December 2003

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16th Bled eCommerce Conference

eTransformation

Bled, Slovenia, June 9 – 11, 2003

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Abstract

This paper presents a theoretical extension of the Technology Acceptance Model (TAM). The extended model aims to predict and explain consumers' intentions to transact with an Internet-based business-to-consumer electronic commerce (B2C EC) system by integrating trust and risk perceptions with TAM.

The proposed model (TRiTAM) was validated using data collected from 133 participants. The results provided substantial support for most of the proposed hypotheses and showed the significance of the extended constructs. Besides testing the model, the relative importance of the trust dimensions is also examined. Firstly, a summary of the quantitative results is presented. This is followed by a detailed discussion of the qualitative results. Several new insights on trust in B2C EC were found. The theoretical implications are discussed.

1. Introduction

Business-to-consumer electronic commerce (B2C EC) is usually associated with commercial web sites that facilitate Internet shopping, for example, a consumer purchasing an item from the popular online retailer Amazon.com. Despite the many benefits that business-to-consumer electronic commerce (B2C EC) offers and the high expectations on its growth, many customers still prefer to use the existing offline distribution channels. For example, there are 4.1 million people in Australia registered as online banking customers in September 2001, yet, less than 50% of the registered users are active users (Kavanagh 2002). To increase the use of B2C EC, it is necessary to identify the determinants affecting its growth.

2. Theory Development

Studies on B2C EC systems adoption can be classified as a class of technology acceptance research, and thus, the Technology Acceptance Model (TAM) may be adapted to explain this phenomenon (Davis et al, 1989). The current study extends TAM for B2C EC adoption by incorporating the multiple dimensions of trust and risk perceptions.

As shown in Figure 1, our proposed model suggests that a customer's intention to transact with a B2C EC system is influenced by their perceived usefulness and ease of use of the system, which is consistent with TAM. In addition, the model proposes a negative relationship between the perceived risks in using the system and the customer's intention to transact with the system.

In a study by Farrell et al. (2002), a key criticism of much of the current literature concerns the oversimplification of the trust concept. Studies that views trust as a singular notion – such as, consumer's trust on web retailers, is not adequate for addressing specific consumer concerns. To provide richer insights, this study examines the relationship between perceived risk and the multiple dimensions of trust. The trust dimensions examined in this study were identified based on a detail review of the trust literature.

Technology trust in B2C EC is defined as the subjective probability by which consumers' believe that the technology infrastructure supporting the B2C EC system is capable of facilitating transactions according to their expectations.

Retailer-ability trust in B2C EC is defined as the subjective probability by which consumers' believe that the web retailer has the ability, competence and skills to process transactions as expected. Undoubtedly, the web retailer's ability is one of the characteristics that would affect consumer's trust towards them (Mayer et al, 1995; Keen et al, 1999).

Retailer-integrity trust refers to the consumer's trust towards the merchant's honesty and willingness to provide the service as expected without acting opportunistically. The identification-based trust theory is the foundation of this trust dimension. This theory proposes trust, to be an element constructed through a full internalization of the other party's desires and intentions (Lewicki and Bunker 1995).

It is also important to consider consumers' trust on the entities in the external environment that surrounds the B2C EC system. This includes *legal framework trust*, which refers to trust towards the legal framework associated with the online transaction, and *third party recognition trust*, which refers to trust towards the third party recognition bodies certifying various elements of the transaction system (Kim et al, 2001).

These five dimensions of trust are arranged in a second-order molar model, which depicts the multiple trust dimensions as the multidimensional entities of the higher second order factor – emergent trust towards adoption. This is theoretically justified since an increase in a single dimension of trust does not necessarily result in an increase in the other dimensions of trust. Moreover, two individuals can have the same level of trust towards system usage through different levels of the trust dimensions (Chin and Gopal 1995).

Chin and Gopal (1995) used the molar model to determine the relative importance of various beliefs to the adoption of a group support system. Determining the relative importance of each trust dimensions in B2C EC adoption is also an objective of this research. A similar approach will be used to meet this objective.

At the top of the model is the *'propensity to trust'* construct. People with different experiences, personality types and cultural backgrounds vary in their propensity to trust (Mayer et al, 1995; Kim et al. 2001). In this study, we propose that buyers with a higher propensity to trust are more likely to transact because their higher propensity to trust

would positively influence the other dimensions of trust, which together results in lower perceived risk, and hence, positively influence their intention to transact.

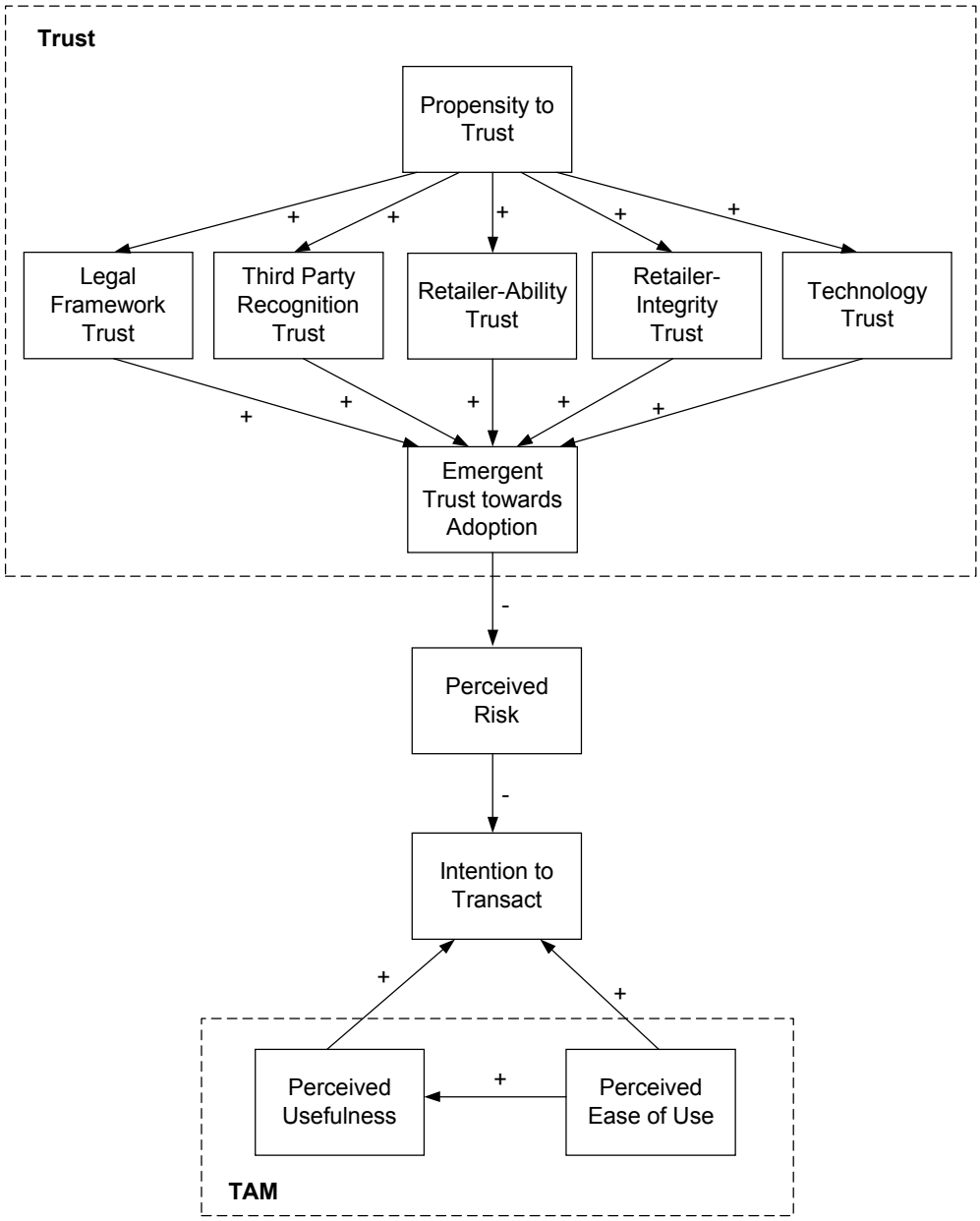

Figure 1: *The Proposed Conceptual Model: Trust and Risk Integrated with TAM (TRiTAM)*

3. Methodology

An experiential survey was conducted to validate the proposed research model. A sample of 133 students enrolled in a postgraduate course in information systems participated in the study. The participants had taken a previous course covering basic concepts in information systems, and are deemed to be computer literate. 58.6% of the participants were males. 90% of the participants are in the 16-35 age group and 72% of the participants have at least one year of industry experience.

There were two criteria for selecting the web site to test the proposed model. First, usage of the chosen web site by the subjects must be voluntary. Second, the web retailer should provide goods and services that the subjects can relate to. This would increase the accuracy of the results.

An online web site for a well-established 'bricks and mortar' music retailer meets both site selection criteria and was chosen for this study.

In a free simulation experiment, subjects were given a hypothetical scenario, indicating that they have an intention to purchase an item that is available offline and on the web site they are asked to review. The subjects were asked to complete a web-based self-administered questionnaire after reviewing it. The participants also participated in a group discussion following the experiment.

Instrument Development

The theoretical constructs in the proposed model were operationalised using validated measures from existing research where possible, or were generated based on similar scales. Seven point measurement scales were used to operationalise each constructs in the proposed model.

The TAM constructs, perceived ease of use and perceived usefulness, were measured using items adapted from Davis (1989) and Davis et al. (1989). The measurement scale for perceived risks were adapted from Jarvenpaa et al. (1999) and Stone and Gronhaug (1993). Most of the items for the trust dimensions are adapted from Pavlou (2001), and Cheung and Lee (2000), with some new items created to enhance content validity.

The research instrument was tested extensively before use. Several experts in information systems were asked to review the questionnaire. The questionnaire was updated and reviewed iteratively until a consensus is reached. The modified instrument was then tested with a small group of postgraduate students for clarity before use. Several minor changes were made. The final version of the measurement scales is shown in Table 1.

Table 1: *Measurement Scales*

Construct	Items
Intention to Transact	Assuming I have access to the system, I intend to use it. Given that I have access to the system, I predict that I would use it. It is likely that I will transact with this system in the near future.
Perceived Usefulness	Using the system improves my performance in my purchasing. Using the system increases my productivity in purchasing. Using the system enhances my effectiveness in purchasing. I find the system to be useful in my purchasing.
Perceived Ease of Use	Learning to operate the system will be easy for me. I find it easy to get the system to do what I want it to do. It is easy for me to become skilful at using the system. I find the system easy to use.
Perceived Risk	Overall, I am concerned about experiencing some kind of loss if I transact with this system.

	All things considered, I think I would be making a mistake if I use this system to make a transaction. Transacting with the online system would pose problems for me that I just don't need. How would you characterise the decision of whether to transact with this system? (Scale: 'very insignificant risk' to 'very significant risk') How would you characterise the decision of whether to transact with this system? (Scale: 'very positive situation' to 'very negative situation') How would you characterise the decision of whether to transact with this system? (Scale: 'very high potential for gain' to 'very high potential for loss')
Propensity to Trust	It is easy for me to trust a person/thing. My tendency to trust a person/thing is high. I tend to trust a person/thing, even though I have little knowledge of it. Trusting someone or something is not difficult.
Third Party Recognition Trust	I believe third party recognition is doing a good job in protecting users of this system. Existing third party recognition bodies are adequate for the protection of users of this online service. Overall, I have confidence in the third parties that certify the security of this system.
Legal Framework Trust	The existing law is adequate for the protection of interests of those relying on this online service. The existing legal framework is adequate for the protection of interests of those relying on this online service. Overall, I have confidence in the legal framework that governs my interaction with this system.
Technology Trust	I believe the technologies supporting the system are reliable all the time. I believe the technologies supporting the system are secure all the time. Overall, I have confidence in the technology used by the retailer to operate this system.
Retailer-Ability Trust	The retailer has the ability to reliably process transactions made over the Internet. The retailer has sufficient expertise and resources to do business on the Internet. The retailer has adequate knowledge to manage their Internet business.
Retailer-Integrity Trust	I believe the retailer is honest with their consumers. I believe the retailer acts sincerely in dealing with customers. I believe the retailer is concerned about consumer privacy. I believe the retailer keeps promises and commitments. I believe the retailer can be trusted to keep my best interest in mind. I am confident that this retailer will not disclose consumer private information to unauthorised parties.

A set of open-ended questions was also included on the questionnaire (see Table 2) to capture any important trust and risk beliefs affecting consumers' intention to transact online, which were not included in our proposed model. Multiple questions were included since individual questions have considerable measurement error that makes them unreliable.

Table 2: *Open-ended Questions*

Questions
In general, if a product / service is available both online and offline, and you want to buy it, would you prefer to transact online? Why? Please explain.
In general, do you see any risks with transacting online? If you do, what risks do you see?
If you don't transact over the Internet frequently, what is stopping you?
Any other comments with regards to your impresson of trust and the web site examined?

4. Quantitative Results

The proposed model was tested using the Partial Least Squares (PLS) approach (using PLS-Graph version 3.0). A single run of PLS-Graph would produce data for assessing both the measurement model and the structural model.

Evaluating the Measurement Model

The means and standard deviations for the items in the measurement model are shown in Table 3. Except for perceived ease of use, the means of all responses are close to neutral. These results are as expected since the subjects have extensive experience in using computers and the Internet. Standard deviations for all responses are in the range 1.22 to 1.78, indicating that there were no problems with floor or ceiling effects.

All constructs to indicators loadings were significant ($p < 0.01$). The t-statistics presented in Table 3 were generated using the Jackknife resampling procedure. All the loadings are above 0.60, an acceptable benchmark suggested by Chin (1998).

The composite reliability and average variance extracted (AVE) for each construct are used to assess the reliability of the constructs. These are presented in Table 4. The accepted value for composite reliability is 0.70 or higher (Thompson et al, 1995). Thus, all constructs show a high degree of internal consistency. AVE is another reliability measure used in PLS analysis. It reflects the overall amount of variance in the items accounted for by the latent construct (Cheung and Lee 2000). AVE is a more conservative measure than composite reliability, thus, Fornell and Larcker (1981) suggested the acceptable value of AVE to be 0.50 or higher. As shown in Table 4, all constructs meet this criterion.

AVE can also be used to evaluate discriminant validity (Fornell and Larcker 1981). To fully satisfy the requirements for discriminant validity, the square root of AVE for each construct should be greater than the correlations between the constructs and all the other constructs. These results are presented in Table 5. The data clearly shows the correlations between the constructs to be less than the square root of AVE of their respective constructs.

Table 3: *Descriptive Statistics and Psychometric Properties of Measurement Scales*

Construct	Items	Mean	Standard Deviations	Weights	Loadings	Loadings t-statistics
Intention to Transact	ITTa	4.20	1.54	0.3557	0.9182	42.1339
	ITTb	4.24	1.56	0.3974	0.9331	74.9492
	ITTc	3.65	1.72	0.3613	0.8377	27.9325
Perceived Usefulness	PUa	4.55	1.44	0.3130	0.8305	28.6352
	PUb	4.56	1.43	0.2192	0.7295	11.3530
	PUc	4.71	1.36	0.3246	0.8851	28.7366
	PUd	4.74	1.38	0.3532	0.8292	29.1595
Perceived Ease of Use	PEOUa	5.66	1.41	0.2793	0.8890	28.0139
	PEOUb	5.45	1.24	0.3254	0.9220	61.6355
	PEOUc	5.45	1.44	0.2451	0.8720	20.2457
	PEOUd	5.50	1.39	0.2638	0.9019	30.0308
Perceived Risk	PRa	4.23	1.78	0.1806	0.7838	20.7296
	PRb	3.44	1.52	0.2259	0.7909	18.9047
	PRc	3.77	1.66	0.2149	0.7992	20.4772
	PRd	3.84	1.57	0.1885	0.7859	18.597
	PRe	3.70	1.24	0.2172	0.6853	9.6986
	PRf	3.84	1.31	0.2775	0.7603	19.4558
Technology Trust	TTa	3.47	1.50	0.3404	0.8782	31.6365
	TTb	3.20	1.39	0.3478	0.9099	41.8557
	TTc	3.75	1.42	0.4239	0.9072	54.1842
Retailer-Ability Trust	RATa	4.34	1.34	0.3662	0.8904	31.0835
	RATb	4.44	1.29	0.3599	0.9252	50.8567
	RATc	4.47	1.25	0.3633	0.9387	76.8526
Retailer-Integrity Trust	RITa	4.61	1.27	0.1990	0.8562	11.7019
	RITb	4.64	1.27	0.2052	0.8755	33.5464
	RITc	4.64	1.22	0.2271	0.8560	32.9146
	RITd	4.26	1.25	0.1770	0.7050	25.3117
	RITe	4.35	1.37	0.2326	0.7724	18.1552
	RITf	4.01	1.49	0.2193	0.6890	13.4447
Third Party Recognition Trust	TPRTa	4.44	1.18	0.4125	0.8721	30.8869
	TPRTb	4.00	1.28	0.3418	0.7942	14.7526
	TPRTc	4.07	1.34	0.4106	0.8982	36.8295
Legal Framework Trust	LTa	3.44	1.38	0.3347	0.9680	157.5096
	LTb	3.54	1.35	0.3524	0.9666	130.6571
	LTc	3.56	1.39	0.3522	0.9526	100.9647
Propensity to Trust	PTTa	3.61	1.53	0.3110	0.9083	45.0218
	PTTb	3.76	1.54	0.3497	0.9103	33.2020
	PTTc	3.12	1.61	0.2693	0.8304	19.0713
	PTTd	3.66	1.57	0.2290	0.7663	12.4490

Based on the above results, convergent validity, discriminant validity and reliability of the constructs and their indicators have been demonstrated. To further confirm the

validity and reliability of the constructs, the data were also submitted to an exploratory factor analysis using SPSS for Windows Release 11.0.0.

Principal component analysis, varimax rotation was applied to the entire data set. A ten-component solution was identified. All items loaded on their hypothesized factors and the overall factor solution has an excellent loading pattern explaining 77% of the variation.

Although Chin and Gopal (1995) suggested composite reliability to be a better estimate for internal consistency than Cronbach's alpha, Cronbach's alphas were also calculated to further confirm the internal consistency of the constructs, these are also shown in Table 4. All Cronbach's alpha values are above 0.70, thus, demonstrating internal consistency (Nunnally 1967).

Table 4: *Composite Reliability, AVE and Cronbach's Alpha for Constructs*

Construct	**Composite reliability**	**Average variance extracted (AVE)**	**Cronbach's alpha**
Intention to Transact (ITT)	0.925	0.805	0.8736
Perceived Usefulness (PU)	0.891	0.673	0.8378
Perceived Ease of Use (PEOU)	0.942	0.803	0.9170
Perceived Risk (PR)	0.896	0.591	0.8629
Technology Trust (TT)	0.926	0.807	0.8805
Retailer-Ability Trust (RAT)	0.942	0.843	0.9056
Retailer-Integrity Trust (RIT)	0.911	0.633	0.8774
Third Party Recognition Trust (TPRT)	0.891	0.733	0.8161
Legal Framework Trust (LT)	0.974	0.926	0.9600
Propensity to Trust (PTT)	0.916	0.733	0.8768

Table 5: *Correlations between Constructs (Diagonal Elements are Square Root of AVE)*

	ITT	PU	PEOU	PR	TT	RAT	RIT	TPRT	LT	PTT
ITT	**0.897**									
PU	0.517	**0.820**								
PEOU	0.124	0.274	**0.896**							
PR	-0.389	-0.220	-0.138	**0.769**						
TT	0.205	0.292	0.046	-0.343	**0.899**					
RAT	0.144	0.223	0.190	-0.338	0.515	**0.918**				
RIT	0.033	0.337	0.192	-0.232	0.344	0.564	**0.796**			
TPRT	0.277	0.258	0.233	-0.491	0.378	0.437	0.379	**0.856**		
LT	0.204	0.209	0.083	-0.343	0.466	0.415	0.341	0.450	**0.962**	
PTT	0.026	0.064	0.020	-0.198	0.140	0.122	0.224	0.182	0.217	**0.856**

Evaluating the Structural Model

The path coefficients for the model, generated using PLS, are presented in Figure 2. The stability of the estimates was tested using the Jackknife resampling technique, which calculated the significance levels of the coefficients (Chin and Newsted 1999).

Overall, the tests showed significant support for our model and the amount of variance in the dependent latent variables explained by the model was moderately high. The model explained 21% of the variance in perceived risk and 35% of the variance in intention to transact.

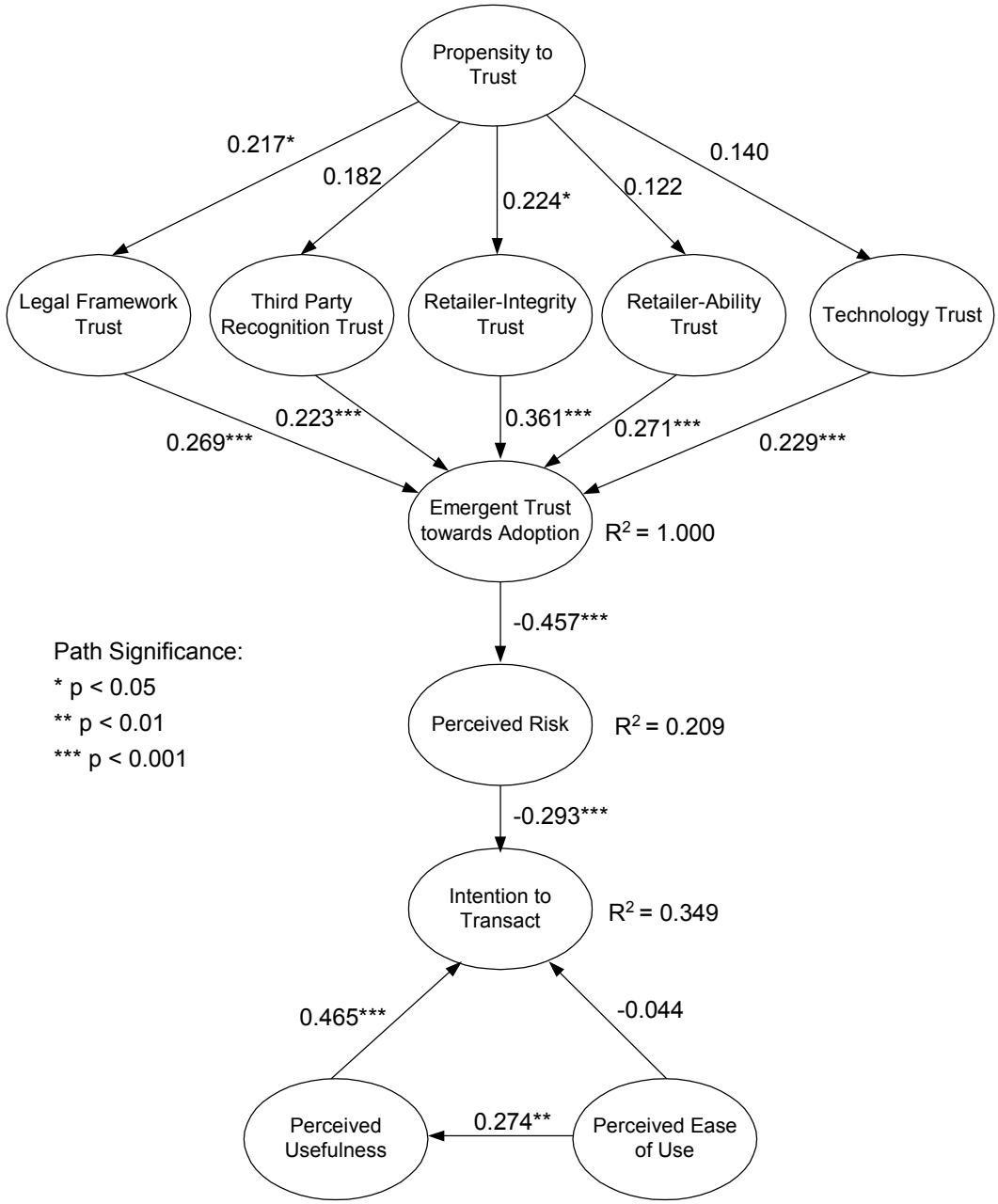

Figure 2: *Results of PLS Analysis – Structural Model*

From the results, it can be seen that the positive relationship between perceived ease of use and intention to transact was not supported. Similarly, the relationship between propensity to trust and the five trust dimensions were positive, but only two of the five paths were statistically significant.

All the standardized path coefficients that are statistically significant exceed 0.2, which is the suggested minimum standard by Chin (1998) for paths to be considered meaningful.

Thus, the overall fit of the model is good. Competing models were also tested to further validate the proposed relationship between trust, intention to transact, and the mediator perceived risk. Positive tests were found, but are excluded from the discussion in this paper.

Relative Importance of the Trust Dimensions

To determine the relative importance of the trust dimensions, the absolute values of the standardized betas on the paths connecting the second-order factor and the first-order trust factors are compared to one another (Chin and Gopal 1995). Results of the compositional analysis for the different trust dimensions are shown in Table 6. Trust on the retailer's integrity appears to be the most important trust dimension, accounting for 27% of the effect size.

Table 6: *Relative Importance of the Trust Dimensions*

Trust Dimension	**Relative Importance***
Retailer-Integrity Trust	27
Retailer-Ability Trust	20
Legal Framework Trust	20
Technology Trust	17
Third Party Recognition Trust	16
*Ordered from most to least important. Adds up to 100 within rounding errors.	

5. Qualitative Results

Qualitative data were also gathered using the open-ended questions on the questionnaire. This data is used to evaluate the proposed model, assist in the interpretation of the quantitative findings, and to provide a richer picture of the participants' decision-to-adoption process.

As individual questions have measurement bias, four questions were included to capture this information. Since the same participant may express the same idea in different questions, answers to the four questions for each participant were combined into a single unit of analysis.

The set of responses were classified into appropriate categories. The classification scheme was developed with consideration of the focus of the study and was reviewed by subject experts for appropriateness until a consensus is reached. The classification scheme covers both the participants' concern to online shopping and the perceived enablers of online shopping.

Data were coded such that each participant was delineated as either stating (1) or not stating (0) a particular category of response across his or her answers for the four open-ended questions. Table 7 and Table 8 show the number of responses in each category.

As shown in Table 8, the most common concern amongst the participants was the lack of security, mentioned by over 83% of the participants. The next two concerns following the lack of security are the inconvenience of online shopping and privacy issues, mentioned by 46.6% and 40.6% of the participants respectively. The lack of incentives for transacting online (22.6%) and the lack of trust in the retailer's integrity excluding privacy infringements (11.3%) were the other concerns identified.

Two main factors that would encourage the use of B2C EC systems were also identified – the perceived relative advantage of transacting online over other distribution channels (27.1%) and the perceived reputation of the web retailer (12.0%).

Table 7: *Classification Scheme for General Online Shopping Enablers*

Classification categories (in bold) and sub categories	Number of responses*	Percentage of sample
Perceived relative advantage	**36**	**27.1**
• Increase performance	31	23.3
• Cheaper goods / services	10	7.5
• Greater range of choices	2	1.5
Perceived reputation of the web retailer	**16**	**12.0**
• Company brand name	14	10.5
• Other customers positive experience	2	1.5
* Total in category may not be equal to the sum of sub-categories since a single participant may have multiple concerns under the same category		

Table 8: *Classification Scheme for General Online Shopping Inhibitors*

Classification categories (in bold) and sub categories	Number of responses*	Percentage of sample
Security perceptions	**111**	**83.5**
• Unauthorized access to customer information	49	36.8
• Trust in the reliability and security of e-business systems	22	16.5
• General security concerns	46	34.6
Inconvenience of online shopping	**62**	**46.6**
• Potential problems with delivery (include order fulfillment and damaged goods)	27	20.3
• Unable to feel or see actual goods to assess quality	35	26.3
• Time delay with order fulfillment	22	16.5
• Lack of face-to-face interaction with the retailer	3	2.3
• General difficulties or hassles with online shopping	15	11.3
Privacy perceptions – Infringement by online retailers	**54**	**40.6**
• Sharing (selling, renting) personal information to other companies	21	15.8
• Storing user profiles and shopping habits	5	3.8
• Being contacted by merchants without consent	4	3.0
• General privacy concerns	27	20.3
Lack of incentives to shop online	**30**	**22.6**
• Price is not lower than offline	16	12.0
• Don't see the need to shop online	16	12.0
• Enjoy the offline shopping experience	12	9.0

• There are social reasons to shop offline	2	1.5
Lack of retailer-integrity trust (exclude privacy infringement)	**15**	**11.3**
• Retailer's identity unknown	4	3.0
• General lack of trust in the integrity of the retailer	11	8.3
Legal concerns	**6**	**4.5**
• Laws for protecting online consumers is unclear	6	4.5
Miscellaneous	**17**	**12.8**
• General lack of trust	8	6.0
• Other (uncategorized responses)	9	6.8
* Total in category may not be equal to the sum of sub-categories since a single participant may have multiple concerns under the same category.		

6. Discussion

Like previous TAM-related studies, quantitative methods were used to test the proposed model in a specific context. In this case, a specific instance of online transaction system adoption was examined. In an attempt to evaluate the applicability of the proposed model for different online transaction systems, the participants' perception of online transactions in general, were also captured using open-ended questions and follow-up group discussions. While the initial expectation is that the results from this analysis will be consistent with the relationships proposed in the model, any inconsistencies would highlight the limitations of our model and the factors it does not address. This is the essence of the triangulation strategy adopted in this study. By comparing and contrasting the results gathered from multiple perspectives using different research methods, whether the data converge, diverge, or are contradictory, the technique provides a richer picture of the social phenomenon being studied.

Content analysis of the open-ended questions reveals six major concerns and two major enablers to the use of B2C EC. These are shown in Table 7 and Table 8. Although these factors do not map directly to the factors included in our proposed model, examining the details of the classification scheme shows overlaps. These findings are discussed next.

'Perceived relative advantage' with transacting online, mentioned by 27% of the participants, was identified to be the main reason for why the participants would consider transacting online. The identified advantages include an increase in purchasing performance and the availability of cheaper items online. Since the perceived usefulness construct in TAM focuses on the increase in purchasing performance, these results may suggest the need to extend TAM to incorporate other perceived benefits such as cost savings, when applied in the B2C EC context.

The perceived reputation of the retailer was found to be another important attribute that has a positive effect on the participants' decision to shop online. In Jarvenpaa et al. (1999), the perceived reputation of the web retailer is proposed to be an antecedent to consumers' trust towards the web retailer. Comments from several participants supported this viewpoint (the web retailer examined is denoted by Company X):

> *"[Company X] is a popular brand name in any case, so there is almost a presumption of trust."*
>
> *"I believe that trust is established by how well established the company is."*

It is outside the scope of this study to examine the antecedents to trust. Therefore, the qualitative results do not deviate from the theory proposed in our model.

Amongst the major concerns with online shopping in general, concerns over the lack of security were mentioned by most of the participants, with 83.5% of the participants making reference to it. In this study, concern over the reliability and security of the system overlaps with the technology trust construct in our model. However, it is uncertain whether all the security concerns are reflected by the technology trust construct as expected. Since the quantitative analysis shows the importance of the technology trust construct to be relatively low, and the qualitative analysis shows concern over security to be relatively high, if our assumption is correct, the two sets of results seems to deviate.

An in-depth examination of the qualitative data was performed in an attempt to find an explanation for this discrepancy. In the group discussions with the participants regarding their perception of security, interesting comments relating trust and perceived security control were found:

> *"I trust the technology to transfer the information across the Internet securely. But once its get there, it's probably processed manually. If you don't trust the company handling the credit card details, you wouldn't trust the site as well."*
>
> *"I trust the technology to provide the security, but not the companies that are using it"*

The above comments suggest that there are two dimensions of trust that determine an individual's security perceptions towards a specific online transaction – trust in the technology and trust in the retailer's ability to process the transaction securely. The comment also suggests perceived security control to be a concern that extends beyond the time of the transaction. First, trust in the technology is required at the time when the transaction is made. After the information is sent, trust in the retailer and the technology to handle the information, are both important when assessing the security of the transaction.

Clearly, the relative importance of technology trust should not be used as a sole indicator for the relative importance of perceived security control in the decision-to-adoption process. If the quantitative results on the relative importance of technology trust and retailer-ability trust (in Table 6) were combined, the quantitative and qualitative results are likely to converge.

At a conceptual level, our proposed model attempts to integrate the concepts of trust and risk with the Technology Acceptance Model (TAM). To keep the granularity of the constructs consistent, perceived security control should not be included in the model explicitly, but may be viewed as a function of technology and retailer-ability trust.

The inconvenience of online shopping and the lack of incentives to shop online are two other factors that negatively affect participants' intention to shop online. Both of these factors are also closely related to the concept of perceived relative advantage defined by Rogers (1983), where an innovation is more likely to be adopted if it is perceived to be better than the idea it supersedes. The inconveniences with shopping online, the lack of incentives to shop online, and the relative advantage of shopping online can be conceptualized as a continuum reflecting the perceived relative advantage construct in the 'Diffusion of Innovations' theory (Rogers 1989). Thus, the results show strong support for the need to incorporate this construct in models explaining B2C EC usage intentions.

The remaining factors, including concerns over privacy infringements, the retailer's integrity and the legal framework, are already included in the trust constructs in our proposed model.

7. Conclusion

A key criticism of much of the current literature concerns the oversimplification of the trust concept, which is often viewed as a singular notion (Farrell et al, 2002). In response to this criticism, exploring the multidimensional nature of trust in B2C EC adoption is the main objective and primary contribution of this research. This research represents an initial attempt to define the concepts, and describe the relationships between the multiple dimensions of consumer trusts, their risk perceptions and intention to transact with B2C EC systems.

In this discussion, we claim that the proposed model (TRiTAM) explains the role of trust and risk perceptions in B2C EC adoption adequately. An increase in consumer trust was found to be associated with a reduction in perceived risk in B2C EC transactions. In addition, the results supported the proposed negative relationship between perceived risk and intention to transact. Following TAM, the results also supported the proposed positive relationship between perceived usefulness and intention to transact. However, there were no evidence showing a direct effect between perceived ease of use and intention to transact. Findings in Gefen and Straub (2000) can justify this observation. In this particular case, perceived ease of use has no effect on intentions to transact because system ease of use is not an inherent quality of the purchased product.

Amongst the multiple dimensions of trust, trust on the retailer's integrity appears to be the most important in the formation of an individuals' overall trust towards the use of a B2C EC system. The other four dimensions are also found to be important determinants of perceived risk. Surprisingly, the proposed positive relationship between propensity to trust and the five trust dimensions identified in this study was not fully supported. Future research should investigate the role of individuals' propensity to trust in B2C EC adoption in greater detail.

While it is beyond the scope of this study to examine other factors affecting consumers' intention to transact online, several new insights were found, such as the importance of the 'perceived relative advantage' construct in the decision-to-adoption process, and the conceptual relationship between trust and perceived security control. The significance of trust and risk perceptions, coupled with the other findings, clearly suggest the need to extend TAM when used in the B2C EC context.

The present research has several limitations that should be noted. The first is the generalisability of the findings outside the current research context. For example, results may vary if the data were collected from a different sample. Second, the results and implications of this research are constrained by the cross-sectional nature of this study. In particular, the validity of the causal relationships in the proposed model was not tested through experimental manipulation of theoretical constructs, but is limited to inferences based on a detailed review of the literature and the data collected. Future research should adopt a longitudinal or randomized experimental approach in testing the robustness of the proposed model.

In conclusion, user acceptance of B2C EC systems remains a complex and dynamic phenomenon in information systems research. This research has provided a number of contributions to this domain of knowledge, in particular, the development of TRiTAM. It is recommended that future studies should test the robustness of the proposed model in different contexts, and to extend our understanding, incorporate other factors affecting B2C EC adoption to the model.

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