous transaction (when payment and delivery are performed in a non-simultaneous manner) and a lack of familiarity with parties with whom exchanges are performed. These factors can lead to the actual or perceived *"incomplete or distorted disclosure"* of information by parties within the transaction as a part of a *"calculated effort to mislead, distort, disguise, obfuscate, or otherwise confuse"* (Williamson, 1985: 47). Institutional mechanisms can be put in place to provide different levels of safeguards to alleviate such concerns, for example, money back guarantees or escrows. The belief is constructed from a

variety of trust antecedents, some of them technological, others based on social norms or habits, and some built up over time. In the presence of trust antecedents which form sufficient belief for an organisation or individual to participate, an online transaction is said to be *trustful* or *trustworthy*.

The main properties of trust identified by previous research include, *subjective, dynamic, bi-directional, asymmetric, non-transitive,* and *context dependent* (Kui et al., 2005, Golbeck et al., 2006). The subjectivity of trust arises from the differing manner in which different parties establish and maintain trust in other parties. The dynamism of trust arises from the transient nature of trust between parties, such that trust varies over time as the factors which influence trust for the party vary. The bi-directionality of trust reflects the fact that trust exists for both of the principal parties in a transaction for one or more specific actions or services, for example, for payment and for provision of a service. The asymmetry of trust dictates that the trust of party A in party B does not imply the trust of party B in party A. The non-transitivity of trust reflects the fact that the trust of party A in party B, the trust of party B in party C does not necessarily imply the trust of party A in party C. Finally, the context-dependence of trust determines that the trust of one party in another party is inextricably tied to a specific context, representing the specific action or service performed and the safeguards which are present.

In understanding the notion of trust, an important distinction should be made between 'what is trust?' and 'what leads to trust?'. Trust can be classified into different categories (such as organisational versus personal based trust, or goodwill versus risk based trust). What lead to trust are referred to as trust antecedents (such as knowledge of a person, contract or information sharing). Through the lenses of different trust antecedents, a specific level of trust is formed by the trustor over a trustee.

Trust Categories

In understanding the relationship between a trustor and a trustee, trust can be classified into three broad categories: (1) *interpersonal trust*, (2) *system trust*, and (3) *dispositional trust* (McKnight *et al*., 2002; Abdul-Rahman *et al.*, 2000). Inter-personal trust is based on the specific characteristics of the individuals involved (such as competence, benevolence, integrity, predictability, dependability) and the context in which the interactions between them take place (i.e. it is agent- and context-specific). System trust, also known as institutional trust or institution-based trust, is based on the perceived reliability of a system or institution involved, primarily derived from structural assurances (regulations and laws) and situational normality (what makes the situation appear normal). Dispositional trust illustrates the general attitude of a party towards trust - their propensity to trust and risks and their personal strategy in dealing with others when seeking favourable outcomes.

Trust in an online transactions has been classified under the categories of (1) individual-level and (2) system-level trust (Grandison and Sloman, 2003; Josang *et al*. 2007; Ramchurn *et al*. 2004). The aspects of online services in which such trust can be placed has itself been classified as (1) resource-access trust, (2) service provision trust, (3) certification trust, (4) delegation trust and (5) infrastructure trust (Grandison and Sloman, 2003). In online transactions, trust depends not only on the relations between a trustor and a trustee mediated through technology, but also on the attitudes of the trustor towards technology as an object of trust (Bart et al., 2005; Corritore, 2003). In all cases, the three categories of trust outlined earlier will combine to produce an overall level of trust between the trustor and the trustee. The trustors and trustees can be human or computer agents or organisations: even in inter-organisational relations, it is specific agents within those organisations who administer the relationships, and the inter-personal trust will be reflected in the overall level of trust between these organisations.

Given the differences between Business to Business (B2B) and Business to Consumer (B2C) e-Commerce, some previous research made distinctions between inter-personal and inter-organisational trust (Lane, Zaheer *et al*, 1998). However, it should be pointed out that even in B2B e-Commerce, the inter-organisational trust is frequently maintained and executed via individuals acting on behalf of the organisations. The factors and mechanisms affecting the level of trust between organisations may differ from those between individuals, but our review identified no fundamental difference between the notions of inter-personal and inter-organisational trust. Therefore, our framework is equally applicable to B2C and B2B e-Commerce.

Trust Antecedents

Trust can be derived from several intertwined processes, including (1) *calculative process* - the calculation of the cost and benefit for a trustee to cheat or to cooperate in a relationship, (2) a *prediction process* – the ability to predict a trustee's behaviour, (3) *capability process* - an evaluation of the trustee's ability to fulfil promises, (4) *intentional process* - the perception of the intentions of a trustee, and (5) *transference process* – the transfer of trust from a known entity to an unknown one (Leimeister et al., 2005, pp. 103). These processes also define the ways of dealing with trust by the trustor according to the behaviour and qualities of the trustee and the main factors that need to be considered. These processes and factors are illustrated by trust antecedents; and it is through the different lenses of trust antecedents that a specific level of trust is formed between a trustor and trustee.

Previous studies have identified many trust antecedents, which can be grouped into six broad categories, namely (1) dispositional trust antecedents, (2) cognition-based trust antecedents, (3) institutional trust antecedents, (4) knowledge-based trust antecedents, (5) calculative trust antecedents, and (6) identification-based trust antecedents. Some of these

trust antecedents are described by different authors using a variety of terminologies. A brief summary of these trust antecedents and their related concepts are presented in Table 2.

Insert Table 2 about here

Dispositional trust is concerned with the subjective quality of the individuals in terms of their disposition (Gefen, 2000; Lumsden and MacKay, 2006; Amoroso and Hunsinger, 2009; Robert *et al*., 2009) or propensity to trust (Mayer, 1975; Gefen *et al.* 2003b; McKnight *et al.*, 2009). McKnight *et al.* (1995, 1998, 2002a) referred to this as *dispositional trust*, while Gefen *et al.* (2003b) called this *personality-based trust.* Mayer defined such trust antecedents as "*the general willingness to trust others"* (Mayer, 1975: 715). Propensity to trust (and risk) is a relatively stable individual quality of an actor, which is determined by their developmental or cultural backgrounds and experiences (Mayer, 1975). Dispositional trust is also known as the 'basic trust' because it is independent of any other party or context (Abdul-Rahman *et al.*, 2000), and is based on an individual's faith in humanity and trusting stance (McKnight *et al.*, 2002a).

Cognition-based trust (McKnight *et al.*, 1998, 2002a; Gefen *et al.* 2003; Goles *et al*., 2009; Lee *et al.*, 2009) or cognitive trust (Robert *et al*., 2009) stands for an individual's ability to process information based on rapid, constitutive cues or first impressions rather than through experience of personal interactions. It is subjective and context-dependent (McKnight *et al.*, 1998), and is also known as *characteristic-based or similarity-based trust* (Zucker, 1986). Sociologists and psychologists have identified different groups of cognitive trust antecedents (Kim and Benbesat, 2003, 2009; Wang and Chiang, 2009; Wang and Doong, 2010). Some of them focus on the signalisation of actors' mutuality of interest such as *unit grouping* because of our tendency to trust members of the same group with shared values, goals or personal

characteristics, while others focus on psychological qualities such as the perception of control over a situation (McKnight *et al.*, 1998). Cognition-based trust antecedents stress individual or socially formed behaviours. The cognitive processes are socially determined as they reflect language and culture (Hodgson, 1989; Scott, 2000; Gifford, 2009). An individual's distinctive background or knowledge is acquired through the cognitive mechanisms of its perception which are socially determined. As such, the cognitive-based trust stands for taken-for-granted and culturally shaped antecedents in a particular social environment.

Institutional trust antecedents are impersonal and provided by socio-economic structures. Many studies (e.g. Zucker, 1986; Shapiro, 1987; Williamson, 1993; McKnight *et al.*, 1998; Pavlou, 2002; Gefen and Pavlou, 2004; Sha, 2009) emphasised the role of institutional context in the process of trust development. They described trust antecedents as *institutional* or *hyphenated trust* (Williamson, 1993), *institutional-based trust* (Zucker 1986), *impersonal trust* (Shapiro, 1987), *system trust* (Luhmann, 1979; Lewis and Weigert, 1985a, 1985b; McKnight *et al.*, 1995), or *institution-based trust* (McKnight *et al.*, 1998, 2009; Pavlou, 2002; Gefen *et al.*, 2003b; Sha, 2009). Institutional trust is based on rules (institutions) that regulate behaviours of different organisations or individuals within a particular social structure through both implied and actual sanctioning. As social structures (Scott, 2000), institutions are third party behavioural constraints that regulate transactions between organisations (Pavlou and Gefen, 2004). Shapiro described it as *"a complicated matrix of social-control strategies"* (Shapiro, 1987: 644); while Sha (2009)'s research identified inconsistent outcomes in previous studies and concluded that "*different elements of institutional structures could have their unique influence on the perceived trustworthiness of an entity*" (Sha, 2009: 51). Institutional trust refers *"to one's sense of security from guarantees, safety nets, or other impersonal structures inherent in a specific context"* (Gefen *et al.*, 2003b: 64). The key criterion for institutional trust antecedents is context or situation specific but it is not specific

to a person (McKnight *et al.*, 1995). This group of antecedents emphasize behavioural calculativeness of actors who balance costs of deterrence against benefits of cooperation upon the sanctions and loses imposed by a given social structure.

Calculative trust, also known as calculus-based trust, refers to relationships formed from economic calculations that balance potential costs against the benefits of cooperation (Lewicki and Bunkier, 1996; Lee *et al.*, 2009). It was originally explored by Shapiro *et al.* (1992) as *deterrence-based trust*, but they emphasised only potential costs of retribution for temptation. Calculative trust antecedents encapsulate mechanisms such as repetition, mutuality of interests or sanctioning which produce costs (sanctions or loses) or rewards (higher benefits from cooperation than deterrence) for particular behaviours (Lewicki and Bunkier, 1996).

Knowledge-based trust (Lewicki and Bunkier, 1998; Gefen *et al.*, 2003a, 2003b; Robert *et al.*, 2009; Wang *et al.*, 2009) is associated with the concept of *familiarity* (Luhmann, 1979; Gefen, 2000; Ba and Pavlou, 2002) or *process-based trust* (Zucker, 1986). It is usually understood as beliefs about future behaviour generated from the past behaviour of individuals or organisations. Such trust antecedents emanate from knowledge about past functioning of the individuals and in particular, the trustor's personal experience and knowledge of a particular party of exchange (Gefen, 2000; Gefen *et al.*, 2003a). This type of trust is person-specific or vendor-specific (McCole *et al*., 2009).

Identification-based trust is based on identification with others' desires, intentions and empathy; it is the highest level of trust development through repeated interactions (Lewicki and Bunker, 1996). This allows the actors to come to a deeper understanding of each other and become aware of shared values and goals, thereby enabling trust to grow to a higher and qualitatively different level. Identification-based trust is also enhanced by a strong emotional bond between the actors, based on a sense of shared goals and values. It is grounded in

perceptions of interpersonal care and concern, and mutual need satisfaction (Lewicki and Tomlinson, 2003).

Unlike trust categories, the different trust antecedents are not mutually exclusive. The calculative mechanisms of trust in the business environment are often based on restrictions imposed by institutional measures for institutional trust. It underlines economic assumptions on individuals' opportunism and self-interest maximization; hence calculative trust and institutional trust often overlap with each other (Williamson, 1993). Similarly, some cognitive trust antecedents can also be regarded as institutional trust, because they are impersonal where non-deliberate, widely accepted, and context-specific logic of action or customs (routinised behaviour) shape individual behaviours. The economic foundation of trust represents such a cognitive logic underlining market actors' mutuality of interests signalled by different culturally supported cognitive schemas.

Some of these trust antecedents can also be seen as different stages of trust building (Lewicki and Bunker, 1996; Kuo and Yu, 2009; Robert *et al*., 2009). For example, Lewicki and Bunker (1996) described the process of trust development from *calculus-based trust*, *knowledge-based trust* to *identification trust*. The level of trust evolves in line with the level of knowledge and the strength of the relationships between parties. They believe that calculus-based trust characterises interactions at the first stage of business relationships; however, the relationships will develop further trough knowledge-based trust. Only a few relationships will attain the highest level of trust - identification-based trust, *"based on identification with others' desires and intentions"* (Lewicki and Bunker, 1996: 122).

When studying the relation between IT solutions and the ensuing trust they instil in a transaction, it is useful to divide these six groups of trust antecedents further into those that are personal, inter-personal and impersonal. Dispositional trust is personal, which is defined by an actor's disposition to trust derived from personal characteristics and experiences. It is

determined by relatively stable personal qualities which are neither defined by person-specific relationships nor by third party socio-economic structures. Knowledge-based trust and identification-based trust are inter-personal in nature, derived from shared experiences and shared values. Inter-personal trust is person-, organisation- or vendor-specific, which encompasses a trustor's knowledge of a particular trustee or a vendor and the value-driven behaviour towards the particular trustee. Cognitive trust, calculative trust and institutional trust are based on impersonal cognitions, norms and regulations, such as customs, reputation, accreditation, certificates, laws and regulations, escrow services and insurance, usually regulated and enforced by third parties. The third parties are typically individuals or organisations whose interests are perceived as neutral to the mutual and conflicting interests amongst the transacting parties.

Previous studies have identified and empirically verified a wide range of factors that affect trust in online transactions, and in particular, in e-Commerce. Some of these factors are important during trust formation (such as website quality and user interface, perceived security) whilst others are more relevant for trust maintenance (such as privacy, reputation). The most common factors identified include risk, perceived security, privacy and technological trustworthiness, market orientation, social presence, relational benefit, website quality and user interface, quality of product and service information, and the website's reputation and brand. Many studies used empirical data from different contexts to verify how each of these factors affects the trust of the users for e-Commerce. Some studies also used the results of their study to inform management practice, for example, how to increase the level of trust of users and what the owners of an e-Commerce website could do to address people's concerns and increase user trust in conducting online transactions (e.g. Jarvenpaa *et al.*, 2000; Kim and Benbasat 2003, 2009; Wang and Emurian 2005; Sha, 2009; Canavari *et al*., 2010; Kim *et al*., 2010; Wang and Doong, 2010; Xiaorui *et al*., 2010).

An Economic Foundation to Trust: Rationality and Transaction Costs

The rapid development of online transactions in recent years is primarily the result of the significant reductions of transaction costs by the Internet (Butler, 1999; Margetts, 2009; Kim *et al.* 2010; Rose, *et al,* 2011). It is essential to investigate the notion of trust from an economic perspective. Since the main purpose of this research is to develop a holistic framework for trust in online transactions and inform the development of trustful e-Commerce and e-Business platforms, it is necessary to define a behavioural model for organisations in online transactions. This characterises the manner in which decisions are taken by the parties prior to and within an online transaction. From an economic perspective, the behaviour of parties is characterised by rationality and self-interest. A party will behave in a manner which is deemed to pursue its own interests in a unilaterally optimal manner, where interests encapsulate the different costs and benefits within the transaction. The parties are constrained in their behaviour by the bounded resources which they can utilize to decide upon their behaviour within a transaction. The model of rationality which is subject to such resources bounds is commonly termed `bounded-rationality' (Simon 1972, Kahneman 2003). Such a view of rationality is consistent with the bounded computational, storage and network resources available to the parties in an online transaction, whether these parties are represented by human or computational agents. In the absence of appropriate mechanisms, the interests of parties in an online transaction may be in conflict, with each seeking to exploit the other, which endangers the viability of the transaction for these parties.

Many researchers, such as Axelrod and Keohane (1985), Ba *et al.* (1999), Dasgupta (2009), or Liu *et al.* (2009), have utlised game theory to model the establishment and maintenance of trust, with a range of mechanisms inducing payoff structures that can be used to explain the behaviour of parties in a transaction. Axelrode and Keohane (1985) identified

three mechanisms that facilitate cooperation in an exchange: mutuality of interests, the shadow of the future, and sanctioning. Mutuality of interests stems from greater benefits from cooperation in terms of subjectively perceived utility of exchanged assets. The shadow of the future describes potential repetition, which suggests long-term benefits from cooperation, as cheating can be retaliated in future exchanges. Sanctioning illustrates control and punishment of non-cooperative behaviours.

An online transaction can be explained using a model of a hypothetical bare transaction. A bare transaction is one where neither normative nor regulative institutional structures (safeguards) exist to secure cooperation between actors. Such transactions are highly risky, since the probability of non-cooperative behaviour is high. As a result, the dominant strategy is non-cooperation, because a player cannot predict the behaviour of its partner. A typical bare transaction is a one shot game (one off transaction), where the risk stems from a lack of repetition, because short-term profits facilitate cheating, and potential reciprocity in the next round does not exist. The strategies of the market actors are also affected by the perception of costs and benefits offered by different game structures (Axelrod and Keohane, 1985; Hodgson, 2004). Mutuality of interests is usually regarded as a precondition for cooperation in bare transactions where no institutional safeguards are available to protect the interests of the transaction parties (Axelrod and Keohane, 1985; Shapiro *et al.,* 1992).

The one-shot game is an important starting point in our discussion, since it is also the type of transaction with the lowest transaction costs, where costs may include those incurred in various institutions that facilitate cooperation through negotiation, monitoring, control and sanctioning (Coase, 1934; Williamson, 1985; Malone, Yates and Benjamin, 1987; Fraser, Fraser and McDonald, 2000; Clemons, Reddi and Row, 1993; Liang and Huang, 1998; Gunasekaran *et al.*, 2009; Ryu and Hung, 2009). The participation in such transactions is only viable when organisations are characterised by a high propensity to risk. These parties would

not project investments, make long-term plans or coordinate their activities because of the high probability of bankruptcy. To address such problems, transaction costs are incurred to facilitate cooperative exchanges. According to Williamson (1985, 1993) the creation of cooperative regulations is to balance the perceived risk with the transaction cost associated with the exchange.

Cooperation is the adjustment of behaviour by an actor to the actual or anticipated preferences of the exchange partner. An actor with a high disposition to trust or good knowledge of its partner's mutual interests can cooperate in a bare environment. The latter can be provided by previous experience with a particular trustee, which generates knowledge of the trustee's behaviour, leading to knowledge-based trust or identification-based trust. The notion of values and goals can also be manipulated by a trustee to signal mutuality of interests through cognition-based trust. Transaction cost economics explores factors that can affect the rationality of parties (Williamson, 1981, 1993), and may consider the bounded resources which can be utilized by an organization to decide upon actions within a transaction. The model of rationality which is subject to such resources bounds is commonly termed `bounded-rationality' (Simon 1972, Kahneman 2003). Such a view of rationality is particularly applicable to online transactions given the bounded computational, storage and network resources available to the agents which make decisions on behalf of parties in an online transaction.

The perception of an actor through behaviour-regulation mechanisms outlined by Axelrod and Keohane (1985) - mutuality of interests, the shadow of the future, and sanctioning - defines the behavioural constraints of the actor in a transaction. They correspond to the classification by Scott (2000) of three types of institutions: cognitive, normative and regulative institutions, which illustrate different behavioural regulation mechanisms - inherent and non-deliberative logic of action, repetition and credible threat of reciprocity, and

sanctions. These mechanisms enable market actors to effectively link a specific transaction with different trust antecedents, by balancing the transaction costs incurred and the level of institutional assurance required. This is then translated into a level of trust by the actors involved in this particular transaction.

TRANSACTIONAL ATTRIBUTES

A transaction has many attributes, and it is conducted in specific transactional context. These attributes and the context are perceived differently by the transactional parties through multiple lenses and assessed with the aid of trust antecedents outlined earlier. The perceptions and assessments by different transactional parties will then determine the level of trust each of them has on a particular transaction. If the level of trust perceived by all parties is sufficiently high on the basis of the transactional attributes and the standard safeguards in the transactional context, then the transaction will proceed. Otherwise, one or all transactional actors may need to invoke the protection of additional safeguards in the transactional context to increase the level of trust of different actors to a sufficient level for the transaction to take place. Such additional measures often carry additional costs, which the parties need to assess against the overall benefit of the transaction. Further discussions will be presented with Figure 1 later in the paper.

In this section we will systematically identify the transaction specific, actor specific, relationship specific and other types of transactional attributes. The transactional context will be discussed in the next section.

Transaction Specific Attributes

This group of attributes describes specific features of the transaction, including the value (Li, 2007), the volume (Smith, 2002) and the frequency of the exchange (Corritore *at al*., 2003; Meyerson *et al*., 1996; Smith, 2002), and the transaction costs incurred (Williamson,

1981, 1985, 1993; Gunasekaran *et al.,* 2009; Ryu and Hung, 2009; Mutz, 2009). These factors can be perceived differently by the parties involved in the exchange (Rose, *et al,* 2011). For example, an exchange item costing $50 might mean very little to one actor but a significant amount to another actor. The differences in their perception of the value of the exchange can significantly affect the level of trust by the two actors in the transaction.

To address the risks involved it is often necessary to invoke the protection of various institutional safeguards such as insurances or enforceable legal contracts, which then add to the total transaction cost (Tang *et al.,* 2003; Loebbecke, 2003; Shin *et al*., 2009).

Actor Specific Attributes

A transaction also has many features that are unique to the actors involved. This includes the importance of the transaction to the actor (strategic, mission critical versus routine, non-critical) (Uzzi, 1997); and the interdependency of the transaction to other activities (nested or independent) by the respective actors. For example, the exchange could be closely interrelated to other activities by one actor, but independent of other activities by the other actor (Grey, 1981; Badwin, 2007). These attributes are unique to the actors involved. If a transaction is strategically important to one actor but routine to the other, then the differences could result in different levels of trust by the two parties in the transaction.

Relationship Specific Attributes

Some transactional attributes are dependent on the relationship between the actors involved in the exchange. One such attribute is whether the transaction takes place directly between two market actors or intermediated through other agents (Ba *et al.*, 1999; Liu, Marchewka, Lu and Yu, 2004; Shapiro, 1987; Tang *et al.*, 2003; Furubotn and Richter, 2005;

Rose, *et al*, 2011). Another attribute is whether the transaction takes places between organisations (inter-organisational) or within an organisation (intra-organisation) (Williamson, 1985; Mintzberg, 1989; Naoum, 2001). Intra-organisational transactions are concerned with coordination, control, exchange of information and logistics; whilst inter-organisational transactions are concerned with purchasing, cooperation, exchange of information and customer relationship management. In most cases, the consistency between two organisations is lower than that between two actors within the same organisation, as the former is characterised by different interests and organisational cultures or structures. Moreover, inter-organisational transactions are generally more formal and are usually protected by contractual safeguards.

Based on a comprehensive literature review of 800 articles, Ebert (2009) classified online transactions into three categories: (1) between persons, i.e. *inter-personal* (P2P), (2) between organizations, i.e. *inter-organizational* (O2O) and (3) between a person and an organization, i.e. *inter-person-organization* (P2O). Eight groups of factors were identified to affect trust in online transactions, namely, satisfaction, security and risk, transaction costs, future intentions, dependency, reputation, person, and environment. However, the study found that trust in P2P relationships were mainly described in terms of *person* (involvement or socio-demographics) or *reputation*; in O2O transactions, the key factors were *transaction costs* or *future intentions*; while in P2O transactions, trust is most affected by *satisfaction, security and risk*, or *reputation*.

Another relationship specific attribute is the level of formalization in the relationship between the actors, which can be standardized and controlled by internal regulations and formal rules (known as *bureaucratic transactions)* within an organisation, legally binding agreements and contracts between organisations, and informal rules based on personal relationships (known as *organic transaction)* (Mintzberg, 1989). Although informal in

nature, social norms are often perceived as highly trustful facilitators of cooperation as they are based on consistent and internally accepted norms. In contrast, bureaucracy and legal contracts are more formal and they are related to highly regulated behaviours, which are often inflexible and difficult to obey when immediate reactions are required.

The purposes of the transaction by the different actors involved are also an important relationship specific attribute. For example, Markus and Christiaanse (2003) investigated collaborative services in the context of B2B e-marketplaces and classified e-marketplaces into six categories: (1) content functionality (industry news, events calendars), (2) commerce functionality (catalogues, actions, consulting or insurance services), (3) collaboration functionality (negotiation tools, cooperative purchasing tools, order management), (4) information sharing tools (message service, shared databases), (5) logistic tools (transport arrangement, track and trace), and (6) supply chain management (inventory management, vendor managed inventory, collaborative panning forecasting) (Markus and Christiaanse, 2003). They distinguished between transactional and collaborative marketplaces, although hybrids of the two functionalities can occur. Compared with collaborative, non-purchasing marketplaces, purchasing transactions usually require formal institutions to provide safeguards and instil trust as they are often based on the opposite interests of the actors. The role of trust in similar collaborative platforms or in interpersonal and inter-organization relationships was also studied by others, for example, Rose, *et al*, (2011), Rossignoli (2009), Pramatari *et al*., (2009) or Canavari *et al*., (2010).

The levels of automation and accessibility are also relationship specific attributes for transactions. Angelov and Grefen (2004) identified two forms of e-contracting based on the level of automation of the contracting process: *deep* and *shallow e-contracting*. For example, e-mailing a contract (or an order) is a shallow e-contracting because of the level of direct involvement of people, and as a consequence no significant change in the business process is

required. In contrast, the contract can be electronically submitted and then it automatically triggers the order and the logistical process of delivery and accounting. The latter is often more trustful because of clear and defined sequences of transactions, which are predictable and facilitate 'situation normality'.

A further relationship specific attribute is the accessibility of actors in the organisational network involved and the level of control the actors can exert on the network, which can be, for example, the Internet, the Extranet and the Intranet. The Intranet is generally regarded as more trustworthy than the Extranet, which is in turn more trustworthy than the Internet. The trust decreases in line with the decrease of control by the actors involved in the network.

Other Transactional Attributes

The transactional attributes discussed above are not exhaustive, and several other attributes can also significantly influence the level of trust by exchange actors in a transaction. Some of these factors are closely linked to the transactional context to be discussed in the next section. For instance, international exchanges are often perceived as more risky than domestic ones, which is particularly the case in online transactions (Tang *et al.*, 2003; Huang *et al.*, 2007; Daskapan and Costa, 2008). This may be because of the potential inconsistency between different legal systems, but also because of the perceived and real differences between cultures, customs and various other institutions between different countries (Canavari *et al.*, 2010; Rose, *et al*, 2011).

The time relationship in a transaction is also important. The synchronization between payment and delivery can instil significant trust in a transaction, because they are conducted simultaneously. However, most online transactions are asynchronized in contrast to offline transactions, because delivery is usually postponed, especially for those involving physical

artefacts but also often the case in digital downloading (Canavari *et al*., 2010). In offline transactions, the quality of the product or service can often be verified before payment is made, which can be difficult to perform in online transactions, especially if the transaction is about an online service, since the quality of such a service cannot be determined until during or after delivery. However, concerns about pre-payment can be partly alleviated through money-back guarantees, third party services and insurance, for example, which add to the transaction cost incurred.

Another aspect of the time relationship is the synchronization of communications between transactional actors, which is determined by the medium of communication. Greenspan, Goldberg, Weimer and Basso (2000) examined the cost and benefit of synchronised and asynchronised communications. They found that synchronised communication provides opportunities for real-time feedback to minimise misunderstandings and demonstrate attentiveness. Asynchronised communication, on the other hand, facilitates control over the exchanged messages as actors have time to carefully analyse the message. The Internet, over which online transactions are conventionally performed, utilizes a communication protocol termed Internet Protocol (IP) (Postel 1981), and this communication exhibits many properties which have a negative impact on the synchronization of communication. These properties include variable latency in communication, such that communication is subject to variable delays between parties, and unreliability in communication, such that communication is subject to failures leading to non-delivery of communication by parties (Attiya 2004). Such properties can affect not only the transaction itself, but the efficacy of measures within the transactional context to reduce uncertainty.

Another significant attribute is the quality of the information provided by seller in a particular transactional situation. Problems can occur both externally (inconsistent

information provided by different sellers) and internally (the same seller provided conflicting information), which can influence the level of trust by the exchange actors in the transaction.

TRANSACTIONAL CONTEXT: STANDARD AND OPTIONAL SAFEGUARDS

The transactional attributes discussed above need to be assessed in a specific transactional context, or transactional environment, which provides different standard and optional measures to safeguard the interest of the parties and increase the trustworthiness of the online transaction for both actors. In this section, we discuss some of the common measures deployed in online transactions. These measures can help build and maintain trust in a transaction through mutuality of interests, the shadow of the future, and sanctioning. The six types of trust antecedents discussed earlier can be used by the parties to aid the assessment processes. The measures induce controls on the parties which can be referred to as institutions. Such measures, and the institutions they induce, can rely on different assumptions with regard to the party's behavioural model and the technologies available.

A wide range of safeguards have been deployed by different e-Commerce websites in order to foster trust with the users in online transaction, either B2B or B2C. For example, a high quality website design is aimed at cognitive trust, while direct communication channels or reputation systems are aimed at knowledge-based trust. Payment services or return polices as contracted services are designed to secure institutional trust.

Insert Table 3 about here

Table 3 outlines some of the common measures deployed by different e-Commerce websites for creating and maintaining trust in an online environment. The table provides a brief description of the measures, along with some key publications which discuss the use of

these measures to create and maintain trust in online transactions. Some of these measures are used by the buyer to establish trust in the seller, such as tips and recommendations and privacy policy, whilst other measures assume that such trust in the seller cannot be fully established with the information available to the buyer, and appropriate impersonal measures must instead be taken to retain the feasibility of the transaction, such as payment, dispute and insurance services (Loebbekke, 2003; Kim and Benbaast, 2003; Lee and Turban, 2001, Wang and Emurian, 2005). For a particular transaction, some of these measures are standard safeguards available to everyone without additional costs, while others are often only available as optional measures, which can be selected by one or both transactional parties if they choose to do so. Such additional measures, especially those provided by third parties, often incur additional transaction costs, which then need to be balanced with the perceived benefits from the transaction by the parties involved.

A HOLISTIC FRAMEWORK FOR TRUST IN ONLINE TRANSACTIONS

These transactional attributes and context are perceived and assessed differently by the parties involved in a transaction. Each party (e.g. a buyer) will independently assess the transaction and the other party involved (e.g. a seller) in the transaction through different combinations of trust antecedents. This will allow each party to form a level of trust in the transaction and in each other. When the level of trust perceived by all actors is sufficiently high on the basis of the transactional attributes and available safeguards, then the transaction may go ahead. Failing that, additional safeguards need to be invoked by one or both parties to create additional trust in the transaction, often at extra transaction costs.

In online transactions, the transactional attributes and context and the different trust antecedents used by the actors to assess them are supported by the underlying information systems. Based on a characterisation of these attribute and antecedents, a holistic framework

can be developed to create and maintain trustworthy online transactions. The question which the framework attempts to answer is why a particular online transaction is trustworthy, for both the seller and the buyer, and how the attributes and the context of the transaction could be manipulated in order to make it more trustworthy. Such a framework is particularly useful for creating and maintaining trusted online transactions, but a similar use of the framework can be articulated for software developers and IT administrators (Daskapan and Costa, 2008; Marimuthu and Dean, 2008).

The framework is built on a systematic categorisation of transactional attributes and context, and a systematic mapping of different trust antecedents used for assessing and building trust in a transaction. The transactional attributes are defined by the characteristics of the transaction, the actors involved, the relationship between the actors, as well as a series of other factors. The transactional context is illustrated by a series of common measures adopted by various e-Commerce websites to safeguard online transactions. The actors perceive the transaction (including the other exchange actor) through different trust antecedents, which allow them to derive a level of trust in the transaction. If the level of trustworthiness is sufficiently high for all actors, then the transaction can go ahead. Otherwise, additional, optional safeguards need to be used by either or both parties to instil further trust in the transaction. The additional safeguards can often increase transaction costs which need to be balanced against the benefits from the transaction to the actors involved. If the costs are too high then the transaction may not go ahead. The framework is illustrated in Figure 1.

Insert Figure 1 about here

CONCLUSIONS AND FUTURE RESEARCH

This paper systematically reviewed previous studies of trust, and developed a holistic framework for building and maintaining trust in online transactions. The framework systematically illustrated the links between actors, transactional attributes and context, and the level of perceived trustworthiness by the actors in a transaction. It identified the key attributes of a transaction and the context in which it is embedded, and mapped out six types of trust antecedents that can be used to assess the trustworthiness of the transaction by different actors. Furthermore, the framework highlights situations where insufficient trust can be derived from standard safeguards available in the transactional context, therefore additional measures need to be selected to instil further trust in the transaction. This framework enables us to systematically understand trust in general and in online transactions in particular. It pinpoints potential barriers and solutions to building and maintaining trust in online transactions; and enables us to identify opportunities for the development of commercial platforms and the information system building blocks needed to implement such platforms.

To validate and further refine the framework, three types of new research are needed. First, it is necessary to systematically identify and classify the full range of online transaction scenarios, the different types of actors, and the different safeguards that can be deployed to maintain and improve trust in online transactions. The scenarios need to cover the full range of online transactions, including B2B and B2C e-Commerce and other emerging new online services, from e-market places, e-business solutions to emerging e-Services (e.g. SaaS and IaaS). The full list of existing and new mechanisms and institutional safeguards in online transactions also need to be identified. One way to address these issues is to identify and interview the full range of actors who are experienced in online transactions. The results could then be used to verify the significance of different transactional attributes and the

effectiveness of different measures in the transactional context; to identify factors that are particularly significant in online transactions; and to explore the processes through which these factors are perceived by different types of actors. A systematic classification of online transaction scenarios and the different types of actors, as well as a full listing of different safeguards, can then be derived from such qualitative research.

Second, it is necessary to develop a more in-depth understanding of the barriers and facilitators for trust formation and maintenance in different online transactions, and the effectiveness of different institutional safeguards in foresting trust between parties. This calls for action research by applying the framework in selected organisations in different types of online environments.

Third, to systematically validate and further develop the framework, it is also necessary to test a full range of hypotheses and empirically validate the rationales and logics of the framework. This calls for large scale questionnaire surveys in order to gather data to quantitatively validate and further refine and develop the complex relationships between transactional attributes, different measures in the transactional context, different types of actors involved, different trust antecedents, and how the interactions between such factors translate into a level of trustworthiness for a particular actor under different transactional scenarios. The quantitative study needs to initially focus on particular countries where the cultural, social and regulatory disparity of parties is limited. International studies can then be conducted to enable comparison between countries, cultures and regulatory regimes.

The findings from the qualitative and quantitative studies can be used to inform the development of building blocks and mechanisms in the information systems underpinning online transactions, in the selection of different safeguards for online transactions of different characteristics and in different transactional contexts. In particular, with the rapid development of 'the Internet of things' and the growing use of computer agents to act on

behalf of individuals and organisations in online transactions, this framework can inform the development of such computer agents to systematically consider the full range of factors and institutional safeguards in fostering trustful online transactions.

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Table 1: Number of Publications on 'Trust' and 'Online Trust' (1970-2010)

Period	Trust	Percentage	Online Trust	Percentage
1970-2010	31950	100%	1298	100%
2010 (partial)	1415	4.43%	n/a	n/a
2009	3746	11.72%	260	20.03%
2008	3874	12.13%	232	17.88%
2007	3190	9.98%	201	15.48%
2006	2739	8.57%	147	11.33%
2005	2376	7.44%	124	9.55%
2000	1108	3.47%	14	1.08%
1999	1044	3.27%	5	0.39%
1998	912	2.85%	5	0.39%
1997	807	2.53%	2	0.15%
1995	507	1.59%	0	0%
1993	345	1.08%	0	0%
1990	153	0.48%	0	0%
1985	104	0.33%	0	0%
1980	82	0.26%	0	0%
1970	57	0.18%	0	0%

Note: The results were obtained after a search of the key word 'Trust' and 'Online Trust' in the topic area on ISI Web of Knowledge. The results were updated in July 2010, and it highlighted the rapidly growing popularity of the subject in scholarly publications across different disciplines.

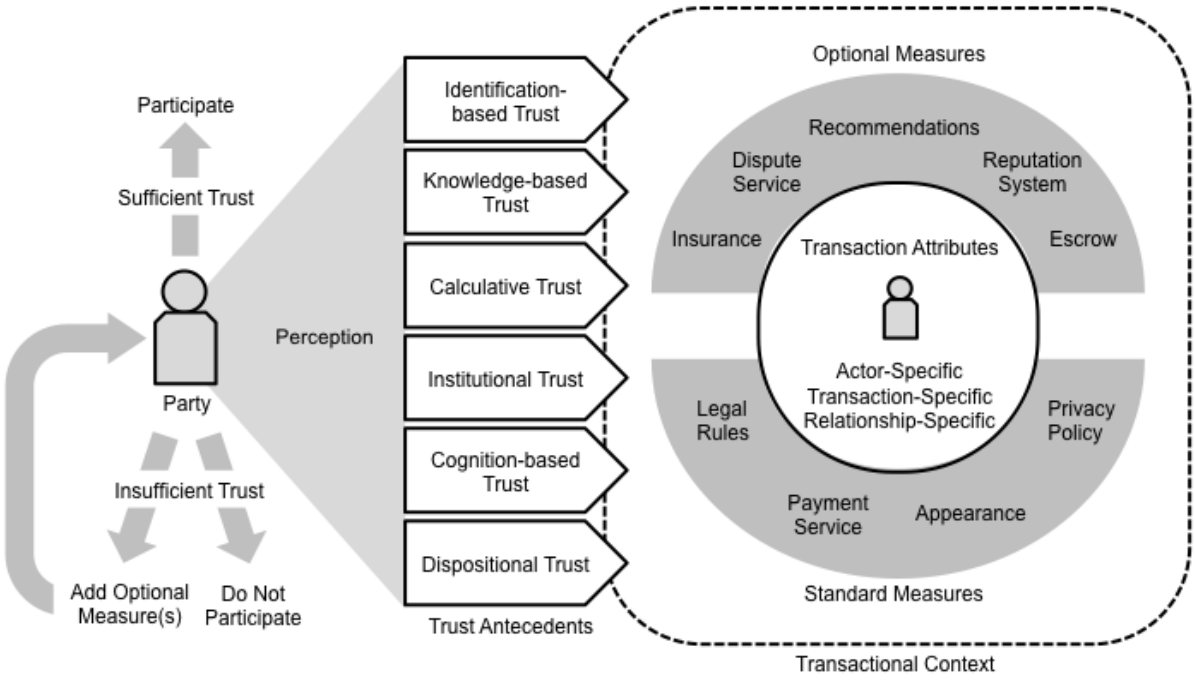
Table 2: The Main Categories of Trust Antecedents

TRUST	MEANING	REFERENCES
Dispositional trust Disposition to trust Personality-based trust Propensity to trust	Trust that stems from individual propensity to trust, described as *"the general willingness to trust others"* (Mayer, 1975: 715)	Mayer, 1975; McKnight *et al.*, 1995, 1998, 2002a; Gefen, 2000; Gefen *et al.*, 2003b; Lumsden and MacKay, 2006; Amoroso and Hunsinger, 2009, Robert *et al*., 2009.
Cognition-based trust Cognitive trust Characteristic-based trust Similarity-based trust	Trust that stems from individual, rapid, cognitive cues or first impressions; it is context-dependent.	Zucker, 1986; McKnight *et al.*, 1998, 2002a; Gefen *et al.* 2003; Goles *et al*., 2009; Lee *et al*., 2009; Robert *et al*., 2009.
Institutional trust Institution-based trust System trust Impersonal trust Hyphenated trust	It *"refers to one's sense of security from guarantees, safety nets, or other impersonal structures inherent in a specific context"* (Gefen, Karahanna and Straub, 2003b: 64)	Luhmann, 1979; Lewis and Weigert, 1985a, 1985b; Williamson, 1993; Zucker, 1986; Shapiro, 1987; McKnight *et al.*, 1995, 1998, 2002a, 2009; Pavlou 2002; Gefen *et al.*, 2003b; Pavlou and Gefen, 2004; Sha, 2009.
Knowledge-based trust Process-based trust Familiarity	Trust that *"is grounded in the other's predictability. . . relies on information rather than deterrence"* (Lewicki and Bunker, 1996: 121)	Zucker, 1986; Lewicki and Bunker, 1996; Gefen, 2000; Gefen *et al.*, 2003a; 2003b; Kuo and Yu, 2009; Robert *et al*., 2009; Wang *et al.*, 2009.
Calculative trust Calculus-based trust Deterrence-based trust	Trust based on economic calculations that balance potential costs against the benefits of cooperation	Shapiro *et al.* 1992; Williamson, 1993; Lewicki and Bunker, 1996; Sheppard and Sherman, 1998, Doney, Cannon and Mullen, 1998; Kuo and Yu, 2009; Lee *et al.*, 2009.
Identification-based trust	Trust that is guarded by identification with others' desires, intentions and empathy	Lewicki and Bunker, 1996.

Table 3: Common Measures by E-Commerce Websites for Building and Maintaining Trust

FACTORS	DESCRIPTION	REFERENCES
Third party certificates	Attestation of attributes of seller from third party.	Lee and Turban 2001; Loebbecke 2003; Kim *et al*., 2003; Kim and Benbasat 2003, 2009; Wang and Emurian 2005; Sha, 2009; Canavari *et al*., 2010.
Reputation systems	Aggregated feedback based on opinions of buyers.	Jarvenpaa *et al*., 2000; Ba and Pavlou 2002; Kim and Benbasat 2003, 2009; Utz *et al.* 2009; Canavari *et al*., 2010.
Tips and recommendations	Advices, suggestions, guidance to increase knowledge of buyers	Sultan, Urban, Shankar and Bart, 2002; Wang and Doong, 2010.
Dispute services	Services provided by commercial organisations to facilitate disputes between partners	Katsh, Rifkin and Gaitenby 2000; Loebbecke 2003; Papazoglou 2003; Pavlou and Gefen 2004; Teo, Wang and Leong 2004; OECD, 2004; Cotteleer, Cotteleer and Prochnow 2007.
Privacy policy	Policy on providing sensitive personal data	Egger 2001; Sultan *et al.* 2002; Kim and Benbasat 2003; Liu *et al.* 2004; Wang and Emurian 2005; Sha, 2009; Kim *et al*., 2010; Xiaorui et al., 2010.
Security policy	Policy on exchanging information, payments	Sultan *et al.* 2002; Lee and Turban 2001; Kim and Benbasat 2003; Wang and Emurian 2005; Sha, 2009; Kim *et al*., 2010; Xiaorui et al., 2010.
Web site design	Graphical design, overall structure due to navigation, presentation of sellers, products	Jarvenpaa and Tractinsky 1999, Jarvenpaa *et al.*, 2000; Egger 2001; Lee and Turban 2001; Sultan *et al.* 2002; Kim and Benbasat 2003, 2009; Wang and Emurian 2005; Wen, 2009; Kim *et al*., 2010; Lim *et al*., 2009; Canavari *et al*., 2010.
Communication with buyers	Communication through mail, telephone, and online forms.	Egger 2001; Kim and Benbasat 2003; Wang and Emurian 2005; Canavari *et al*., 2010.
Payment services	Payment administration and escrow services	Cotteleer *et al.*, 2007.
Returns policy	Money back guarantees…	Loebbecke 2003; Teo *et al.*, 2004.
Insurances	Transference of risk to third party.	Loebbecke 2003; Tang *et al.* 2003;
Transference	Affiliations with trustful online providers, brands, trademarks, logos	Stewart 2003; Kim and Benbasat 2003; Pavlou and Gefen 2004; Wang and Emurian 2005.

Figure 1: A Holistic Framework of Trust in Online Transactions



Note: A party in an online transaction will perceive the other transactional party, the transactional attributes and its contexts through the lenses of trust antecedents to form a level of trust in the transaction. If the trust is sufficiently high, then the transaction may go ahead. If not, then one or both parties may abandon the transaction, or invoke the safeguards of optional measures to increase the level of trust, but these measures will increase the total transaction costs. If then the level of trust is sufficient, then the transaction may go ahead. However, if the level of trust is still too low or the additional measures are too costly, then the transaction parties may choose to abandon the transaction.

