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14th Bled Electronic Commerce Conference

Bled, Slovenia, June 25 - 26, 2001

The Role of Trust in Business-to-Business Electronic Commerce in Singapore

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Abstract

The Internet is a global and borderless environment, and it will be a challenge having to identify and trust the other party whom one is transacting with. Developing and communicating trustworthiness to one's business partners is crucial at a time when business opportunities in e-commerce are flourishing.

The objective of this study is to examine the role that trust plays and the extent to which it drives business-to-business e-commerce participation in Singapore. Indeed, knowledge of the role of trust, in its specific dimensions, will be useful to businesses in meeting the future competitive pressures surrounding it in the e-commerce context.

Trading partner trust and electronic trust are examined as the independent variables of participation. The results demonstrated that both trading partner trust

and electronic trust are significantly related to participation in e-commerce. Furthermore, of the three dimensions of trading partner trust, keeping commitments, negotiating honestly and taking advantage, the data suggests that keeping commitments may comparatively be the more important driving force of trust.

1. Introduction

Trust has been widely acknowledged as an important concept to study because it is a key enabler of cooperative human actions [24]. In a research they conducted, KPMG [14] has attributed the low rates of electronic commerce (EC) participation in the Asia-Pacific region to that of perceived risks in the security of business-to-business (B2B) EC transactions and trust of the trading parties. While technology at present may seem to provide safeguards such as digital signatures, encryption, web seal assurances and other standards that provide technology based security and trust mechanisms, there appears to be a perception by businesses that transactions conducted specifically via the Internet are insecure and unreliable [4, 33]. It appears that apart from the technical assurances that many governments have tried to put in place, it is the ‘people-side’ of the transactions that many of these players have begun to question [34]. Parkhe, [30] suggests that this is due to two types of uncertainties, uncertainty regarding future events, and uncertainty regarding trading partners’ responses to these future events. The importance of trust among trading partners is hence accentuated in this environment of dual uncertainty. The final straw that determines the adoption of B2B EC may then shift from the reliability of the technology to the reliability of trading partners [34].

In Singapore for instance, a survey released by the Infocomm Development Authority of Singapore (IDA) shows that only 8.5 percent of companies in Singapore conducted business online in 1999 [41]. Despite various government initiatives to create a positive and conducive environment for businesses to implement and deploy online services, the rate of EC participation in Singapore remains low.

The objective of this study is hence to examine the role that trust plays and the extent to which it is responsible for B2B EC participation in Singapore. This study is significant for several reasons. Firstly, it utilizes existing theories relevant to trust amongst trading partners to examine the role that trust plays in a new environment—B2B EC. Secondly, it adapts an instrument that has been validated in the literature, the short version of the organization trust inventory (OTI), to ensure that trust is measured reliably and that the dimensions of trust are captured adequately. Finally, it attempts to link both trading partner trust (TPT) and electronic trust (ET) with increased activity in EC, thereby giving support to the importance of both kinds of trust to the B2B EC environment.

The theoretical background and hypotheses for the paper are developed in the next section. Following that, the research model and the research methodology for data collection are described. Subsequent to that, the data analysis approach and the

results are described. Finally, the paper's implications for businesses, government and researchers are examined and some of its limitations as well as suggestions for future research are expounded.

2. Theoretical Background and Hypotheses

Trading Partner Trust (TPT) and Participation in EC

Trust has received a great deal of attention from scholars in the base disciplines of social psychology [9, 17, 19], sociology [18, 40], and economics [8, 44], as well as in more applied areas like management [12, 15] and marketing [1, 10, 25]. Yet what characterizes trust, which in turn had a bearing on the way philosophers have tried to define it, is both vast and varied, a "confusing potpourri" [38]. Nevertheless, Worchel [45] has attempted to classify these efforts into three distinct categories, each having a separate approach in their study of trust. The approaches will now be briefly discussed.

Personality theorists have posited that the readiness of an individual to trust is shaped by specific developmental and social contextual factors [13]. Lewicki et al. [17] states that trust at this level is affected by the individual's early psychological development. Rotter [36] further stressed the need to consider individual differences in the study of trust.

In another approach, Lewis and Weigert [18] approached trust as a sociological topic as opposed to a psychological trait within the individual, this is in line with the approach of the sociologists and economists. Trust is a prerequisite in the continuance of harmonious social relationships. The extent of this social trust will in turn determine the way individuals interact with social institutions in everyday life.

The last approach is that of the social psychologists. They focus on the factors that create or destroy trust in individuals involved in a personal, work or business relationship [13]. The trusting individual is vulnerable to the actions of the other party, which in turn have a strong bearing on the individual's future propensity to trust. We contend that the trust between trading partners involved in a business relationship falls in this category of relationship trust.

Trust plays a critical role in joining buyers and sellers in the marketplace, thereby enabling human relationships to flourish. It binds trading partners together to make them strong and effective. It also increases feelings of security, reduces inhibitions and defenses, and frees them to share feelings and participate with one another in all manner of transacting. Without trust, no company can ever hope to achieve excellence. In the supply chain, relationships characterized by trust flourish since trading partners are drawn to those with integrity [32].

Where relationship trust is concerned, Mayer [23] suggests that a target's ability, benevolence, and integrity are the primary factors leading to trust. Fukuyama [11] views trust as the expectation of regular, honest, and cooperative behaviour based

on commonly shared norms and values. While Rotter [36] focuses on one party's ability to rely on another's word or promise, stressing the need for consistency.

Following closely with above arguments, this study has adopted Bromiley and Cumming's [6] definition of trust, which has been widely accepted in the literature. They defined trust as an "individual's belief or a common belief among a group of individuals that another individual or group (i) makes good faith efforts to behave in accordance with any commitments both explicit or implicit, (ii) is honest in whatever negotiations preceded such commitments, and (iii) does not take excessive advantage of another even when the opportunity is available. In a similar vein, trustworthy behavior means that individuals actually behave according to (i), (ii) and (iii)" [6].

Bromiley and Cummings [6] endorsed this definition of trust for three reasons. They explained that firstly, it agrees with the common usage of being trustworthy. Secondly, it avoids the problem of defining the individual's long-term interests. Other definitions of trustworthy behavior often focus on behavior deviating from the agent's self interest but these definitions generate the almost insurmountable problem that given appropriate beliefs about the future almost everything can be in one's interest [6]. Thirdly, it conforms to Williamson's [42] Transaction Cost Economist Theory (TCE). Bromiley and Cummings [6] use the same logical structure as TCE but with an important change in assumptions. Whereas Williamson develops a theory of an organization assuming that the organization must act as if individuals cannot be trusted, Bromiley and Cummings assume that trust exists and takes on sufficiently high values to have impact on organizational processes and structure. They assume that individuals are neither perfectly trustworthy nor completely guileful and that average levels of trust or guile vary across organizations and influence inter-organizational outcomes [6].

Hence, their definition of trust rests on a view that organizational action is based largely on good-faith effort, honesty in exchange, and limited opportunism. In other words, if trust exists between trading partners, one would believe that the other would make a good faith effort to keep its commitments, negotiate honestly and not take excessive advantage of another.

The next section delve into three theories, Williamson's (1975) Transaction Cost Economist Theory, Blau's (1964) Social Exchange Theory, Morgan and Hunt's (1994) Commitment Trust Theory, to explain the importance of trust among trading partners. With the establishment that trust plays an important role in the relationship between trading partners, and that it strengthens business interactions, it would follow that as trust between two parties increase, the business relationship between them ought to deepen as well. It can then be argued that if participation were used as a proxy for the strength of the relationship between business entities, it would also increase as trust between two parties increase.

Transaction Cost Economic Theory (TCE)

Williamson [42] suggests that firms will enter into arrangements with each other when transaction costs associated with an exchange are intermediate, or in other words, not high. Examples of transaction costs include costs incurred during the transaction as well as costs incurred to maintain controls. The lack of trust in this theory will result in the belief that the risk of opportunism is high, which will result in high transaction costs [34]. Hence, the presence of trust, which lowers transaction costs, indirectly promotes business arrangements between the related entities.

TCE is thus an important theory explaining why trust gives rise to cost savings, and also that mutually trusting firm should stay as partners. In other words, the presence of trust in any business relationship under this theory will give rise to business cooperation with one another.

Social Exchange Theory

Social exchange theory relates to mutually trusting behaviors that translates to a willingness to accept vulnerability in the face of uncertainty [34]. In other words, the firm, when dealing with the supplier for the very first time, initiates trusting behaviors like disclosing information about them and not being overly concerned with the supplier's apparent constraints. The supplier, likewise, exhibits trusting behaviors like not making excessive implorations into the client's history and delivers ordered goods on credit. These trusting behaviors are initiated in the face of uncertainty and make both parties vulnerable to risks. This is because both parties, being strangers to each other, do not know if their actions will be reciprocated. Although Blau [5] applied this theory to social exchanges, which differs from economic exchanges, as it does not involve monetary exchanges, it can be argued that in most economic transactions, elements of social exchanges are present. It is common to see trading partners extending favors to one another in the ordinary course of transactions, for example, offering to deliver goods on credit. This coincides with the idea of a social exchange, which involves favors that create and diffuse future obligations. The supplier and its client, when making such social exchanges, have no way to assure an appropriate return for a favor, hence social exchange requires trusting others to discharge their obligations. But, if the firm reciprocates the supplier's trust in them or vice versa, they prove themselves worthy of being accorded continued and extended favors. Hence, social exchanges generate trust in social relations through their recurrent and gradually expanding character [5]. As the relationship progresses, the depth and breath of the exchanges will also increase due to the trust between them that has been deepened. Therefore, this theory explains the importance of trust and the role it plays in cementing and expanding the relationship of trading partners.

Commitment Trust Theory

Morgan and Hunt [26] stated that “trust is pivotal to business interactions”, and relationships that are characterized by trust will be so highly valued that parties will desire to commit themselves to a strategic partnership. Trust is the cornerstone of such a relationship. Ratnasingham [34] explained that trust would also encourage firms to preserve their relationship investments and resist attractive short-term alternatives. Morgan and Hunt (1994) theorized that the presence of relationship commitment and trust is central to successful relationship marketing. They explained that when both commitment and trust are present, they produce outcomes that promote efficiency, productivity and effectiveness. Trust also encourages cooperation among business partners; where cooperation refers to situations in which parties work together to achieve mutual goals [34]. In short, commitment and trust lead directly to cooperative behavior that is conducive to relationship marketing success. Hence, the impact of commitment and trust among trading partners is important for the development of long-term relationships in e-commerce.

These three theories establish that trust is extremely crucial to initiating, maintaining and strengthening trading partner relationships. In a related field, previous studies in EDI indicated that trading partners with high levels of trust are more dependable and can be relied upon to carry on tasks that are related to business transactions, further establishing the relationship between trust and business cooperation [39]. In short, research relating to trust in business relationships indicated that high levels of trust lead to long term relationships, increases cooperation, confidence, reduces risk and encourages bigger investments [35]. Trust is, according to O’Hara Deveraux and Johansen [29], “the glue of global electronic commerce”. It is at this juncture that the first hypothesis be stated as:

Hypothesis 1: Trading partner trust is positively correlated to participation in business-to-business e-commerce.

Electronic Trust (ET) and Participation

It is logical to conceive that as the trading platform moves from the conventional one involving telephones and fax machines to one that involves computers and the Internet, apprehension towards the safety of the new technology would arise. To increase participation in EC, it is important that the perceived risks associated with the susceptibility of the technology to unauthorized interference, are kept at a manageable level. If trading partner trust exists between two parties, but the belief in the security of the transacting platform is absent, it would follow that the original cooperative intentions may be compromised.

Indeed, both Muir [27], and Lee and Moray [16], who defined trust in EC as “an individual’s belief in the competence, dependability, and security of the system under conditions of risk”, established that trust is a causal variable influencing people’s use of automated control systems, and self-confidence had a significant impact on participation [13]. Muir [28] has also found that trust correlates strongly

to participation, and Kini and Choobineh [13] claims in determining individual's decision to engage in EC, trust is an important factor to consider.

This research follows Ratnasingham's [34] study in recognizing such trust as ET (Electronic Trust), and provided a few operation definitions for this form of trust as follows. It refers to one's belief in the functionality of the security safeguards provided by the EC technology; that EC transactions remain original, genuine, accurate, complete and correct as they are passed over the Internet; that there will be no disclosure of information to unauthorized third parties.

Therefore, besides being impacted by trading partner trust, participation in EC will also be affected by the transacting parties' belief in the new technology, in that a higher ET will result in increased participation in EC as well. Hence, our second hypothesis will be:

Hypothesis 2: Electronic trust is positively correlated to participation in business-to-business e-commerce.

3. Research Model

The research model, which forms the basis of this study, is presented in figure 1 below. This research model is partially adapted from Ratnasingham's [34] model where she used field studies to examine the importance of trading partner trust in EDI participation. While we had adapted part of her research model, our study differs from hers in several ways including: the context of the study (EC and EDI), the research methodology (survey versus field study), and also the use of our TPT research instrument, mainly the short version of the OTI questionnaire, and the utilization of the theories underlying the instrument to explain the results of our study.

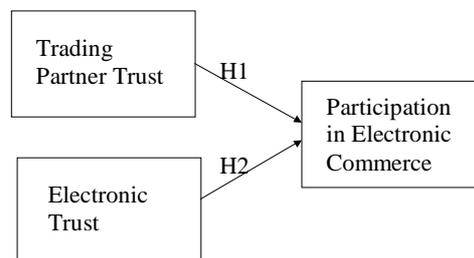


Figure 1: Research Model

Operationalization of the research model above takes the form of a linear relationship:

$$Y = A_0 + A_1X_1 + A_2X_2$$

Where:

Y is defined as the participation level

X₁ is defined as TPT and

X₂ is defined as ET

$A_0 - A_2$ are coefficients measuring the strength of the relationship. Attributes of the various variables are discussed in more detail in the next section.

4. Research Methodology

Independent Variables

Trading Partner Trust (TPT)

The questionnaire for TPT was adapted from the Organisational Trust Inventory (OTI) validated by Cummings and Bromiley [7], which measured inter-organizational trust. Questionnaire items were taken from the short form OTI, which consists of 12 questions. As Cummings and Bromiley [7] had selected these questions as a short form of the original OTI, we felt that by adapting these 12 questions, we can ensure an accurate representation of the original questionnaire.

Cummings and Bromiley [7] based their theory and measurement of trust partly as a belief on the assumption that, as a belief, trust should be captured via three dimensions (keeping commitments, negotiating honestly and avoidance to taking excessive advantage).

Keep Commitments

The first dimension of trading partner trust implies “a belief that the individual being trusted is reliable, that is, actually behaves to fulfill commitments. This is also to say that even if the fulfillment of those stipulated objectives is not directly in their short-term interest, a good-faith effort would be made to fulfill those contracted obligations, whether explicitly stated or implicitly understood”. [7]

Shapiro [37] suggests that trust in business relationships first develops on a calculative basis, as parties try to determine the amount of trust to accord to each other. They will evaluate their trading partner based on, for example, their ability to keep commitments and hence, obtain a clear evaluation of what their own risks and vulnerabilities are likely to be. This is in line with Mayer [23], who described integrity, an attribute closely related to keeping stipulated commitments, as one of the primary factor leading to trust.

By keeping commitments and therefore demonstrating integrity, a supplier can give his customer the view that his risks and vulnerabilities are reduced. This effectively sums up the first component of trading partner trust.

Negotiates Honestly

The second dimension implies that the individual's "statements and behavior prior to making commitments are consistent with the individual's real desires and facts as the individual knows them" [7].

Trust emerges when the customer perceives that the supplier intends to perform an action that is beneficial. The perceived positive intentions are derived from credible information regarding the intentions or competence of another [3]. In other words, if one party perceives another to have only selfish intentions, trust is unlikely to develop [20]. By negotiating honestly with one's business partner, especially by disclosing information and by being concerned about the partner's gains and losses, trust can be established.

Avoidance to Taking Excessive Advantage

The third dimension implies that the individual "does not take full, short-run advantage of unforeseen opportunities to gain at the expense of the other. It implies that the individual can be counted on to put forward a bargain that is not seen as unreasonable given the norms of the organization or group. This is not to say that the more powerful party will not perhaps do better than the less powerful party but rather that the use of such power will be *kept within some limits*" [7].

Likewise, Williamson, [43] suggests that since it is assumed that most people act opportunistically, whether one takes excessive advantage is a good economic calculus that customers can use to establish whether suppliers can be trusted.

The measurement of trust as a continuous construct implies that these features as described by Bromiley and Cummings [7] will be present in differing amounts in differing organizations and activities. In other words, these three features exist as distinct dimensions, but correlated to amount to provide a full definition of trust.

Electronic Trust (ET)

In contrast to TPT, which is a construct that has been widely researched, ET has received much less attention. Accordingly, we developed our own instrument to measure this component of trust based on reference to past literature and interviews with the IT managers of local firms. Face validity for the questions was ensured through further consultation with experts in this field.

Table 1 below presents the 12 adapted questions for TPT as well as the three-item instrument developed to measure ET. Respondents scored all the above items on a 7-point Likert scale, with anchoring of 1-*Strongly Disagree*, 2-*Moderately Disagree*, 3-*Slightly Disagree*, 4- *Neutral*, 5-*Slightly Agree*, 6-*Moderately Agree* and 7-*Strongly Agree on the scale*.

	Questions	Dimensions
Trading Partner Trust (TPT)	1. We think that our supplier tells the truth in dealings.	<i>Negotiate Honestly</i>
	2. We feel that we can depend on our supplier to deal with us honestly.	
	3. We think that our supplier does not mislead us.	
	4. We think that our supplier negotiates fairly during transactions.	
	5. We feel that the supplier tries to get the upper hand during negotiations*.	<i>Avoidance to taking excessive advantage</i>
	6. We think that our supplier interpret ambiguous information in their own favour*.	
	7. We feel that the supplier takes advantage of people who are vulnerable*.	
	8. We think that our supplier takes advantage of our weaknesses*.	
	9. We think that our supplier meets its negotiated obligations to our company.	<i>Keep commitments</i>
	10. We feel that the supplier will keep its word.	
	11. In our opinion, the supplier is reliable.	
	12. We feel that the supplier tries to get out of its commitments*.	
Electronic Trust	1. We think that the information passed between our supplier and I will not be intercepted by third parties.	
	2. We think that online orders received through our website is in its original form.	
	3. We think that the orders received are not from fictitious customers.	
Participation rate**	The total amount of the purchases through electronic means over conventional means with that particular supplier for the month preceding the phone interview: 1. 1%, 2. 5%, 3. 8%, 4. 10%, 5. 12%, 6. 15% and 7. 20% or more	

Table 1: Questionnaire items

*These questions are reverse-coded.

**The rates were recoded to become participation levels ranging from 1 to 7 accordingly.

Dependent Variable

The dependent variable in this study is actual *participation in electronic commerce*. As the respondents have been told to bear in mind the supplier from which their companies have most recently purchased over the electronic platform when answering the questionnaire, participation with respect to that specific supplier was measured. Electronic platform or means in this study refers to email, website and EDI, but exclude telephone and fax mediums. Phone interviews were conducted with the respondents at a later date (a week after the submission of the questionnaire) to capture the participation rates of these companies. This was done to avoid perception inflation bias by ensuring that the dependent variable was not measured at the same time as the independent variables. As it was evidently difficult to quantify the participation rates, the interviewees (who were the same ones who answered the questionnaire) were told to pick from a list of rates given to them. The rates were listed as: 1%, 5%, 8%, 10%, 12%, 15% and 20%. These rates were chosen after a brief survey was conducted with companies outside the sample set and represent the percentage of the total amount of purchases through electronic means over conventional means, from the particular supplier for the month preceding the phone interview. The answers were recoded into 7 participation levels of 1 (1%) to 7 (20%) respectively. In that way, the level of TPT and ET would have corresponded to the participation level in a common time frame. This was especially appropriate since trust as a belief is constantly subjected to changes in the external business environment [2, 13].

Data Collection

A survey instrument was formulated to obtain feedback from organizations regarding their TPT, ET and their participation level in EC. The survey instrument has a reminder at the top that required the respondents to answer survey questions keeping in mind the supplier that their firms have most recently purchased from over the EC platform.

We faxed the survey to 120 companies and emailed the survey to 1400 companies, all of which are randomly selected from the local business listing of the telephone directory and Internet service providers. The companies were located in Singapore and consisted both of both multi-national companies and small medium enterprises. Prior to faxing and emailing the survey, we called the companies to explain to them the purpose of the questionnaire and attempted to solicit response from those that are involved in B2B EC. As a result, questionnaires were administered only to businesses that engaged in *purchasing* via the e-commerce platform. This is because when assessing the relationship between two business partners, trust becomes an issue essentially for the purchaser, who is subjected to vulnerabilities associated with such a transaction. Examples of this include non-delivery (for transactions requiring an upfront payment), fraudulent use of its sensitive information and so on. For the supplier, as long as the credit card number or other payment methods of the purchaser are valid, it would not be susceptible to other

high-risk areas, other than the reliability of the technology on which the transaction is based upon.

5. Data Analysis and Results

General Profile and Summary Statistics

Of the 120 companies that received the survey through fax, a total of 20 responses were obtained (a response rate of 17%). 18 of these responses were deemed usable. We received only a maximum of one response from each company. 3 questionnaires cannot be used because they are either incomplete or completed in a manner clearly indicating that the respondent had not attempted the questionnaire seriously (e.g. by circling the value 4 for all questions). Of all the 1400 companies that received the survey through e-mail, a total of 12 questionnaires were returned (a response rate of 0.09%). We were able to use all 12 responses via email. A total sample size of 30 responses was obtained as a result. The low response rates were attributed to the low incidence of EC participation in the region and the hectic year-end financial closing period during data collection. Although there is no reason to suspect undue bias in the response (except as noted in the later section on limitations of the study), inferences will have to be interpreted with caution due to higher likelihood of sampling variability.

The companies who responded to our survey were from several different industries, generally representing a cross section of industries in Singapore. 40% of them comprise Multinational Corporations (MNCs), with the remaining respondents being smaller local and foreign firms. 36.7% of them have less than 20 employees, 33.3% of them have between 20 and 50 employees, none employ between 51 and 100 employees, and 20% have 101 and more employees. The respondents who filled in the surveys held different responsibilities in the organization as follows: 23.3% specialize in sales management, 46.7% specialize in information technology, 10% were from marketing research/services, 10% from financial management and accounting, and 10% from "others".

In line with our expectation that EC is a new phenomenon in Singapore, 66.7% of the companies have been participating in EC for less than 1 year, whereas 20% has participated for between 1 to 2 years. Only 10% of the companies have participated beyond 2 years. Half of the companies' respondents (50%) visited the supplier's homepage less than 25 times a month, 23.3% visited 25 to 50 times, 6.7% visited 51-100 times, 3.3% visited 101-250 times, while 3.3% visited more than 250 times.

About 13.3% of the respondents filled in not applicable as their response to this question. Finally, 70% of the companies have made less than 5 online purchases per month. 10% of them made 5 to 10 purchases, 6.7% made 11 to 20 purchases and 10% made 31 and more online purchases per month.

Factor Analysis and Reliability

The factor analysis for the 12-item instrument for TPT shows that all the 12-item load well (0.586 to 0.845) into one main factor with the principal component analysis, with a reliability of $\alpha=0.91$. Similarly, the factor analysis for the 3-item ET factor loaded cleanly on one factor (0.715 to 0.857) with only one component extracted. The α for ET questions is 0.72. As the α levels are above .70, this indicates that the scales are moderately reliable.

As seen from table 2 below, both TPT and ET demonstrate high correlations (significant at $p < .01$) with participation. TPT, however, was not significantly correlated to ET, which suggests that they are largely independent variables.

	Mean	Standard Deviations	TPT	ET	Participation level
			Pearson Correlation (2-tailed)		
TPT	54.7	11.91	.91	.273	.659**
ET	12.4	3.27	.273	.72	.551**
Participation level	4.03	1.73	.659**	.551**	N.A.

Table 2: Means, standard deviations and correlations of variables

** Correlation is significant at the 0.01 level (2-tailed)

Diagonal cells represent reliability alpha.

Regression Analysis

A statistical linear model was estimated so that inferences can be made about the linear relationship that exists between participation level, TPT and EC. Data from the 30 companies collected were compiled and analyzed with SPSS. The linear regression was estimated with results presented in table 3. The regression model shows that both TPT and ET are significantly correlated to participation level in EC. This demonstrates significant support for H1 and H2 at $p < 0.01$.

EC Participation level	Constant	Trading Partner Trust	Electronic Trust
Y=	0.00	0.550	0.401
p-value	0.016*	0.000**	0.004**
R ² =0.583	Adjusted R ² =0.552	F-statistic=18.876**	Obs=30

Table 3: Statistical results

** Significant at the 0.01 level

* Significant at the 0.05 level

Due to the small sample size and the fact that the dimensions of TPT are likely to be highly correlated to one another, we have looked at TPT as one construct. To gain an insight into the possible effects of each of the dimensions of TPT on driving participation, however, we looked at the correlations amongst these dimensions and with TPT. As can be seen from table 4, apart from being correlated to the dependent variable, the three dimensions of trading partner trust are also significantly correlated to each other. The significant correlations between the dimensions justify our earlier position that these are correlated variables, arising out of a common construct – TPT. Marquardt and Snee [21], Mason, Gunst, and Webster [22], and Price [31] have noted that, when there is a high correlation among predictor variables, the solution obtained using ordinary least squares tends to be very unstable¹. Hence the dimensions of TPT were not tested explicitly in the regression. From the ordering of the means, however, we can see that keeping commitments can be considered to be most important, followed by negotiate honestly. Avoidance to taking excessive advantage appears to be the "least" important among the three dimensions in the context of this study. All 3 dimensions are significantly correlated ($p < 0.05$ two-tailed) to participation level.

		Mean	Standard Deviations	1 Negotiate Honestly	2 Avoidance to taking excessive advantage	3 Keep commitments	4 Participation level
				Pearson Correlation (2-tailed)			
1	Negotiate Honestly	19.6	3.61	1	.644**	.815**	.691**
2	Avoidance to taking excessive advantage	15.0	5.26	.644**	1	.609**	.413*
3	Keep commitments	20.1	4.55	.815**	.609**	1	.700**
4	Participation level	4.03	1.73	.691**	.413*	.700**	1

Table 4: Means, standard deviations and correlations of TPT Dimensions

** Significant at the 0.01 level

* Significant at the 0.05 level

In the next section, the results of this study and their implications for businesses, governments, and researchers will be discussed. In addition, ways to overcome the

¹ The estimates of the regression coefficients may change radically corresponding to slight changes in the sample data. It then becomes almost impossible to rely on the model.

current trend of low participation in EC will also be highlighted. Where relevant, data from the additional questions in the survey will be presented and information from post-hoc interviews with four companies (who participated earlier in the survey, and were willing to allow us to interview them face to face after the surveys were completed) will be drawn upon to substantiate the discussion below.

6. Discussions, Limitations and Conclusions

Implications for Businesses

In the real world, there is a direct correlation between trust and revenue [32]. This implies that those organizations that are able to base their practices on respected policies and procedures will be able to attract a wide market. A company must pride itself as possessing integrity, such that independent of the external circumstances, it has the conviction to stay the course and keep its commitments. It must also effectively assure its trading partners of the fact that it is competent, and negotiates honestly with its suppliers and customers alike. Besides, when conditions are ambiguous, it must avoid the opportunity to take undue advantage of its business partners and achieve gains at their expense. In all, these efforts will convey a sense that the organization is reliable, open and communicative in its dealings. Over time, these characteristics develop, allowing its business partners to infer a set of predictable behaviors about the organization. This will in turn lead to faith and trustworthiness both in the organization and also its ability to conduct affairs with a high level of integrity.

From the interviews we conducted subsequent to the data collection, it seems that businesses are more concerned that their business partners provide assurance that commitments entered into will be kept. This is in line with the suggestion provided by our data, where the dimension of keeping commitments is the most important dimension of trust influencing participation. This has specific implications for businesses transacting online to provide assurances that contractual commitments will be kept. While all three dimensions of trust are important, this study suggests that businesses should focus their trust building efforts especially towards instilling a strong belief in their partners that they adhere to commitments.

Developing and communicating trustworthiness to one's business partners is crucial at a time when business opportunities in EC are flourishing. When asked the question "We intend to increase the volume of transactions with our supplier through the web if granted more business opportunities" on the same 7-point Likert scale from 1- "Strongly disagree" to 7- "Strongly agree", 73.3% of the respondents are keen on increasing transactions (scale: 5 to 7). Only 10% expressed disagreement (scale: 1 to 3) and 16.7% are neutral (scale: 4). This shows a general inclination towards transacting via the EC platform and in this light; businesses that can successfully build a trusting relationship with their partners stand to gain from the vast markets out there.

Implications for Government

Authorities promoting EC to date have largely concentrated on selling the rational aspects behind the adoption of EC as a way of business. These rational factors include cost savings, opportunities for new businesses, streamlined business processes, improved productivity and better customer service, among others. Although these benefits will be manifested in one way or another as businesses jump on the EC bandwagon, the role of trust in both initiating and maintaining this business transition and trend should be accorded due emphasis.

About half of the respondents interviewed personally and through the phone (in conjunction with obtaining the EC participation rate) were largely unaware of the security protocols that were in place to ensure a secure transaction over EC networks. Of those who are aware of the controls in place, most perceived that they were sufficiently adequate although some mentioned concerns over controls applied to the credit card charging mechanism. These responses are not part of the formal survey responses, and are obtained as a post-survey feedback to the study. Nonetheless, the authorities' attention should be directed to the lack of business education on the security mechanisms developed for the purposes of promoting EC. In the process of channeling its resources to developing a sound and secure infrastructure, authorities should not overlook the user-education facet, a lack of which might seriously dampen the chances of a smooth transition to transacting on the EC platform.

Implications for Researchers and future research

Morgan and Hunt [26] claim that trust is a key mediating variable in relationship models and maintain that overlooking the role of trust "results in flawed conclusions". Moreover, trust, according to Fukuyama [11] is possibly the single most important factor that directly affects organizational and national prosperity and adaptability, including the adoption of new information systems and the political and organizational changes it entails. The results of this study affirm the necessary role of trust, at least with respect to transacting on the EC is concerned.

A more in depth research into the mechanisms that promote both TPT and ET is promising ground for future research. Understanding these mechanisms will result in concrete propositions as to some practical ways of establishing both the people-side of trust among business entities and also the trust towards the electronic infrastructure upon which businesses transact.

Yet another possible ground for future research is a comparative study between the businesses in the States (where participation in e-commerce is relatively much higher) and the Asia-Pacific region. Hypotheses such as whether the levels of trust differ significantly between the two regions could be tested. This could provide further evidence to either support or reject the current finding that trust is indeed a key enabler of business-cooperation in EC.

7. Limitations

As mentioned in the research methodology, participation level in EC has been used as a proxy for the strength of the relationship between the business entities. It was argued that since trust was pivotal in building and strengthening business interactions, which can be represented by the level of participation between the two businesses, it would follow naturally that trust leads to participation in EC. Nevertheless, the measurement of participation was fraught with technical difficulties. A broad definition of participation had to be adopted but that did not solve the problem of its measurement. When asked to quantify the amount of participation, most respondents appeared uncertain until given a list of options to pick from. It has been assumed in this study that the option chosen by the respondent firms closely represents the actual amount of participation of the respective businesses.

Due to the low response rate and the lack of reactions on the part of organizations in spite of repeated efforts to follow up with the questionnaires disseminated, two limitations have emerged, namely small sample size and lack of representativeness of the data with respect to the population. The small sample size of this study restricted the types of analyses that can be performed on the data collected (for instance, no discriminant analyses are done to find out which of the three dimensions of TPT is significantly correlated to participation level, only a composite measure of TPT is used). A larger sample size will provide more statistical power for more analyses. Additionally, the question of representativeness of the data is raised and this may limit the generalizability of this study. In this study, 40% of the responses came from MNCs and 56.7% came from smaller local and sole proprietorship/partnership companies, with 3.3% from "others" whereas in Singapore, there are 92,000 SMEs in total and together, they make up 92% of all establishments, and employ 53% of the workforce. The fact that larger companies have more resources to spare may have accounted for the increased willingness for them to participate in this and other studies. A larger absolute number of responses would overcome these deficiencies. Stratified random sampling by industry and by type of company may provide better ability to note differences between differing industries and types of companies, and may very well show differences in the levels of participation in EC.

8. Future Research

In the discussion of the hypotheses above, we argued that high levels of trust lead to the establishment of long-term relationships. There are two other possible scenarios arbitrating this assumption that may be worth investigating in future studies. Firstly, one may argue that TPT is a necessary condition for B2B commerce but not a sufficient one. In other words, if TPT is low, the purchasing organization will not participate in the business relationship at all with the trading partner, not to mention electronic buying. Reversibly, it is possible to argue that even in the case of high

TPT, there may not be participation in the B2B EC due to other reasons, such as low level of ET.

In this study, only organizations already in a trading relationship participated in this study. If the above arguments are true, then for participants with low TPT, it may be that TPT are still above a threshold level that allowed them to participate in the trading relationship nonetheless. It will be interesting to find out if indeed TPT is a necessary (but not sufficient) condition for trade by surveying organizations that have yet to enter into a trading relationship. Additionally, this study also shows a positive linear relationship between TPT and participation level, i.e., high TPT is correlated to high participation level. It may be interesting for future studies to look at moderating variables that may moderate this relationship.

Secondly, there is a question of entrenchment in a trading relationship that may distort this linear relationship. It may be argued that the level of participation in EC with a trading partner may not vary with the level of TPT and ET because in some B2B relationships, once electronic buying commences, the level of participation usually does not change month to month. This is especially so in the case of EDI relationships. It appears from our data that such entrenchment exists only minimally at most, in our study. This could be due to the fact that we are not looking at longitudinal data of participation level and TPT and ET, which may reveal buying patterns over time for a particular organization. Again, this may be an interesting study for future research to consider.

9. Conclusions

With the benefits and opportunities that EC has to offer, it would be unfortunate if the perceived risks in such an arrangement remains the sole barrier to entry. Trust, as laid out by the Transaction Cost Economic Theory [42], Social Exchange Theory [5] and Commitment Trust Theory [26], has been found to mediate this problem. In order to effectively tap on the benefits of EC, and successfully use it as a business vehicle, it is vital that businesses first learn to build up a trustworthy relationship with their trading partners. Relationships characterized by trust are potentially rewarding and to the extent that the level of trust leads to cooperation, benefits will be reaped accordingly.

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