SHAPING ASYMMETRIC SUPPLY CHAIN PARTNERSHIPS: THE ROLE OF SHARED IT AND TRUST

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ABSTRACT

Every organization attempts to minimize transaction costs. One way to do so is by forming partnerships. This paper presents a process view of how shared IT and trust affect transaction costs in a transaction dyad consisting of a small supplier and a large customer. The paper presents a dual perspective of influencing elements; shared IT represents the technological aspects of changes in transaction costs and the Trust represents the human aspects. The base model emphasizes the impact on transaction costs by shared IT and trust. Trust was shown to be the strongest determinant of the reduction in transaction costs; Shared IT demonstrated that it too could reduce transaction costs, but with less influence than trust. The mediating effects of trust are significant on the relationship between shared IT and transaction costs. However, shared IT does have a direct impact on transaction costs and is an important consideration in decisions regarding transaction costs between trading partners of unequal size.

Keywords: Trust, Supply Chains, Relationships, Small or Medium-sized Enterprise

INTRODUCTION

In response to cost of market transactions, organizations form partnerships. Forming alliances is one strategy firms use to access valuable resources they do not already own [10]. They are more likely to form such alliances when both firms are vulnerable strategically [20]. By using strategic alliances, a firm can access strategic capabilities by linking with a partner possessing complementary resources or by pooling internal resources with a partner possessing similar capabilities; these alliance create synergies that enhance or reshape market competition. The spectrum of governance of supply chain partnerships takes many cooperative business forms and in general, swings along the continuum from the extreme of spot market transactions (markets), to full vertical integration (hierarchies), with a hybrid strategy of relational governance. The role of such governance in modern business transactions has taken a greater significance in recent years due to the emphasis on joint ventures, alliances, and supply chain integration. Shared information technology

is the new age enabler that addresses the complexities of modern partnerships while trust is an age old necessity of a lasting relationship. While supply chain integration efforts have been aided by a combination of trust and information technology, the question is, do shared IT and trust in the alliance help reduce transaction costs in asymmetric partnerships?

Benefits of forming supply chain partnerships include entry barriers, economies of scale, product differentiation, increasing access to distribution channels, control market access, improve cost effectiveness, enhance value added partnerships decrease the safety stock and utilize human resources effectively, improve customer service, faster speed to market of new products, stronger focus on core competencies, increased sharing of information, ideas & technology improved shareholder value and competitive advantage over other supply chains while drawbacks of forming supply chain partnerships include goal conflict between participants, quest for dominance, clash of personalities, incompatibility of organizational culture and values, inadequate communication and betrayal. [25][35][58][36]. Strategic alliance creation requires a commitment to investing in relation-specific assets having the potential of collectively increasing the competitiveness of alliance partners through lower total value-chain costs, fewer defects and faster product development cycles [12]. These investments can also increase mutual dependency among partners and, hence, the vulnerability of these partners [19]. Therefore, despite the benefits, partnerships come with many drawbacks that need to be minimised through trust and IT.

For an alliance to remain an effective option, effective safeguards, such as trust, against the risk of opportunism must exist. Interfirm trust, built up gradually as firms repeatedly interact, is an organizational resource that can alleviate opportunistic hazards [52]. Relational-exchange elements and offsetting investments have been shown to be positively related to performance. Manufacturers have dramatically changed their interactions with suppliers, realizing that buyer-supplier relationships are a key component of competitive success [2]. As the relational elements of collaboration and commitment become more prevalent, cooperation will replace competition as the norm, opportunistic behavior will decline, and relationship adaptability will increase [27][28]. These changes in behavior will result in lower costs, more reliable deliveries, and increased satisfaction with the exchange. Thus the relational elements increase buyer-supplier performance [2]. Shared IT, on the other hand, supports the complexities of modern commercial partnerships. Information technology can affect firm boundaries by changing the costs of coordinating economic activity between firms [23] and its use could be interpreted as

decisions made in response to high transaction cost by reducing potentially opportunistic contracting costs and monitoring costs [4][22].

The dynamics of the partnerships between large customers and small suppliers is unique. Generally the partner with the greater bargaining power in the alliance gets a greater share of generated rents while the smaller partner may be compensated with improved reputations, exploitation of the larger partner's resources, and a significantly lower resource commitment to the relationship [12]. Since the current trend for large business is to align itself with a few, capable Small to Medium-Sized Suppliers (SMEs) [29], it is important to study how SMEs develop a more relational association with large customers and the role IT plays in the transition. As an illustration, Bose Corporation has suppliers manage its inventory and feed production processes on a just-in-time basis. The benefits to Bose include: reduced inventory, lower transaction costs, faster response to problems, and decreased procurement costs. Supplier benefits include increased volume, lower production costs, and improved overall operations [46]. This study specifically examines: a) the role of IT and trust in SME's adaptive efforts b) the mediating effects of trust on the relationship between IT and transaction costs c) the direct impact of IT and trust on transaction costs.

LITERATURE REVIEW

Transaction Cost Economics (TCE)

TCE focuses on the governance of contractual relations in transactions between two parties [55]. Its underlying premise is that transaction costs result from the need to establish and maintain contracts to support an exchange [56] ; the actual level of transaction costs is determined by certain characteristics of that exchange—the frequency with which transactions occur, the level of uncertainty surrounding the exchange and the presence of transaction specific assets [2]. TCE presumes that market-based exchange is generally preferred for its flexibility and efficiency [18]. However, TCE uses three elements to explain why and when hierarchy will supplant market governance: opportunism, bounded rationality, and asset specificity [55][21]. To minimize the costs of partner-related performance evaluation, firms may resort to hierarchical controls in strategic alliances [55]. The greater the transaction costs, the more likely the alliance will utilize hierarchical governance [10].

Transaction Costs in partnerships. Transaction costs are defined as the costs of "all the information processing necessary to coordinate the work of people and machines that perform the primary processes" [33]. How-

ever, partners in a supply chain dyad typically have limited understanding or information of each other, leading to opportunistic behaviors [30]. Such behaviors may be exacerbated by the complexity of the product or asymmetry in unilateral relationship-specific investments (e.g., technology, people, and facilities). The cost of guarding against opportunism is a part of transaction costs, which also includes the cost of developing and maintaining an exchange relationship, and monitoring exchange behaviors. Alliances possess the unique feature of mutual interdependence where one or both parties are vulnerable to the other and behaviors are not always controllable [38]. The parties are not contractually bound in the classical sense, but instead share the expectation of continued exchange beneficial to both parties; these expectations encourage interdependence [32][18]. The overarching theme that unites alliances is that each party needs the other to advance own interests, yet these needs are coupled with behavioral uncertainty to create vulnerability to opportunism [38]. The perception of opportunistic behavior would result in governance structures involving greater coordination and compliance costs, including high expenditures for drafting, negotiating, monitoring, and enforcing contingent claims contracts. As reduction in transaction costs is the primary objective for forming partnerships, it becomes a relevant outcome measure worth studying.

Inter-organizational Trust

Trust is one element that can enhance openness and accessibility in an alliance; openness motivates partners to be more transparent, increases the relationship's scope, and promotes mutual knowledge transfer between firms [57][37]. The role of trust, as a pre-condition in Inter-organizational relationships is established by existing studies [16][11]. With higher levels of trust in an alliance, partners are more prone to invest assets specific to the relationship such as personnel training, co-located facilities, manufacturing or marketing processes, research and development of new and existing products, and actual production equipment. Mutual trust can have a positive impact on desire and ability of the partners to adjust to changing environmental demands through modification or termination of the agreement [57].

When exploring supply chain partnerships, studying mere shared IT and process interfaces between partners may not be enough. Inter-organizational trust, a key construct in Inter-organizational relationships needs to be explored too [44][51].Relational governance(RG) may function to mitigate the precise exchange hazards targeted by formal contracts—hazards associated with exchange-specific asset investments, difficult performance measurement, and uncertainty [40]. Relational governance is a

social construct that guides business among partners through extra-contractual social and relational means based on a common understanding of mutual norms and collaborative activities [32]. While contractual governance is considered as a control mechanism to address exchange hazards by specifying each partner's roles in the relationship, RG addresses these risks through a social relationship between the parties [9].

Shared IT

Researchers on shared systems, have long recognized their strategic potential and strength [30][15]. Evidence that patterns of information technology use between partners are significant determinants of relationship-specific investments [3] in business processes provides a justification of IT-enabled electronic integration [49][54].

Shared IT has the ability to lower coordination costs without increasing the associated transactions risk, leading to more outsourcing and less vertically integrated firms [13]. Shared IT can decouple an investment's beneficial impact on coordination costs from the damaging impact on its transaction costs, thus allowing firms to move towards the establishment of long-term, stable partnerships and increase resource utilization through greater coordination [14]. More complex levels of shared IT can be enabled through an Inter-organizational Information System (IOIS), an application of enterprise level IT that helps restructure interactions with business partners [50]. Inter-organizational information systems are assuming an increasing role in facilitating and enabling Inter-organizational collaboration as companies invest in joint resources to manage increasingly complex merged systems [1]. Such systems, lead to improved supply chain performance through elevated levels of process and information integration [41].

Small to Medium-Sized Suppliers (SME)

Large businesses in particular have developed a keen interest in relational business arrangements. They have turned to the inherent efficiencies and resources found in tightly coupled supply chains to create or enhance competitive advantage. By carefully selecting and nurturing a small group of providers, large businesses can attain control of vertical integration together with the cost efficiencies of an open market. When the supplier is a small or medium-sized enterprise (SME), usually with specialized "niche" capabilities, the large partner can also tap rapid innovation skills and close market contacts that help to assure sustained competitive advantage [12]. Ideally, the arrangement between them is a strategic partnership where each party's fate is intricately linked to the

other party and both parties strive to benefit the dyad, not opportunistically benefit only themselves [7].

The SME, especially a SME supplier, typically does not have the physical resources to equal the investment of a large customer in the relationship; therefore, the SME usually finds itself disadvantaged compared to the larger partner, suffering from a lack of resource leverage and bargaining position in the arrangement. The SME supplier does, however, bring intangible assets to the relationship that a large customer needs, such as closer market ties and rapid production change capabilities. The SME generally engenders itself to the larger customer by providing these intangibles, often highly customized, that the large partner could not obtain elsewhere without considerable expense and time. In conjunction with these intangible assets, the SME supplier uses IT to strengthen the communication ties with the large customer and increase the information content in the relationship, thus further cementing the relational bonds between them and making it more difficult and more costly for the large customer to switch providers [8]. This strategy moves the SME supplier and the large customer closer toward a strategic partnership.

RESEARCH MODEL AND HYPOTHESIS

The model (Figure 1) stems from an examination of many cross-sectional models [22][27][28][2] concerning shared IT and trust and their role in the reduction of transaction costs.
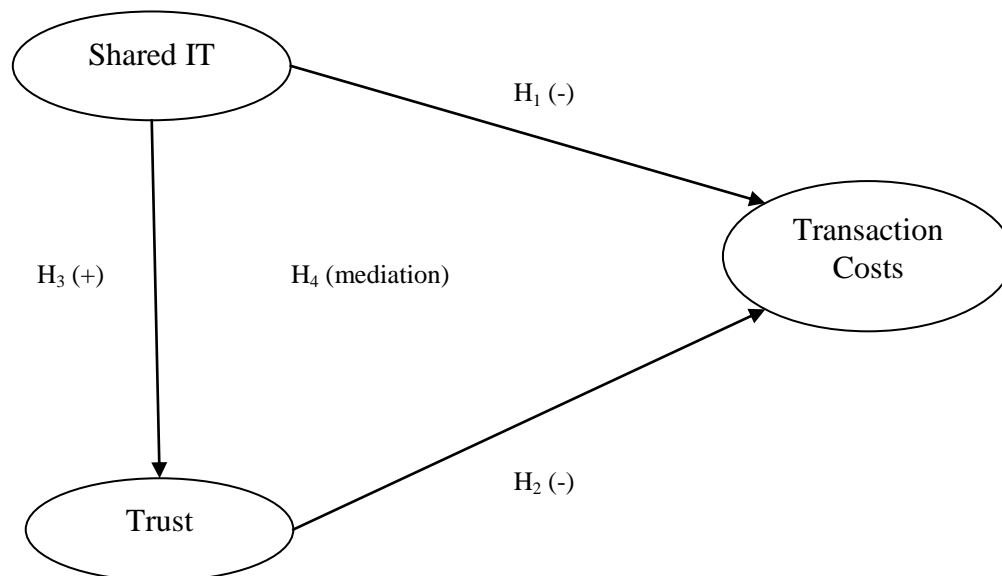

Figure 1: Research Model

The model addresses the research questions by hypothesizing that the adaptive efforts (shared IT and trust) reduces the transaction costs of the SME supplier, thus increasing their survivability. The model proposes that the role of shared IT and trust are significant in these adaptive efforts and are negatively related to transaction costs. The direct impact of shared IT on transaction costs is noted in the model by the hypothesized negative relationship between shared IT and transaction costs. Changes in shared IT affect not only transaction costs but also levels of trust; thus trust can have a mediating effect on the relationship between shared IT and transaction costs; this role is reflected in the model.

Hypotheses Development

As discussed earlier, shared IT use between firms has the potential to lower coordination costs without increasing the associated transactions risk [13], and could be interpreted as decisions made in response to high transaction costs by reducing potentially opportunistic contracting costs and monitoring costs [22]. The cross-sectional study by Grover et al. [22] found a weak (.15),

positive relationship between shared IT and transaction costs. However, theories, such as transaction Cost Economics, suggest that shared IT can lower transaction costs; studies such as Clemons et al. [13] have utilized this theoretical relationship but have not empirically tested it. If transaction costs are high, firms are likely to increase their IT expenditures to combat the transaction costs by, for instance, automating elements of transactions. Shi [47] found empirical evidence of the role of Inter-organizational system enabled B2B e-commerce systems in reducing Transaction costs while Singh and Teng [48] found role of IT integration in reducing Transaction Costs. Li, P., & Mula [31] found evidence of relationship between EDI and reduced transaction costs. It is the contention of this study that with increase in IT, there will be a drop in transaction costs just as theory predicts. Therefore, the first hypothesis states that increases in shared IT will lower transactions costs.

H1: Shared IT is negatively related to transaction costs.

The proponents of Social Exchange Theory [57] and Relational Exchange Theory [39] state that trust is influential in constraining the behavior of partners, limiting their actions to ones that benefit and perpetuate the relationship. For an alliance to remain an effective option, effective safeguards against the risk of opportunism must exist. Interfirm trust, built up gradually as firms repeatedly interact, is an organizational resource that can alleviate these opportunistic hazards. Manufacturers have changed their interactions with suppliers, realizing that buyer-supplier relationships are a key component of competitive success [2]. As the relational elements of collaboration and commitment become more prevalent, cooperation will replace competition as the norm, opportunistic behavior will decline, and relationship adaptability will increase [27][28]. These changes in behavior will result in lower costs, more reliable deliveries, increased satisfaction with the exchange, and increased buyer-supplier performance [2]. Therefore, higher levels of trust, should reduce the risk of opportunism by ameliorating or eliminating search, coordination, and monitoring costs, thereby reducing transactions costs.

H2: Trust is negatively related to transaction costs.

Automated systems build trust with reliability. Information technologies assist partners in information exchange which has been linked in prior research to increases in trust levels [19][27]. Therefore, investments in shared IT should be related to levels of trust in a buyer-supplier dyad. Small firms with inherently limited debt capacity, few retained earnings, and capital market disadvantages, can overcome these limitations if they have access to IT investment resources and capabilities. These

relationships are assisted by IT to provide the coordination and scale of large firms and the flexibility, creativity, and low overhead of small firms [25]. Thus,

H3: Shared IT is positively related to trust.

Both shared IT and trust are hypothesized to impact transaction costs. In an in-depth case study, Welty & Becerra-Fernandez [53] demonstrated that interplay between trust and technology can decrease transaction costs. There is also a hypothesized link between IT and trust. Therefore trust could be a mediator to the relationship between IT and reduction in transaction costs.

H4: Trust mediates the relationship between shared IT and transaction costs.

RESEARCH METHODOLOGY

Shared IT is a formative construct consisting of two components, both formative by themselves: Automation and Information Exchange (Table 1). Since we are measuring breadth of shared IT usage, each item measures different aspects of the shared IT usage, we treat IT as a formative construct, in line with recent works by Rai, Patnayakuni, & Seth [43] and Jeffers, Muhanna, & Nault [24]. The first four questions on shared IT are items adopted from operationalized constructs in a study [22] that investigated the role of IT in building buyer-supplier dyads; but the source for these constructs is an earlier study [42] that examined the role of inter-organizational and organizational factors on the decision model for adoption of inter-organizational systems. These four questions were validated in the Grover et al. [22] study with an item to total correlation value greater than 0.30. The remaining five questions are extensions of these questions to provide finer granularity in this construct.

Measures

Trust is treated as a reflective latent construct. The questions on trust were adopted from a seminal and well cited study by Doney & Cannon [17](Table 1) which investigated the nature of trust in buyer-supplier relationships. Their study included a variable named "Trust of Supplier Firm" comprised of eight questions.TC was treated as a formative second order construct encompassing three reflective first order constructs: a. Monitoring: cost of monitoring the performance of partner; b. Problem solving: cost of addressing problems that might arise in the relationship with partner and c. Advantage: concerning the likelihood of partner taking advantage of the relationship. The measurement items were adapted from a prior study [22] (Table 1) which was based on a previous study examining relational bonds in industrial exchange to test TCE framework [39].

Table 1: Constructs and Measurements

Customer Trust	
1.	Our trust that Customer C keeps promises it makes to us.
2.	Our trust that Customer C is honest with us.
3.	Our trust in the information Customer C provides us.
4.	Our shared mutual trust with Customer C.
5.	Our trust that Customer C is genuinely concerned that our business succeeds.
6.	Our trust that when making important decisions, Customer C considers our welfare as well as its own.
7.	Our trust that Customer C keeps our best interests in mind.
8.	Our trust that it is not necessary to be cautious with Customer C.
Transaction Costs	
1.	It is easy to tell if we receive fair treatment from Customer C. *(Monitoring)*
2.	We are in a good position to evaluate how fairly Customer C deals with us.*(Monitoring)*
3.	There is not much concern about Customer C taking advantage of this relationship.*(Monitoring)*
4.	The approach to solving problems with Customer C is clear-cut.*(Problem Solving)*
5.	There are standard solutions or approaches to problems that might occur with Customer C.*(Problem Solving)*
6.	It is easy for Customer C to alter the facts to get what they want. *(Taking Advantage)*
7.	There is a strong temptation for Customer C to withhold or distort information for their benefit. *(Taking Advantage)*
8.	There exists, from Customer C's perspective, a significant motivation to take advantage of unspecified or unenforceable contract terms. *(Taking Advantage)*
Shared IT	
1.	Exchanging information on technical product requirements for Product P.*(Information Exchange)*
2.	Ordering raw materials or components for Product P. *(Automation)*
3.	Shipping and receiving of Product P's raw material or components. *(Automation)*
4.	Inventory control for raw material or components for Product P. *(Automation)*
5.	Exchanging information on finished goods inventory for Product P. *(Information Exchange)*
6.	Exchanging information on production schedules for Product P. *(Information Exchange)*
7.	Exchanging information on anticipated demand for Product P. *(Information Exchange)*
8.	Exchanging information on costs or prices for Product P. *(Automation)*
9.	Placement of orders for Product P.*(Automation)*

STUDY RESULTS

The target respondents were manufacturing firms in the continental US with 250 or fewer employees that have been in business at least 5 years and have a relationship with at least one customer that employs 1000 or more people. The list of respondents was obtained from the U.S. Small Business Administration. A total of 17,867 email requests were sent, and 1,937 emails were returned as undeliverable. 721 were returned with messages against spamming and a request to be removed from the mailing list. 318 responses were obtained from the mailings; however, elimination of blank responses yielded a final sample of 272 responses. Given the large number of undeliverable emails, it is not certain to determine the exact response rate.

When the instrument was pilot tested on volunteers, we observed that 60% of the volunteers failed to respond as our e-mail went into their spam folder leading us to believe that approximately (60% of 17,867) mails from our mail survey were sent to spam and were not accessed by the respondents. We believe that the details of incentive to participate by winning an IPOD in a raffle that was provided in the body of the email may have triggered the email systems to put the email in the spam folder. Other factors included employees leaving the organization, organizations blocking access to university sites and recipients not fitting the respondent profile ex-

pected by the survey. For the above mentioned reason, we estimate the response rate to be between 8% to 12%.

Responses were analyzed using descriptive statistics (Table 2), analysis of variance (ANOVA), t-tests, and PLS (Partial Least Square) technique, a SEM (Structural Equation Modeling) technique that assesses both the structural model and the measurement model which enabled us to concurrently do factor analysis with hypotheses testing [34]. For PLS, we used the SmartPLS software [45] to perform factor analysis and hypothesis testing simultaneously for both formative and reflective constructs. To avoid problems associated with normality deviations, a ratio of 15 respondents to one parameter is considered acceptable [34]. In our study, the 9 parameters would necessitate at least 135 responses; we have over twice that number of responses.

To control for extraneous factors we used annual sales, number of employees and length of relationship as suggested by similar studies [43][24][49][11]. Non-response bias was tested by comparing 50 of the first responses (early) and 30 of the last responses (late) on 7 question items randomly selected. None of the selected constructs showed significant results. The same was applied for demographic elements such as annual sales, number of customers, years of service, and annual levels of product purchases number of employees, sales ($), annual purchase ($) and length of service and number of customers. Chi-square statistic testing showed no differ-

ences between early and late responses. Table 2 summarizes and groups demographic information.

These characteristics are reflective of our target sample frame; we targeted small manufacturers that are suppliers to large customers. Both the median and mean figures for number of employees do not exceed the 250 employee threshold we set for this study earlier; also the employee groupings show the majority of the number of employees are fewer than 100. In a small business upper management and owners typically function in multiple roles and represent their company with the public directly; the sample demographics reflect this aspect since over half of the respondents are either the President or the Vice-President of the organization. Annual sales for most of the respondents were $10 million or less, which is typical for most US small businesses. Most small businesses are niche marketers, serving a few customers rather than mass market penetration; the sample demographics also confirm this characteristic as most of the respondent organizations have 100 or fewer total customers.

Model Assessment

We assess convergent validity by evaluating the loadings of the individual measures to their respective constructs. One item had loading lower than 0.60 and was removed from the study. The trimmed model was re-evaluated; the loading for the remaining items were over the recommended level of 0.70 (Table 3).

Table 2: Respondent Demographic and Groupings

	Number Employees	2005 Sales ($)	Number Customers	Years of Service	Annual Purchases ($)
Min	1	20,000	1	1	300
Max	6,000	875,000,000	50,000	58	100,000,000
Median	13	2,000,000	101	11	250,000
Mean	74	12,761,131	1,173	14	1,232,901
Std. Dev	410	72,201,813	4,478	10	6,667,774

Title	Frequency	Percent	Customers	Frequency	Percent
C.E.O	15	~6%	<=100	133	~49%
Director	11	~4%	101 to 1000	77	~28%
Manager	50	~18%	>1000	62	~23%
Owner	24	~9%			
President	93	~34%			
V.P.	43	~16%			
Others	36	~13%			

Employees	Frequency	Percent	Service	Frequency	Percent
<10	104	~38%	<=5	68	~25%
10 to 50	118	~43%	6 to 10	64	~24%
51 to 100	26	~10%	11 to 20	75	~28%
>100	24	~9%	>20	61	~23%

Sales	Frequency	Percent	Purchases	Frequency	Percent
<1Million	67	~25%	<=100 K	71	~26%
1 to 10 Million	157	~58%	101K to 500K	92	~34%
10 to 100 Million	45	~17%	501K to 1 Million	37	~14%
>100 Million	3	~1%	>1 Million	72	~26%

Table 3: Correlations of Individual Items to Constructs

	Trust	IT	TC	Auto	Exch	Moni	Prob	Adva
T1	0.88	0.21	-0.50	0.21	0.18	-0.45	-0.27	-0.36
T2	0.90	0.22	-0.50	0.21	0.20	-0.42	-0.30	-0.36
T3	0.83	0.22	-0.47	0.21	0.20	-0.37	-0.31	-0.31
T4	0.90	0.22	-0.54	0.20	0.20	-0.42	-0.35	-0.40
T5	0.88	0.21	-0.53	0.16	0.21	-0.43	-0.34	-0.38
T6	0.87	0.19	-0.54	0.17	0.18	-0.44	-0.36	-0.38
T7	0.87	0.18	-0.55	0.17	0.16	-0.45	-0.35	-0.40
T8	0.68	0.20	-0.45	0.19	0.18	-0.42	-0.31	-0.28
IT1	0.15	0.70	-0.14	0.56	0.73	-0.21	-0.18	0.08
IT2	0.17	0.77	-0.10	0.88	0.60	-0.14	-0.12	0.04
IT3	0.22	0.81	-0.11	0.88	0.65	-0.15	-0.13	0.03
IT4	0.15	0.75	-0.10	0.81	0.62	-0.14	-0.19	0.06
IT5	0.19	0.78	-0.12	0.61	0.82	-0.16	-0.16	0.02
IT6	0.14	0.71	-0.07	0.53	0.80	-0.16	-0.05	0.06
IT7	0.22	0.80	-0.14	0.61	0.84	-0.17	-0.14	-0.02
IT8	0.19	0.81	-0.16	0.65	0.82	-0.20	-0.15	0.02
IT9	0.20	0.72	-0.17	0.75	0.59	-0.17	-0.15	-0.07
TC1	-0.40	-0.12	0.68	-0.10	-0.12	0.80	0.41	0.29
TC2	-0.33	-0.24	0.63	-0.18	-0.26	0.81	0.45	0.20
TC3	-0.45	-0.16	0.71	-0.14	-0.16	0.77	0.48	0.36
TC4	-0.39	-0.15	0.72	-0.15	-0.13	0.57	0.92	0.27
TC5	-0.27	-0.19	0.57	-0.17	-0.18	0.41	0.86	0.17
TC6	-0.30	0.06	0.57	0.04	0.08	0.30	0.20	0.86
TC7	-0.39	-0.03	0.65	-0.04	-0.01	0.36	0.25	0.92
TC8	-0.42	0.04	0.59	0.05	0.03	0.30	0.22	0.87
IT2	0.17	0.77	-0.10	0.88	0.60	-0.14	-0.12	0.04
IT3	0.22	0.81	-0.11	0.88	0.65	-0.15	-0.13	0.03
IT4	0.15	0.75	-0.10	0.81	0.62	-0.14	-0.19	0.06
IT9	0.20	0.72	-0.17	0.75	0.59	-0.17	-0.15	-0.07
IT1	0.15	0.70	-0.14	0.56	0.73	-0.21	-0.18	0.08
IT5	0.19	0.78	-0.12	0.61	0.82	-0.16	-0.16	0.02
IT6	0.14	0.71	-0.07	0.53	0.80	-0.16	-0.05	0.06
IT7	0.22	0.80	-0.14	0.61	0.84	-0.17	-0.14	-0.02
IT8	0.19	0.81	-0.16	0.65	0.82	-0.20	-0.15	0.02
TC1	-0.40	-0.12	0.68	-0.10	-0.12	0.80	0.41	0.29
TC2	-0.33	-0.24	0.63	-0.18	-0.26	0.81	0.45	0.20
TC3	-0.45	-0.16	0.71	-0.14	-0.16	0.77	0.48	0.36
TC4	-0.39	-0.15	0.72	-0.15	-0.13	0.57	0.92	0.27
TC5	-0.27	-0.19	0.57	-0.17	-0.18	0.41	0.86	0.17
TC6	-0.30	0.06	0.57	0.04	0.08	0.30	0.20	0.86
TC7	-0.39	-0.03	0.65	-0.04	-0.01	0.36	0.25	0.92
TC8	-0.42	0.04	0.59	0.05	0.03	0.30	0.22	0.87

Constructs: TC: Transaction Costs, Auto: Automation (IT), Exch: Information Exchange (IT), Moni: Monitoring (TC), Prob : Problem Solving (TC), Adva:Taking Advantage (TC). **Items:** T1 to T8: Trust, IT1 to IT8: IT, TC1 to TC8: Transaction Costs.

For convergent validity, we also examined the scales for composite reliability (CR) using structured equation modeling with the dropped items removed. As shown in Table 4, all constructs showed a composite reliability score of 0.80 or greater. To establish discriminant validity, we examined the average variance extracted (AVE) to ensure that each construct shares larger variance with its measures than with other constructs in the research model. This calls for the construct's AVE to be at least 0.50, or the square root of the AVE (diagonal in Table 4) should be greater than the correlation of the construct with other constructs.

Using PLS, the measurement model in Figure 2, shows the relative path weights from the lower order constructs to their respective higher order constructs. The higher-order constructs are formed by using the indicators of all its lower-order constructs.

Table 4: Correlations, CR, and AVE Values

| Construct	CR	AVE	1	2	3	4	5	6
Advantage (TC)	0.92	0.79	**0.88**					
Monitor (TC)	0.85	0.65	0.36	**0.80**				
Problem solving(TC)	0.88	0.80	0.25	0.57	**0.89**			
Trust (TR)	0.96	0.74	-0.44	-0.51	-0.40	**0.86**		
Automation (IT)	0.91	0.67	0.03	-0.18	-0.18	0.22	**0.81**	
Exchange (IT)	0.88	0.65	0.06	-0.23	-0.17	0.18	0.74	**0.80**
Note: Advantage, Monitor and Problem solving are lower order constructs of Transaction costs (TC); Automation and Exchange are lower order constructs of Shared IT.								
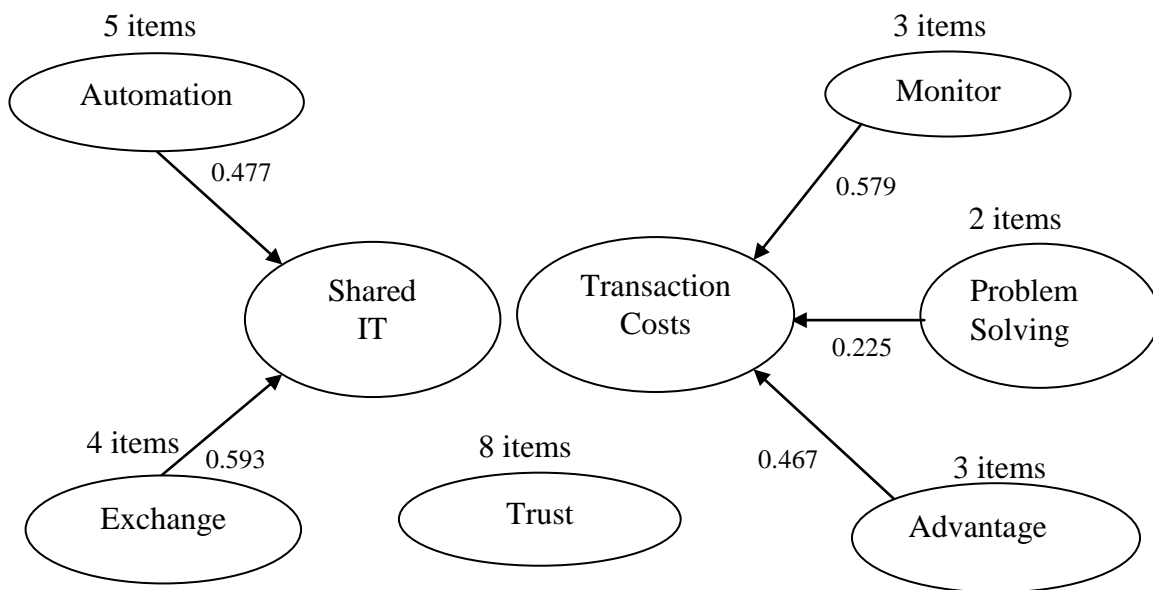
Figure 2: Measurement Model

Hypotheses Testing

The structural model shows the paths in the model with their path coefficients (Figure 3). The model is tested by assessing the significance of the paths stated in the model. **H1:** The lack of support for hypothesis 1 (b = -0.008, t-statistic = -1.08, p > 0.10) implies that, although an isolated bilateral relationship is supported as evidenced by Table 5 (b= -0.309, t-statistic =1.98, p < 0.05), in the presence of trust, the level of shared IT technology does not directly impact the transaction costs of the dyad. **H2:** Support for this hypothesis (b = -0.595, t-statistic = 8.411, p-value < 0.01) implies that transaction costs can be reduced by fostering greater levels of trust. **H3:** Support for this hypothesis (b = 0.217, t-statistic = 2.041, p-value < 0.05) indicates that trust can be enhanced by increasing information technology expenditures to benefit the dyad. **H4:** According to the recommendations of Baron & Kenny [5], for mediation to occur, there should be a significant path between 1. shared IT and TC, 2. shared IT and Trust 3. trust and TC, and 4. the path between shared IT and TC should become insignificant after controlling for Trust. We isolated the three constructs and ran structural equation modelling to look for significance (Table 5).
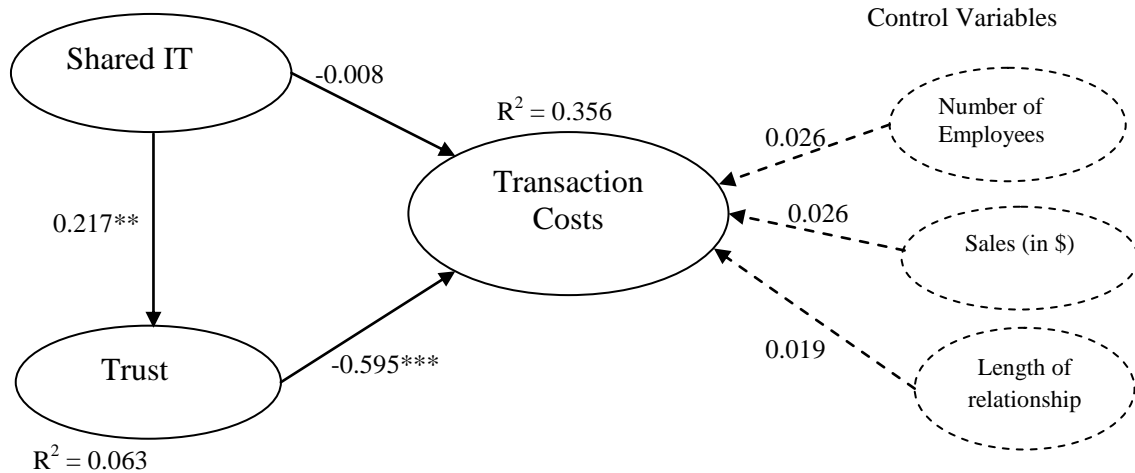
*** significant at p<0.01; ** significant at p<0.05; * significant at p<0.1

Figure 3: Structural Model

Table 5: Mediation of Trust

Step	Model	I. V	D.V	Coefficient	Std. Error.	T-Stat	Significant
1	Direct	SIT	TC	-0.309	0.156	1.98**	Yes
2	Direct	SIT	Trust	0.217	0.106	2.04**	Yes
3	Direct	Trust	TC	-0.597	0.0631	9.468***	Yes
4	After controlling for Trust	SIT	TC	-0.008	0.1054	0.078	No
Results: There is evidence of complete mediation.							
TC: Transaction costs, SIT: Shared IT, *** significant at 0.01,** significant at 0.05,* significant at 0.1							

The relationship between shared IT and TC is no longer significant after including trust in the model (Table 5). We can conclude that strong evidence was found to support the hypothesis that trust mediates the relationship between shared IT and reduction in TC.

Open-ended questions

The respondents also provided their responses to five open-ended questions in the survey about the relationship between the firm and its larger customer; first two questions asked what the company has done to improve the relationship, and what the company should be doing to affect relationship improvements. Prevalent responses for both questions involved: increasing communication, increasing personal relationship ties, and improving operational efficiencies along with responses like *"We offered several incentives involving price reduction, additional database sharing, communications, CAD/CAM competence, etc."* There were also two similar questions about the customer's role in the relationship; one asking what the customer has done to improve relations and one asking what the customer should be doing. Here again, increasing communication was the prevalent response; however, improving the relationship and operational efficiencies were also frequent responses. Two examples of what the customer has done to improve relations were: *"Keep the lines of communication open,"* and *"share future requirements, and establish long term purchase orders".* Some responses to what the customer should be doing were: *"If we lose a contract, I'd like to know why. Was our pricing too high? Was our delivery unsatisfactory? Did the customer's requirement evaporate? We currently have no way of knowing," "Share production schedules," "Insuring we have more accurate information regarding their market conditions," "Continue talking to us by providing feed-back on products they receive from us," "Share information as to forecasts, new products coming on line, getting us more involved in product development,"* and *"Open communication on a more regular basis with the management of the Customer and express more specifically their own needs."* Representa-

tive list of responses to the last question "other thoughts and comments" are given in Table 6.

DISCUSSION OF RESULTS

In an environment where supply chain partners often have conflicting optimization goals, can IT shared across two organizations facilitate trust as well as to help reduce transaction costs? In other words, the big question is: Do inert artefacts across partners provide tools that enable behavioral changes and influence economic forces in a partnership? Built upon past research, our study has confirmed such enabling effects, as described by Bensaou [6] regarding companies in Japan using shared IT as a tool to further supplier relationships. As researchers of the IT artefact, to us, the significance of the above confirmation stands out as the most relevant as it defines the role of shared IT in the overall scheme of things in an organization. This also negates beliefs about IT being an inert phenomenon and reinforces its potential in influencing organizational structures [26].

The role of shared IT in this strategy has become increasingly more significant for the SME. The cost of IT hardware and software has decreased and the capabilities of shared IT have increased dramatically in recent years to the point where the SME can afford to be on equal IT footing with large counterparts [3]. Also, the IT competency and confidence of SME employees have been enhanced through general technical education of the public and also by the user-level simplification of IT applications. The general business climate also has changed so that IT capabilities between supply chain participants are an expected and necessary part of doing business. The end result is an increasing role for IT in daily business transactions to improve efficiency and also create a greater impact on strategic decisions that affect effectiveness and competitiveness. The move toward relational governance between trading partners throughout the supply chain accentuates the importance of shared IT.

Table 6: Responses to the open ended question "other thoughts and comments"

As much communication as possible between all parties. Let everyone know what is going on, especially about problems. Resolve them asap.
Annual growth incentives have been agreed. Marketing packages have been implemented. Rebates for more % of business have been agreed to.
Annual Supplier Appreciation Day. Sharing machining knowledge and technology.
Better forecasting of finished goods requirements.
Brought them to our plant to see problem and defects.
Building relationships outside office through off-site training, recreational activities and building a family like bond.
Complete and open honesty. Quarterly meetings to assess our needs.
Conduct CPFR meetings weekly by phone and monthly on-site meetings.
CPFR implementation 2 years ago, including promotional collaboration.
Frequent monitoring of demand and supplies, frequent communication.
Have established an electronic Kanban system by which they can see our inventory level of their supplied materials on a real-time basis.
Individual representative that handles our account. Yearly meetings to discuss needs and changes.
ISO 9000 has actually lessened the time to get components.
Joint meetings at the supplier facility to work out logistics, QAE issues, engineering, etc.
Meetings with various representatives on a bi-weekly basis.
Monthly metrics communicated, provide forecasts for each month, interface weekly [at least] on status.
Mutual co-ordination and transparency in objectives to be done by both parties in synchronization leads for big and better results in future.
We have jointly worked on research and development products to better meet my ultimate customer's needs. The results were an improved end product.
Regular quarterly reviews of performance for both parties. Weekly contact between principle people in both organizations. Open, candid communication.
Shared engineering product testing. Assuring communication remains extremely open.
Technical information exchange, mutual quality management.
We educate our strategic suppliers on the specifics of our market from both a sales and marketing perspective, this helps to put discussions into context.
We have joined a buying group that should keep the service and reduce the cost, which is key to our competitive marketplace.
Weekly conference calls and monthly progress reports that have to be verified by myself as well as auditors who conduct visits every quarter.

CONCLUSIONS

Implications for Practice

This study presents a dual perspective of influencing elements; the shared IT represents the technological aspects of changes in transaction costs and the Trust represents the human aspects. Technological and behavioral aspects of the supply chain dyads are especially complicated and intertwined for the small business. Small business is generally limited in funds, and often at a disadvantage with large customers. However, small business is more agile, creative, and more in tune with customers. Information technologies for business have been steadily decreasing in price and increasing in functionality. These two elements are now at a stage where most small businesses can invest in shared IT with directed purpose and sufficient user skills to attain strategic benefits. Also, large business has increasingly sought out partnerships and alliances with small business to tap into their strengths; a major part of these unions is the exchange of information, often with technology mandated by large business. By carefully utilizing shared IT to automate and increase the exchange of information, small businesses can leverage their innate strengths towards a strategic partnership with their large customers. Another significant factor that can be used to strengthen the partnership is the inter-organizational level of trust that overcomes pure price competition in a free market environment.

Level of trust among partners is an important predictor of transaction costs. The mediating role of trust reveals that shared IT indirectly influences transaction costs by increasing trust among partners. By reducing transaction costs, trust ensures longevity of the partnership.

Research Limitations and Future Directions

This study is not without limitations. One of the primary limitations of the cross-sectional study design is that inter-related factors are simultaneously assessed and there is generally no evidence of a temporal relationship between antecedents and outcomes. Apart from capturing temporal aspects, future studies can use deeper aspects of shared IT such as system quality, the absence of which could be a possible confounding factor in this paper. Further studies to capture the view point of the larger partner can also be done. Finally, this study offers some recommendations. The reduction of transaction costs due to shared IT and trust equates to rates of return sufficient to fuel the formation of strategic partnerships. These principal components of the customer-supplier dyad are elemental to the performance of the entire supply chain. From the perspective of the small business supplier, these components are crucial to profitable, long-term partnerships that can yield positive strategic advantages. By enhancing trust and shared IT, small business suppliers to large business can move from a price-only based supplier that cannot be assured of a place in the supply chain from one purchase to another, to a valued strategic partner that will have a productive and influential role in determining the success of the supply chain.

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