Influence of Transaction Trust in B2B e-Marketplaces: An Investigation of Tan and Thoen's Views

Ying-Wei Shih, Sheng-Cheng Lin, and Yu-Lin Ke

***Abstract*—Tan and Thoen proposed a generic model of trust for e-commerce in which transaction trust combines party trust and control trust. The purpose of this study is to assess the influence of party trust and control trust on risk perception and exchange behavior in B2B e-marketplaces. The authors modeled party trust and control trust as higher-order formative constructs; they then developed a partially mediated research model to show how these two forms of trust influence perceived risk, information sharing, and transaction. The research model was tested on a sample of 82 manufacturing enterprises having experience in B2B e-marketplaces using Partial Least Squares. The results show that party trust negatively influences perceived risk, that control trust positively influences information sharing, that perceived risk negatively influences information sharing, and that information sharing positively influences transaction. Information sharing acts as the mediator between trust and transaction. E-marketplace operators should supply all participants with various tools and channels for sharing transaction-related information.**

***Index Terms*—Party trust, control trust, B2B e-marketplace, generic model of trust.**

I. Introduction

Business-to-business (B2B) e-commerce accounts for the largest percentage of all e-commerce [1], and more than half the B2B e-commerce transactions take place in e-marketplaces [2]. Although on the surface e-marketplace platforms may appear promising, research has raised several issues. White *et al.* [3] reported on a famous e-marketplace that experienced difficulties and on several now closed e-marketplaces that were once well known, while O'Reilly and Finnegan [4] observed that e-marketplaces appear to have a high failure rate.

The literature has indicated that the low use/adoption rate by businesses is the primary reason for e-marketplace failure [5]. Unfortunately, the available statistics for e-marketplace adoption paint a troubling picture. The European Commission reported that 11% of the organizations in Europe have used e-marketplaces and that adoption rates vary from industry to industry, ranging from a high of 32% for the transportation industry to a low of 4% for textiles [3]. Research by The Internet and Mobile Association of India and *estatsindia.com* found that the e-marketplace adoption rates among the Micro, Small and Medium Enterprises in India range from 10-20% for the automotive, consumer goods, and computer industries, to 25-30% for pharmaceuticals, metals, textiles, agricultural products, chemicals, and telecommunications [6]. In China, only 28% of the small and medium enterprises have used third-party e-commerce platforms [7]. In Taiwan, where this study was conducted, the rate of e-marketplace use/adoption among enterprises is 23.5% [8]. In sum, low use/adoption rates for e-marketplaces appear to be a worldwide industrial phenomenon.

Trust has been widely recognized as an essential factor in e-marketplace use/adoption [4] and [9]. Organizations can employ trust to manage complexity and uncertainty of online exchanges [10]. Tan and Thoen [11] proposed a generic model of trust for e-commerce, arguing that transaction trust combines trust in the other party in a transaction (party trust) and trust in the control mechanisms applied to the transaction venue (control trust). In their model, party trust is subjective; perceived party trust can vary from enterprise to enterprise. Additionally, the influence of party trust is both actional and informational; the level of party trust could determine the extent to which an enterprise has confidence in the actions the trustee performs and in the information the trustee provides. Control trust is subjective as well, though a control mechanism is objective in and of itself. Additionally, control trust is an essential need when party trust is insufficient. Tan and Thoen also proposed objective and subjective reasons for both party trust and control trust: objective reasons are social indicators, whereas subjective reasons are personal experience, understanding, and communality.

Tan and Thoen's approach appears to be useful in providing insights into e-marketplace use/adoption since it incorporates multiple forms of and reasons for trust. To the best of our knowledge, there is little research dealing with the roles of those trust reasons in forming trust and with the influence of party trust and control trust in the context of B2B e-commerce. This scarcity, along with the importance of e-marketplaces, motivated this study.

Based on Tan and Thoen's views on trust for e-commerce, the present study addresses the following questions: *In B2B e-marketplaces,*

- What are the ingredients of party trust and control trust?
- What are the relationships between party trust, control trust, risk perceptions, and exchange behavior (information sharing and transaction)?

To provide answers, this study (1) models party trust and control trust as higher-order formative constructs and

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identifies the components of these two forms of trust; (2) proposes a partially mediated research model to delineate how party trust and control trust influence an enterprise's exchange behavior directly and indirectly through risk perception; and (3) tests the research model with a component-based structural equation modeling technique called Partial Least Squares.

The remainder of this paper is organized as follows: Section II elucidates the specifications for party trust and control trust, the research model, and the research hypotheses. Section III explains the research methodology. Section IV provides the results of model testing. Section V discusses implications, limitations, and future research.

II. Conceptual Development

In the following sub-sections, we first identify the vital ingredients of each form of trust based on the reasons for trust (social indicators, personal experience, understanding, and communality) and then put forward the research model and research hypotheses.

A. Party Trust

Not all of the trust reasons are applicable to party trust in the context of B2B e-marketplaces. For example, an enterprise may not have full knowledge of others' objectives and intentions [11], rendering the reason *understanding* irrelevant. In addition, the *social indicators* in an e-marketplace are typically credentials or a "seal of approval" issued by the operator or other third-party institutions to the participants. An enterprise does not trust other participants displaying such social indicators unless it believes that the certification systems are effective. The perceived effectiveness of such systems should fall into the category of control trust.

Adapted from Tan and Thoen [11], *personal experience* refers to an enterprise's knowledge of other participants' trustworthiness gained from previous interactions. Similar viewpoints underlining the importance of personal experience in trust formation can be found in Beldad *et al.* [12], arguing that people typically place their trust in those who have demonstrated their trustworthiness in prior contacts. In the field of organizational science, Mayer *et al.* [13] described trustworthiness as a trustor's belief in ability, benevolence, and integrity of the trustees. Pavlou [14], in his focus on B2B e-marketplaces, argued that credibility, a substitute for Mayer *et al.*'s ability and integrity, and benevolence are key dimensions. For simplicity, this study adopts a unitary construct strategy to conceptualize trust-related characteristics of the trustees and proposes that *perceived trustworthiness* represents personal experience.

Communality refers to a sense of belonging[1] developed by participating in a group or community. Tan and Thoen [11] argued that based on such a sense people trust the opinions of other members. For those who intend to exchange online, opinions toward the others, that is, the others' reputations, are essential for building party trust [15]. Information on reputation assists in choosing interaction partners [16]. Social exchange theorists have echoed this point, arguing that reputation is a major source of trust [17] and [18]. This study thus adopts *perceived reputation* to represent communality.

This study models the construct of party trust as a combination of two lower-order constructs: *perceived trustworthiness* and *perceived reputation*. The rationale for taking a formative modeling approach is that those reasons for trust can be visualized as sources or components of an enterprise's trust in the others. An increase in perceived trustworthiness or perceived reputation would cause an increase in party trust, but an increase in party trust would not necessarily accompany an increase in both lower-order constructs, thus meeting the criterion for a formative construct [19]. In the present study, the object of an enterprise's party trust is other e-marketplace participants as a whole; perceived trustworthiness and perceived reputation are operationalized in accordance with this point.

B. Control Trust

For building control trust in B2B e-marketplaces, the present study focuses on *personal experience* because the other three trust reasons are inappropriate. First, an enterprise may lack knowledge of the extent to which other participants rely on the control mechanisms for protection, rendering *communality* irrelevant. Second, an enterprise may not know how the control mechanisms work, rendering *understanding* inapplicable. Third, an enterprise may not know exactly who creates the control mechanisms: the e-marketplace provider/operator, other third-party institutions, or both? Even if it does know, it may not have an adequate understanding of the creator(s). These render *social indicators* unreliable.

Personal experience refers to an enterprise's knowledge of the effectiveness of control mechanisms accumulated through using the e-marketplace. Pavlou [14] proposed five institution-based control mechanisms in an online B2B marketplace:

- Accreditation *assesses an enterprise's qualifications as a competent buyer or seller.*
- Monitoring *keeps an eye on economic activities or events to maintain fair, just, and error-free transactions.*
- Feedback *documents enterprises' experience with a particular trading partner as part of this partner's history and offers a channel of access to the history.*
- Legal bonds *are contracts between buyers, sellers, and third-party institutions which direct transactions.*
- Cooperative norms *are values and beliefs that encourage cooperation among enterprises.*

As with party trust, this study models control trust as a second-order formative construct to obtain an aggregate level of control trust. Pavlou's [14] theory of five institution-based control mechanisms is applied to the development of a specification for control trust. Following Pavlou and Gefen [20], we assess those control mechanisms in terms of their effectiveness as perceived by enterprises.

C. Research Model and Hypotheses

Fig. 1 shows the research model. This model incorporates the constructs of party trust, control trust, risk perception,

[1] A definition of "communality" on *Dictionary.com*, retrieved at 12 August 2010, URL: http://dictionary.reference.com/browse/communality

and trusting outcome. Risk perception refers to an enterprise's subjective assessment of the likelihood of loss or harm [21]. This study adds risk perception because risk is the most salient reason for the usefulness of trust [13]. Trusting outcome refers to exchange behavior. Pavlou and Fygenson [22] argued that adoption of e-commerce cannot be examined as a simple behavior. Hence, this study discusses trusting outcome along two different dimensions: information sharing and transaction.

D. Effects of Party Trust

Social exchange theorists view trust as an essential element in a successful exchange relationship, arguing that trust increases amount of sharing, communication and dependence [23] and [24] and stabilizes the relationship [25]. For economic exchanges between organizations, researchers have drawn on social exchange theory [26] to contend that trust promotes inter-organizational interaction/collaboration, decreases risk perceptions, consolidates commitment, and facilitates relationship continuity [27] and [28]. In the context of online exchanges, trust has been found to diminish expectations of unethical conduct [20] and mitigate concerns about being mistreated by others [29], consequently increasing online sales and online information sharing [30].

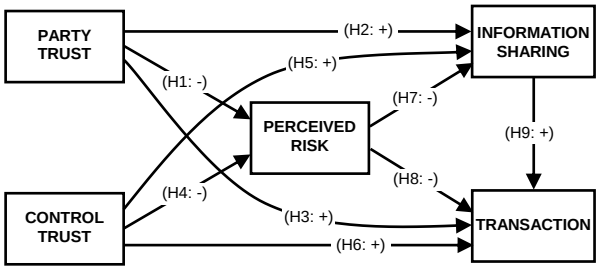

Fig. 1. The research model and hypotheses.

In the current conceptualization, party trust is earned from previous encounters with and the reputation of e-marketplace participants. This form of trust, according to social exchange theorists, decreases decision uncertainty [31] and leads to subsequent risk-taking behaviour [13] and [32]. In the context of B2B e-commerce, trust in the other party has been widely recognized as a key facilitator of cooperation, open communication, and information sharing [9] and [33]. Further, it has been shown to reduce the perception of risk [14], increase purchase intention [34] and [35], and achieve loyalty/continuity [14] and [36]. Therefore, we propose the following hypotheses.

H1: Party trust negatively influences perceived risk.

H2: Party trust positively influences information sharing.

H3: Party trust positively influences transaction.

E. Effects of Control Trust

The control mechanisms investigated in this study, accreditation, monitoring, feedback, legal bonds, and cooperative norms, are institutional regulatory procedures that serve as structural assurances [14]. These mechanisms are meant to ensure the success of transactions through qualification control, behavior control, output control [37] and [38], and social control [39]. Social exchange theorists have argued that an exchange relationship will gradually develop into mutual commitments as long as institutional or contextual structures are in place and enforced [40]. Further, transaction cost economists have argued that regulatory procedures inhibit opportunistic behavior in economic exchanges [24]. In the field of e-commerce, literature has indicated that structural assurances reduce risk perceptions [20], [41] and [42] and increase trusting intentions to give personal information and make purchases [43] and [44].

Control trust reflects enterprise confidence in the control mechanisms [11]. This confidence engenders trust in the platform or website into which those control mechanisms are built, which in turn promotes information sharing [45] and online purchase intentions [46]. The institution-based view of trust by Pavlou [14] contributes to an understanding of another influential aspect of control trust: trust that others are properly monitored. E-marketplace participants who have perceived the effectiveness of control mechanisms may think that others' behavior is properly regulated and that errors, misconduct, and unwanted consequences are minimized. Such an impression would lower perceived risk and alleviate misgivings about exhibiting exchange behavior [42]. We thus hypothesize:

H4: Control trust negatively influences perceived risk.

H5: Control trust positively influences information sharing.

H6: Control trust positively influences transaction.

F. Effects of Risk Perception

When perceiving high transaction risk, an enterprise may hold that loss, both financial and nonfinancial, is possible [47] and may consequently have misgivings about the transaction. These perceptions restrain the enterprise from engaging in activities related to completing the transaction.

The literature has discussed the effects of risk on online exchange relationships. For example, Jarvenpaa and Todd [48] and Pavlou and Gefen [20] proposed that perceived risk breeds unfavorable attitudes toward sellers and stores; Pavlou [49] argued that risk lowers an individual's perceived control over the environment and the performance of his or her behavior, to the detriment of transactions; San Mart ń *et al.* [50] found that transaction risk reduces repeat purchase intention; McKnight *et al.* [21] confirmed that high web risk has a negative effect on consumer intention to share personal information and purchase. Thus, we construct the following hypotheses.

H7: Perceived risk negatively influences information sharing.

H8: Perceived risk negatively influences transaction.

G. Relationship between Information Sharing and Transaction

Information sharing, one manifestation of relational norms, plays the role of safeguard in exchange relationships because it enables buyers and sellers to acquire useful information that may influence their decisions [51]. Researchers have proposed that knowledge/information sharing behavior facilitates virtual community promotion and success [52]. Recent evidence has indicated that searching for/obtaining information has a positive effect on purchase intention in e-commerce [22], [53] and [54]. In B2B e-marketplaces, enterprises willing to share

transaction-related information tend to think that particular relational norms are in place and are more likely to locate or be located by prospective buyers or sellers [53]. These factors increase the likelihood of transaction; therefore:

H9: Information sharing positively influences transaction.

III. Methodology

A. Measurement Development

This study measured the research constructs based on the literature. Accreditation (ACC), monitoring (MON), feedback (FBK), legal bonds (LBD), and cooperative norms (CNM) were adapted from Pavlou [14]. Reputation (REP) was adapted from Jarvenpaa *et al.* [29]. Trustworthiness (TRU) was adapted from McKnight *et al.* [44] and Pavlou [14]. Risk (RIS) and information sharing (IS) were adapted from McKnight *et al.* [21]. Transaction (TR) was adapted from Pavlou and Gefen [20]. All items were arrayed on seven-point scales ranging from "strongly disagree" (1) to "strongly agree" (7). Priori to the field survey, the instrument was pretested by a professor in MIS and by two practitioners; they reviewed the instrument and then gave feedback.

B. Data Collection

Data required for testing the research model were collected from manufacturing enterprises. *China Credit Information Service Ltd.'s Top 1000 Manufacturing Enterprises* was chosen as the sampling frame. Because of their large scale and manufacturing nature, these enterprises should have extensive experience in using B2B e-marketplaces. Further, the volume and variety of their transactions in e-marketplaces tends to be great. These make them more suitable for this study than small manufacturing enterprises and enterprises in the other sectors such as service.

This study adopted a complete sampling strategy; each of the top 1000 manufacturing enterprises received one copy of the research questionnaire via regular mail. The beginning of the questionnaire explained that the survey was about B2B e-marketplaces and that enterprises having experience in using B2B e-marketplaces were eligible to this survey. It also asked the recipient enterprises to distribute this questionnaire to the personnel who were responsible for the purchase or the sale on B2B e-marketplaces. In the end, we received 82 usable responses. Such a low response rate is attributable to the low e-marketplace use/adoption rate among enterprises in Taiwan (23.5%) [8] and to the reluctance of private enterprises to provide information they deem confidential. Table I shows the respondent profile.

C. Non-Response Bias and Common Method Bias Tests

To detect non-response bias, we split the sample into two groups, the early and the late respondents, and compared the profiles of these two groups [55]. The results of the chi-square tests indicate that there is no difference in age of enterprise (p=0.26), number of employees (p=0.09), amount of authorized capital (p=0.41), and transaction volume ratio (p=0.53) between the early and late respondents. Accordingly, there did not appear to be a problem with non-response bias for sample representativeness.

To detect common method bias, we conducted Harman's single-factor test [56] using an exploratory factor analysis. This analysis, into which all items of the research constructs were loaded, produced a multi-factor solution. The first factor accounted for 24.50% of the variance in the loaded items. We thus concluded that common method bias was not a problem in this study.

TABLE I: Profile of Respondents

	n	***%***
Age of enterprises		
Less than 10 year	6	7.3
10 – 20 years	16	19.5
21 – 40 years	45	54.9
More than 40 years	15	18.3
Number of employees		
Less than 100	11	13.4
100 – 300	21	25.6
300 – 500	13	15.9
500 – 1000	19	23.2
More than 1000	18	22.0
Amount of authorized capital (NT$)		
Less than 1 billion	35	42.7
1 – 3 billions	23	28.0
3 – 5 billions	5	6.1
More than 5 billions	19	23.2
Transaction volume ratio (e-marketplace/total)		
Less than 10 %	61	74.4
10 % – 30 %	15	18.3
30 % – 50 %	3	3.7
More than 50 %	3	3.7

IV. Results

Partial Least Squares (PLS), a component-based structural equation modeling technique, was employed to assess the research model because compared with covariance-based technique (e.g., LISREL), PLS allows researchers to prevent statistical identification problems when dealing with formative models [57] and [58]. The software package SmartPLS 2.0 (M3) Beta [59] with a bootstrapping re-sampling procedure was used to provide statistics for validating the measuring instrument and higher-order constructs (the measurement model) and for testing the research hypotheses (the structural model). The results are described below.

A. Measurement Model

The measuring instrument was first analyzed in terms of reliability using the criteria that the Cronbach's α and composite reliability coefficients of each construct should both exceed 0.7 [60]. As Table II shows, all constructs pass this examination except the construct of feedback. The Cronbach's α for feedback is 0.69, which is acceptable. Next, the validity of the measurement was examined. Convergent validity was examined by scrutinizing whether each outer loading exceeded 0.5 [60], each outer loading's t statistic was significant at $p < 0.05$ [61], and each construct's average variance extracted (AVE) was greater than 0.5 [62]. Discriminant validity was examined by checking whether each construct's square root of AVE was greater than its correlations with the other constructs [62]. The figures in Table II, Table III, and Table IV establish both types of validity.

Finally, those formative constructs were assessed using the approach of repeated indicators [63]. This approach, which regresses each indicator of first-order reflective constructs on the second-order formative construct, is deemed appropriate for estimating parameters in a formative measurement model using PLS [64]. The results, shown in Fig. 2, reveal that reputation and trustworthiness are significant components of party trust, and that accreditation, monitoring, feedback, legal bonds, and cooperative norms are significant components of control trust.

TABLE II: RELIABILITY MEASURES FOR PRINCIPAL CONSTRUCTS

	α	CR	AVE
ACC	0.93	0.96	0.88
CNM	0.83	0.90	0.75
FBK	0.69	0.82	0.61
IS	0.82	0.92	0.85
LBD	0.87	0.94	0.88
MON	0.92	0.94	0.80
REP	0.89	0.93	0.82
RIS	0.88	0.91	0.67
TR	0.94	0.96	0.90
TRU	0.95	0.96	0.74

TABLE III: CORRELATIONS BETWEEN PRINCIPAL CONSTRUCTS [a]

	ACC	CNM	FBK	IS	LBD	MON	REP	RIS	TR	TRU
ACC	0.94									
CNM	0.70	0.87								
FBK	0.63	0.61	0.78							
IS	0.29	0.35	0.20	0.92						
LBD	0.68	0.66	0.65	0.12	0.94					
MON	0.86	0.71	0.60	0.32	0.70	0.89				
REP	0.61	0.58	0.52	0.34	0.53	0.74	0.91			
RIS	-0.08	-0.25	-0.12	-0.38	-0.16	-0.22	-0.34	0.82		
TR	0.28	0.44	0.38	0.73	0.25	0.32	0.40	-0.29	0.95	
TRU	0.72	0.75	0.54	0.25	0.64	0.79	0.79	-0.21	0.30	0.86

[a]: The main diagonal shows the square root of AVE.

TABLE IV: OUTER LOADINGS FOR EACH MEASUREMENT ITEM

Constructs (construct codes) / Item codes: Measurement items		Outer Loadings
Accreditation (ACC)		
ACC1:	The e-marketplace makes an effective evaluation and selection of prospective buyers and sellers	0.95***
ACC2:	The e-marketplace undertakes a thorough screening process before buyers and sellers are allowed to transact in it	0.94***
ACC3:	The e-marketplace makes a substantial effort to assess buyers' and sellers' transactional competencies	0.93***
Monitoring (MON)		
MON1:	The e-marketplace is capable of monitoring all buyers and sellers	0.86***
MON2:	The e-marketplace is capable of resolving transaction conflicts	0.90***
MON3:	The e-marketplace is capable of assuring that all products are in accordance with the posted specifications	0.92***
MON4:	The e-marketplace is capable of assuring that all transactions are conducted properly	0.89***
Feedback (FBK)		
FBK1:	The transaction history of most participants is available from the e-marketplace	0.83***
FBK2:	If any buyer/seller misconducts or commits an error in a transaction, the e-marketplace is capable of informing the seller/buyer.	0.87***
FBK3:	The e-marketplace provides a space (e.g., bulletin board, online forum, etc.) to allow participants to publicize their transaction experience with others	0.63***
Legal bonds (LBD)		
LBD1:	The e-marketplace imposes formal agreements that detail buyers' and sellers' responsibilities and obligations	0.94***
LBD2:	Participating in the e-marketplace implies that sellers have formal contractual agreements with buyers	0.94***
Cooperative norms (CNM)		
CNM1:	The e-marketplace promotes cooperative norms to resolve any transaction disputes	0.83***
CNM2:	The e-marketplace participants rarely take advantage of their transaction partners	0.87***
CNM3:	Most e-marketplace participants are willing to make cooperative adjustments to transact successfully	0.90***
Reputation (REP)		
REP1:	The e-marketplace participants are well known	0.84***
REP2:	The e-marketplace participants have a good reputation	0.95***
REP3:	The e-marketplace participants are respected in their industries	0.92***
Trustworthiness (TRU)		
TRU1:	The e-marketplace participants care for their transaction partners' welfare	0.84***
TRU2:	The e-marketplace participants act in their transaction partners' best interests	0.85***
TRU3:	The e-marketplace participants would make an appropriate concession to their transaction partners	0.77***
TRU4:	If my company needs help, the e-marketplace participants will do their best to provide help	0.86***
TRU5:	The e-marketplace participants are sincere in dealing with their transaction partners	0.92***
TRU6:	Promises made by the e-marketplace participants are reliable	0.89***
TRU7:	Information provided by the e-marketplace participants is correct	0.88***
TRU8:	The e-marketplace participants are honest with their transaction partners if problems occur	0.90***
Risk (RIS)		
RIS1:	Entering company's basic information (e.g., address, phone number, etc.) in the e-marketplace is unsafe	0.83***
RIS2:	Entering information about the products/services my company wants to buy/sell (e.g., specification, quantity, unit price, etc.) in the e-marketplace is risky	0.78***
RIS3:	My company hesitates to enter its basic information (e.g., address, phone number, etc.) in the e-marketplace	0.79***
RIS4:	My company hesitates to enter information about the products/services it wants to buy/sell (e.g., specification, quantity, unit price, etc.) in the e-marketplace	0.85***
RIS5:	My company hesitates to transact business in the e-marketplace	0.85***
Information sharing (IS)		
IS1:	My company is willing to provide basic information (e.g., address, phone number, etc.) to e-marketplace participants	0.94***
IS2:	My company is willing to provide information about the products/services it wants to buy/sell (e.g., specification, quantity, unit price, etc.) to e-marketplace participants	0.91***
Transaction (TR)		
TR1:	Given the need, my company is willing to conduct transactions in the e-marketplace	0.94***
TR2:	Given the chance, my company would consider carrying on trade in the e-marketplace	0.96***
TR3:	My company is willing to transact business with e-marketplace participants	0.94***

***: $p < 0.01$

B. Structural Model

After validating the measurement model, we tested the structural model. All the paths in the research model, which correspond to the proposed hypotheses, were estimated simultaneously. Table V provides the results. Among the

nine hypotheses, five (H1, H5, H6, H7, and H9) are supported, while the other four (H2, H3, H4, and H8) are not. The results indicate that information sharing has a positive impact on transaction (H9; $\beta = 0.68$; $p < 0.01$), that perceived risk has a negative impact on information sharing (H7; $\beta = -0.33$; $p < 0.01$), that party trust has a negative impact on perceived risk (H1; $\beta = -0.32$; $p < 0.01$), and that control trust has positive impacts on information sharing (H5; $\beta = 0.25$; $p < 0.01$) and on transaction (H6; $\beta = 0.16$; $p < 0.1$). Explained variances for each endogenous construct are 0.07 for perceived risk, 0.21 for information sharing, and 0.56 for transaction. Total effects of exogenous constructs on endogenous constructs are -0.32, 0.11, and 0.07 of party trust on risk, information sharing, and transaction, respectively, and 0.25 and 0.17 of control trust on information sharing and transaction, respectively.

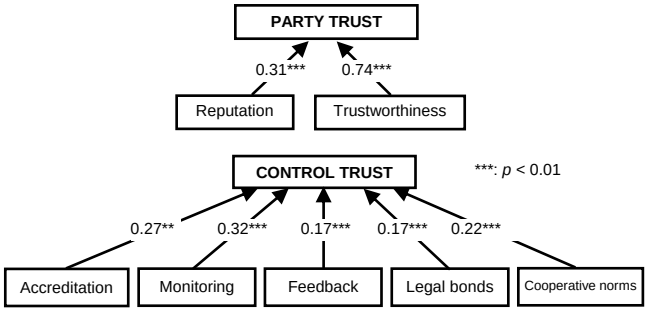

Fig. 2. Estimations of higher-order formative constructs.

TABLE V: PATH COEFFICIENTS

Structural paths	Path coefficients	*t*-values
H1 Party trust → perceived risk	-0.32	2.82***
H2 Party trust → information sharing	0.01	0.04
H3 Party trust → transaction	0.02	0.22
H4 Control trust → perceived risk	0.06	0.50
H5 Control trust → information sharing	0.25	2.77***
H6 Control trust → transaction	0.16	1.73*
H7 Perceived risk → information sharing	-0.33	5.26***
H8 Perceived risk → transaction	0.01	0.13
H9 Information sharing → transaction	0.68	9.77***

*: $p < 0.1$; ***: $p < 0.01$

V. DISCUSSION

This study assesses Tan and Thoen's [11] views on trust in the context of B2B e-marketplaces. From a theoretical perspective, it offers several contributions:

- Most cyber-trust studies have examined a single form of trust as the antecedent, or a single type of trusting behavior as the outcome. In our study, the antecedent side comprises an enterprise's trust in the e-marketplace participants (party trust) and trust in the control mechanisms (control trust), and the outcome side comprises information sharing and transaction. Omitting any of these constructs for either side may lead to an incomplete understanding of the relationship between trust and enterprise behavior in B2B e-marketplaces.
- *Modeling* party trust and control trust as higher-order formative constructs allows the researchers to comprehend multiple facets of each form of trust. This approach also enables the researchers to explore the relative importance of those ingredients or sources of trust. The results are helpful in explaining the rationale for trust formation.
- This study has developed a partially mediated research model. This model renders the present work viable for *simultaneously* probing into the direct and indirect effects of trust on trusting behavior in B2B e-marketplaces.

A. Implications

The results prove that reputation, trustworthiness, accreditation, monitoring, feedback, legal bonds, and cooperative norms are significant components of their respective higher-order constructs of trust. This supports the applicability of the viewpoints of social exchange, organizational control, and institution-based trust to B2B e-marketplaces. Trustworthiness and monitoring top the lists of significant sub-constructs for party trust and control trust, respectively. The former suggests that e-marketplace providers/operators trigger mechanisms for encouraging the participants to act in good faith, so as to make prospective buyers and sellers believe that trustworthiness is part of the character of the participants, which in turn results in a higher level of party trust. The latter demonstrates that an effective monitoring system targeted on the process and outcome of buyer-seller interactions contributes the most to control trust.

Party trust is found to decrease risk perception. However, the effect of control trust on this perception is not supported in our study. The reason why control trust fails to decrease perceived risk may be that effective control mechanisms do not necessarily guarantee the absence of errors and opportunistic conduct. Party trust represents a subjective belief in a trustworthy community of buyers and sellers and consequently serves to decrease perceived risk.

When information sharing is the focus, the two forms of trust exhibit different patterns of influence: while control trust is a positive factor, party trust plays no role. The reason for this may be that the "how" issue overshadows the "whom" issue. In terms of information sharing in B2B e-marketplaces, enterprises would reasonably be more concerned about the method than the object. The information sharing method, similar to the control mechanisms mentioned above, is a part of the institutional structures. Once the enterprise perceives the effectiveness of the control mechanisms, it places its faith in the information sharing method, consequently increasing the likelihood of exhibiting sharing behavior. Further, a prospective buyer/seller in the B2B e-marketplace will be willing to share information with other participants in order to get a good deal. In such a situation, whether other participants behave as a trustworthy party becomes unimportant. In fact, party trust influences information sharing indirectly, through the mediation of risk perception.

This study finds that information sharing has a positive effect on transaction, signifying that in B2B e-marketplaces, an enterprise's willingness to provide useful information (e.g. the details about itself and about the products it wants to purchase or sell) to others is a determinant of transacting business. This corroboration occurring on both sides of a transaction supplements what Pavlou and Fygenson [22]

have confirmed about the relationship between getting information and purchasing on the buyer side. We therefore suggest that e-marketplace providers/operators supply the participants with various tools and channels for sharing transaction-related information and establish norms for proactively providing such information.

Regarding the other hypothesized antecedents of transaction, party trust and perceived risk receive no support, and control trust can be omitted due to its weak effect (β = 0.16; $p < 0.1$). This means that under a higher threshold of statistical significance, information sharing is the only determinant of transaction. Such a result is attributable to the conservative nature of the manufacturing industry in Taiwan. Most Taiwanese manufacturing enterprises are highly risk-averse; just because the reputation of and the experience with the e-marketplace participants are good, a set of effective control procedures has been in place, and perceived risk is low, does not mean that they will buy or sell. In fact, they are used to exhibiting "sequential and progressive" trusting behavior; information sharing comes before transaction.

After removing those non-significant paths ($p > 0.01$) from the partially mediated research model, a fully mediated structure emerges, shown in Fig. 3. This structure reveals that in B2B e-marketplaces, enterprises will share information when they perceive certain qualities of the transaction environment and the participants, and this sharing behavior will in turn bring about buying and selling behavior. Information sharing acts as the mediator, thus accentuating its importance as a form of trusting behavior.

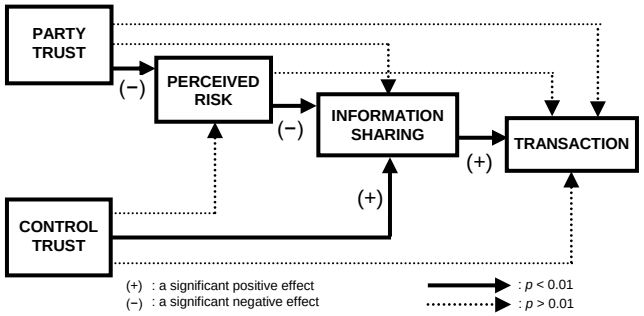

Fig. 3. Redrawing the research model with significant and non-significant paths at $p < 0.01$.

B. Limitations

This study had some limitations. First, for simplicity it conceptualized the trust-related characteristics of a trustee as a unitary construct. Such a modeling approach prevented the researchers from delving into different facets of a trustee's trustworthiness. Second, it focused on generic B2B e-marketplaces, meaning it may lack specificity to particular forms such as horizontal (e.g., material, repair, and operations (MRO) commerce) and vertical (e.g., supply chain alliance) e-marketplaces. Third, the sample for testing the research model was relatively small, which might be disadvantageous to stability of the results. Finally, this study omitted data from other industries and the manufacturing enterprises in the sample were all from a single region. Both factors lowered the generalizability of the findings.

C. Future Research

With the foregoing limitations in mind, we suggest that future research take a multidimensional approach to trusting belief in the trustees and look for other sources of party trust. We also suggest targeting B2B platforms of a specific form, which includes identifying the control mechanisms existing in those platforms, assessing their significance to control trust, and examining the entire structural model. When it comes to the data, prospective researchers should adopt distinct sampling frames; they could collect data from service industries, which account for a significant portion of B2B e-commerce, or from different regions or countries. We also encourage researchers to investigate the views of Tan and Thoen on trust under different e-commerce business models (e.g., business-to-consumer and consumer-to-consumer).

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