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Trust Model for e-Supply Chain Management (e-SCM) Business to Business (B2B) Collaboration

[1]Norshakirah Ab.Aziz and [2]Rohiza Ahmad, P.D.D Dominic

[1]*Information System Department, College of Information Technology, Universiti Tenaga Nasional, Putrajaya Campus, Jalan UNITEN-IKRAM, 43000 Kajang, Selangor.*
[2]*Computer and Information Sciences Department, Universiti Teknologi PETRONAS, Bandar Seri Iskandar, 31750 Tronoh, Perak.*

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ABSTRACT

Advancement of IT in terms of infrastructure and technology in Malaysia has allowed e-Business applications such as e-procurement, being adopted for handling routine supply chain (SC) business transactions. This shows the technology readiness in Malaysia is improving especially in the information exchange perspective. However, this readiness for technology adoption among SC components is still at its infancy stage. Many SC components still prefer to conduct their businesses in the conventional way and are unwilling to collaborate electronically. One of the major factors as been identified by few researchers is the lack of trust among the SC components. Thus, due to the above, the focus of this study is to propose an e-SCM trust model which can help SC components to identify a trusted partner for potential Business-to-Business (B2B) collaboration. In other words, this study is aimed to support electronic collaboration of trusted SC components. Combining the results from three stages of research methodology, an e-SCM trust model was developed. Thus, at the completion of this study, several findings and outputs have been produced. They are the four trust values identified along with their characteristics; the e-SCM trust model; the expert system prototype; and the results of each analysis conducted. From the final results obtained, it can be said that the proposed trust model is acceptable to be used for identifying trusted partner among SC components for potential B2B collaboration.

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INTRODUCTION

Trust is linked to IT since mid 80's (Saunders, *et al*., 2004; Sen & Banerjee, 2006). A series of studies conducted by McKnight, starting from 1996 until 2011 concluded that trust is the key in e-Business/e-Commerce SC (Ab.Aziz, *et al*., 2011b; Dominic, *et al*., 2013). In his first article published in 1996 McKnight defined trust in e-Commerce as the willingness to believe on the other party on various attributes such as goodness, ability, benevolence and predictability. It can be concluded that the trust is related to expectancies/beliefs and behaviours.

As for the consequences of lack of trust, once distrust existed, consumers hesitate to engage in any e-Commerce activities and started to control their information sharing/ exchange (Dominic, *et al*., 2013). The distrust will lead to behaviours such as lack of cooperation, information distortion, formal agreements, increasing controls, and no business transaction which at the end will decrease the business profit. The studies on trust have been conducted by many researchers and one of the researchers gave a definition of trust as willingness to rely with confidence *on* other party's reliability and integrity. This definition was derived from 96 definitions from 50 years of study (Castaldo, *et al*., 2010).

However, as mentioned earlier, the definition is essentially based on the domain or sub-domain of the study on which it was analyzed. According to Tullberg (2008), trust can help smooth the business transaction process. For example, the business transaction process can be slow if the buyers/trading partners insist on getting goods before paying, and seller wants the money before delivery. So, e-SCM trust model is needed to ensure the process can run as expected, because e-Business helps contributes consistency, competence, predictability and goodwill to SCM relationships (Ratnasingam, 2005).

Corresponding Author: Norshakirah Ab.Aziz, Department of Information System, Universiti Tenaga Nasional
E-mail: norshakirah@uniten.edu.my

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Even though the IT infrastructure existed, trust still needed to encourage the SC components to perform the e-Commerce transaction and as basis for collaboration. For example, Company A has long-term B2B relationship with Company B and Company C because of their excellent performance, and both are bonded by trust. At the same time, there is no direct business relationship exists between Company B and Company C. Nevertheless, Company B may consider collaborating with Company C based on preferences from Company A. This matter occurs because people usually make decisions based on their knowledge, experience and business preferences for a business relationship. Even so, the assessment criteria may differ between companies. Therefore, the key to business relationship is trust, and it is a precondition for collaboration and helps people to commit to work (Nooteboom & Stam, 2008, Blomqvist, 1997). From all of the above discussions on trust in the e-SCM, in particular trust in e-SCM dealings which involved more than one party, there is still a gap in marrying the concept of IT with business. In other words, there is still a lack of attempts to translate the trust as seen from the business perspective into e-SCM. At the moment, the decision to either be involved in the SC system is more of manual judgment rather than automated. As mentioned by Covey et.al, (2012) in his current research, the most important element in a business relationship is to have "smart trust", i.e. about how to use smart judgment or analysis to select trusted trading partner. Thus, this research intends to propose an e-SCM trust model which can be used to decide if a partner is trustful for B2B collaboration. For that, the next section will elaborate on the trust values which are often seen from the IT and business perspective as the determinants of trust.

Methodology:

There are three stages of research were conducted that contributes to the trust model for e-SCM as shown in Figure 1. Each the stages are to be executed sequentially with the results from the previous stage will be used as inputs to the next stage. In the first stage, extensive literature surveys including books and journals have been reviewed. This study gathered literatures which were published from the year 1996 until 2012. To define the meaning of 'trust' in identifying trusted business partner in an e-SC, more than 70 journals and books were referred in this research which resulted in four values consistently mentioned in all the literatures referred. Four trust values identified are identification, openness, competence, and reliability. The initial trust model was designed at this stage.

At the stage 2, data collection and analysis were done using the mixed method approach which is composed of Quantitative and Qualitative studies. The quantitative study used the trust values which were shortlisted in Stage 1 as the focus of its survey questions. The survey questions were distributed to Malaysian Construction Industry's SC as the domain chosen among for the purpose of verifying the validity of the hypotheses of research. Next, a qualitative study was conducted to strengthen the earlier findings as well as detailing out the trust values together with their characteristics and measurable parameters. As a result, the initial trust model was enhanced using the findings of the Stage 2.

After the stage 2 completed, at the stage 3, thirteen trust values measurable parameters in the enhanced trust model was analysed in order to formulate it's into the knowledge base rules. The knowledge base rules were later used in the web based ES prototype. The prototype was later tested to verify that the knowledge base is capable of producing the intended results as expected by the experts. The results were also compared to a manual based approach which is currently used by a Malaysian government body in determining partners in the Malaysian Construction Industry's SC.

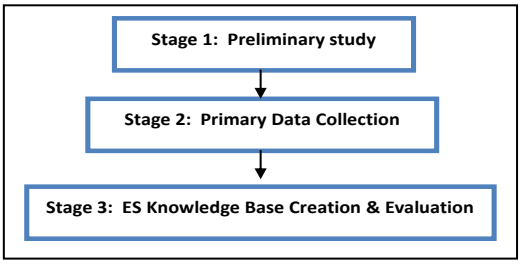

Fig. 1: Research Methodology Stages.

RESULT AND DISCUSSION

From the study conducted, there are four trust values identified which are competence, openness, reliability, and identification. Undeniable, trust is difficult to be built but easy to be broken, thus without solid trust, conflict or problem may happen that will affect the e-SCM business relationship. Solid trust helps to strengthen the B2B relationship and requires all four trust values. As shown in Figure 2, trust model for e-SCM consist of four trust values and eight trust characteristics. Each of trust values has two trust characteristics. These

characteristics useful to identify the measurable parameters to select trusted trading partner. Below are the details of the trust values.

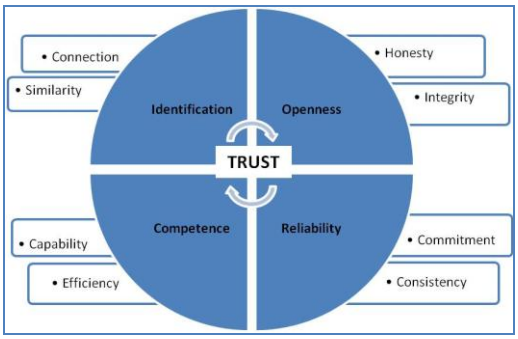

Fig. 2: Trust Model for e-SCM.

Competence:

Competency is about satisfaction with the decision, quality, skill, capability, experience, leadership, efficiency, effectiveness, and achievement of trading partner (Dominic, *et al*., 2013). In e-SCM, this value related to the ability to perform the e-SCM application, especially in helping the consumers in experience their expectation. Not limited to the capability, a few researchers believe this value also about efficiency that helps to perform a task physically and intellectually (Cazier, *et al*., 2006; Liefa & Wang, 2010; Zambaldi, *et al*., 2010). This included the application performance in the perspective of ease of use, transaction time consume, and consumer satisfaction. e-SCM relationship is heavily depended on competence and those who have this value definitely understand their capabilities and work, and also knowledgeable to overcome their weaknesses in order to survive in the marketplace (Ab.Aziz, *et al*., 2011a; Laeequddin, *et al*., 2012). With this value, an organization can always be trusted by trading partners because of their behaviors, knowledge, skills and abilities can guarantee the achievement of the business goals. Laan *et al*., (2011), believed that competency related to performance as only a competent individual can perform better and achieve the task successfully and efficiently.When they have the evidence to prove their capability and efficiency, then the trust can be build.

Reliability:

Reliability is about commitment, consistency in behaviour, explanation, and steadiness in performance (Shockley-Zalabak, *et al*., 2010). This value related to alignment between words and actions (Ab.Aziz, *et al*., 2011b). According to Castaldo et.al (2010), reliability explains as continuity to keep committed and consistent in behaviour from either words or actions itself which considered essential requirement to develop trust in a long-term e-SCM. In other words, means that one must *'walk the talk'* or implement any promises being made, and not to take advantage of another. Basically this value plays a significant role to achieve business goals, and aims that indirectly maintain long term and stable the e-SCM business relationship. From the literatures reviewed, this value can ensure all the business activities completed successfully and guarantee the business performance. This value is important in achieving business goals and long-term e-SCM business relationship.

Openness:

Openness is about willingness to share valuable business information, related to honesty and integrity on problems such as disagreement, performance evaluations, job related problems, decision making and also about long term strategic direction (Shockley-Zalabak, *et al*., 2010). To ensure the e-Business application information integrity, the organizations should be able to cater all the potential threats (Baker, *et al*., 2007). This because the e-SCM confidential information is crucial, such as product info, product price info, and payment information which need to be genuine and secure without any risk of alteration especially from the hackers. Not limited to that, the company details information included with the inventory and logistic information also need to be free from data modification and accurate. If the information is not accurate, the decision made probably is not the right decision which the consequence is on the time and cost of a project that may decrease the business profit. When the communication between SC components was communicated accurately, openly, and transparent, there is no issue will raise at the end or after of a project completion (Karib, 2009).

Identification:

Identification is about connection and similarity to trading partners, management, in objective, goal and in business direction"(Nooteboom, *et al*., 2008; Shockley-Zalabak, *et al*., 2010). This value in e-SCM helps in avoiding the fraud and deception in e-Business. The fraud and deception can be avoided by investigating the potential company background/detail information, direction and similarity on the e-Business application used

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and the fraud can be avoided by applying cryptographic in every transaction conducted. Identification has lots of definitions, and can be defined as similarity and connection between two or more parties, verification of information and as company preferences (Dominic, *et al*., 2013).

Nevertheless, identification can be summarized as any connection and similarity that can be found among trading partners including shared values, purpose, experience, objectivity and environment of products or services, which have positive relationships with trust for collaboration. This value exists in business relationship when the SC components feel connected to each other from the information shared and similarity existed between them. The similarity existed makes the business relationship closer that at the end help enhance communication, recognize any problem arising, and an improved business environment (Ali, *et al*., 2010). The improved communication results fewer surprises problem such as schedule delay that increase cost. To conclude here, this value helps to identify the common values that shared between SC components. Using this value, trust can be built because when the SC components feels connected to each other and the process of developing trust is much easier (Liu, 2012).

In order to transform into IT implementation prototype which in the form of knowledge based expert system (ES), measurable parameters for each characteristics was identified. Basically, all the measurable parameters were stored as attributes in the web based ES prototype in the form of knowledge base rules. The web based ES prototype as shown in Figure 3, was developed purposely to help organization investigate which potential trading partner can be trusted for B2B Collaboration. Indirectly this model helps to automate the business partner evaluation process and the process is transparent from the conventional way. The trust model can be extended to other industries with similar problem on lack of trust. Generally the impact is based on the benefits to develop a trusted environment for B2B collaboration which only trusted partner is involved in the environment.

Fig. 3: Web based ES Interface.

Conclusion:

The trust model for e-SCM trust consists of four core values which are identification, competence, openness and reliability. Each of the trust values has their own characteristics that help to measure trust in a business relationship (*identification*=similarity + direction; *openness* = honesty + integrity; *competence* = capability + efficiency; *reliability* = commitment + consistency). This final e-SCM trust model can be used as guidelines for SC components to select a trusted trading partner and create a trustful business environment for them. The trust model was transformed into IT implementation using knowledge base of the ES prototype. The trust model can be adopted by other researcher of similar intention. As a conclusion, this study has successfully answered all of the research questions as well as achieved all of the research objectives. Overall, this study found that; Trust consists of four trust values (identification, competence, honesty and reliability). Each of the trust values has their own characteristic (similarity; connection; capability; efficiency; honesty; integrity; commitment; consistency). The trust values characteristics help to avoid distrust and considered as the prerequisites for solid trust in B2B collaboration relationship.

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