

Investigating the Role of Information Technology in Building Buyer-Supplier Relationships

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ABSTRACT

A widely held position observed through the lens of transaction cost theory (TCT) has been the role of information technology in decreasing transaction costs between buyers and suppliers and in creating more market based governance structures. However, observations have not supported this contention. In particular, buyer-supplier dyads often engage in cooperative behavior that could offset opportunistic tendencies espoused by TCT. The role of IT in this structure is unclear. This paper examines the relationship between perceived transaction costs and the concept of relationalism within buyer-supplier dyads. The role of IT in mediating this relationship is also examined. Survey data from 203 buyers in the OEM electronics industry is used to test proposed hypotheses. All major constructs, transaction costs, relationalism, and IT use are operationalized using validated multi-dimensional scales. The results suggest a positive role of IT in partially offsetting the negative relationship between transaction costs and relationalism. The results suggest that the decision to use IT within the dyad can encourage a commitment to establishing relational behavior.

Keywords: Interorganizational systems, transaction cost theory, interorganizational cooperation, EDI, relationalism, survey research, structured equation modeling

I. INTRODUCTION

Transaction cost theory (TCT) asserts that any transactional exchange between two parties (e.g., buyers and suppliers) is characterized by opportunism, where one party can take advantage of the other. The level of opportunism depends on the nature of the exchange environment and gives rise to costs in establishing and managing the relationship called transaction costs. The theory proposes that markets and hierarchies are two extreme forms of governance mechanisms that can manage the exchange relationship, and firms would do well to “match” the appropriate mechanism with the exchange context. For instance, spot markets are appropriate when the transaction costs are low, perhaps due to simplicity of the products and low investment in customizing the exchange. Similarly, hierarchies (vertical integration) are appropriate when transaction costs are high due to complex products and relationship specific investments. In the latter case, ownership or creating an employee-employer relationship mitigates opportunism. While these unilateral governance mechanisms are useful in theory, in practice we observe many bilateral alliances, partnerships, and cooperative arrangements in contemporary firms. Further, with the pervasiveness of networking infrastructures, information technology (IT) seems to be playing an important role in interfirm relationships [Benjamin and Wigand 1995].

On the academic front, the role of IT has been mainly observed through a TCT lens. The arguments made from this vantage point promote the idea that IT reduces the transaction costs resulting from potential opportunistic behavior and thereby making market-based as opposed to hierarchical buyer-supplier governance structures more attractive [Malone et al. 1987]. However, empirical evidence of this is sparse [Hess and Kemerer 1994]. Both buyers and suppliers in various industries are creating structures that have neither the characteristics of pure markets, nor those of pure hierarchies. In fact, we observe that many companies limit their number of suppliers in order to jointly coordinate value chains and create relationships that transcend specific transactional exchanges. This concept, referred to here as *relationalism* reflects cooperative behavior with long-term implications. The role of IT in reducing transaction costs seems relatively clear with respect to pure modes of governance [Malone et al. 1987]; its role in the broader context of relational structures needs is not well understood. Some researchers have argued that relationalism is a form of governance that lies between markets and hierarchies [Pilling et al. 1994]. This allows its interpretation through a transaction cost framework [Dyer 1997]. Others have criticized transaction cost theory for being restrictive due to its inability to accommodate social constructs such as cooperation and relationalism [Ghoshal and Moran 1996]. However, here again there is no clear direction for the effect of IT [Bensaou 1997].

The primary objective of this study is to examine the effect of IT on relationalism in light of transaction cost economics. Specifically, the study examines

- the association between transaction costs and relationalism
- the mediating role of IT on this association

The results will provide insight into the decision to incorporate IT into the dyad as a mechanism for reducing transaction costs and increasing relationalism. This inquiry captures an important

manifestation of observable governance structures by further developing a construct of relationalism within the context of the widely understood transactional framework. Further it operationalizes and explores the mediating role of IT within the relational context.¹

The next four sections develop the concepts of transaction costs, relationalism, their association, and the role of IT. Based on this, hypotheses are developed. This is followed by a description of a large-scale study of purchasing companies in the electronics industry. The paper concludes with a discussion of the results and their implications.

II. TRANSACTION COST THEORY

Transaction cost theory (TCT) has been used extensively in interpreting buyer-supplier exchanges [Williamson 1975]. Due to their finite cognitive abilities (bounded rationality), neither the buyer nor the supplier has a complete understanding of the other party and the information upon which they base their decisions. This leads to the possibility for opportunistic behavior on the part of each party as they attempt to maximize their utility through the exchange. The presence of unilateral relationship-specific investments (e.g., technology, people, facilities) that can only be used in the context of the dyad increases the likelihood of opportunism. This is because the party without the investment might extract concessions from the other due to the limited value of the other party's investment in alternate use.² Uncertainty in the transaction exchange or complexity of the product in the transaction can serve to increase the potential for opportunistic behavior and parties might incur higher transaction costs. These costs include the costs of developing and maintaining an exchange relationship, monitoring exchange behavior, and guarding against opportunism.

A solution proposed by TCT is to create a governance structure between buyers and suppliers that matches the nature of the exchange environment. In other words, if transaction costs are high due to opportunism stemming from relationship-specific investments, then the proposed governance structure is a hierarchy, where one party finds it easier to "control" (and monitor) the other, create rewards for desirable behavior, and prevent the ability to profit from specific investments outside the context of the relationship. This is very much like a firm (vertical integration) structure that reduces the chance for opportunism [Heide and John 1988]. Alternatively, under conditions of low transaction costs, it is possible to structure a market-based contract between parties. A market-based governance structure increases coordination costs, but buyers could benefit from better economies of scale and scope of suppliers and consequently better production costs.

Therefore, the existence of transaction costs creates the opportunity for partners in an exchange to reduce these costs by changing their governance structures. In a buyer-supplier dyad, the buyer could see these costs in the effort in developing, monitoring, addressing problems, and gauging opportunism in the relationship. These costs could vary depending on the characteristics of the exchange environment. Rational buyers would assess these transaction costs and choose governance structures that can appropriately handle them.

¹In a recent meta-analysis of TCT, Rindfleisch and Heide [1997] called for the need to develop reliable and valid measures of transaction costs.

²A manufacturer who has invested in machinery or warehousing facilities to specifically cater to a supplier places this investment at risk if the supplier chooses to forgo the customer—unless an enforceable contract is in place.

III. RELATIONALISM

While TCT has been used to explain interorganizational relationships, there is a growing cadre of behavioral researchers that challenge the assumptions of economic models that overlook social context factors like trust and dependence, exaggerate the influence of opportunism, and ignore the importance of relationships [e.g., Barney 1990; Connor and Prahalad 1996; Saxton 1997]. However, TCT has been used to examine behavioral governance structures from an economic perspective. Williamson [1985] has briefly explored the concept of relationalism in the context of TCT. He maintains that it reflects a focus on the exchange relation, which although falling short of vertical integration, exhibits a significant level of cooperation between two partners.

Long-term cooperative relationships between firms that reflect mutual dependence between partners have been called *alliances* [Monczka et al. 1998; Young-Ybarra and Weirsemá 1999]. According to TCT, these relationships might still have the potential for opportunistic behavior. However, economic tools such as the *mutual* (bilateral rather than unilateral) investment of specific assets may be utilized to reduce the potential for opportunism by locking partners into a strategic alliance with the expected long-term gain from maintaining the relationship exceeding the potential short-term gains from opportunism and defection [Parkhe 1993]. Bilateral investment in a relationship might, therefore, create a dependence on good faith, non-opportunistic behavior that can *loosely* be referred to as cooperation [Heide and John 1990]. However, this cooperation is a result of formal, self-enforcing safeguards, which are economic hostages created intentionally to control opportunism by aligning the economic incentives of transactors [Dyer and Singh 1998; Williamson 1985]. If one party invests more, then the safeguards do not offset, resulting in noncooperative, opportunistic behavior on the part of one party.

It is our contention that the economic argument does not fully capture the concept of relationalism. Relationalism extends TCT by considering intrinsic motivations of trust and a long-term perspective. While TCT focuses on individual transactions, the concept of relationalism epitomizes the entire relationship. In other words, the guard against opportunism is not due to economic safeguards but due to each party's appreciation of the past transactions in anticipation of future exchange [Pilling, et al. 1994]. It has been argued that interorganizational cooperation (a behavior) arises in the context of a specific relationship and unfolds through ongoing interaction corresponding to a shift away from market exchange to bilateral governance [Bensaou 1997]. In other words, relationalism reflects the idea of a relationship among parties based on a social component, largely facilitated by trust or faith in others to work successfully. Therefore, relationalism departs from purely economic motives and becomes overlaid with social content that carries strong expectations of cooperative behavior and abstention from opportunism [Ring and Van de Ven 1992; Zaheer and Venkatraman 1995]. Similar concepts have been espoused in the literature under terms such as social controls [Ghoshal and Moran 1996], relational exchanges [Joshi and Stump 1999], cooperation [Heide and Miner 1992], network governance [Jones, et al. 1997], and informal self-enforcing agreements [Dyer and Singh 1998]. The concept mirrors the notion of *relational embeddedness*, which captures the degree to which exchange parties consider each other's needs and goals [Granovetter 1999; Powell 1990].

Therefore, relationalism can be interpreted as a governance mechanism that reflects implicit open-ended relational contracts to adapt to environmental contingencies and to coordinate and safeguard exchanges. While hierarchies and markets reflect explicit contracts, relationalism is an implicit contract, not legally binding, that has a reciprocal expectation. To the extent this expectation is binding, it serves as a safeguard against opportunism in the relationship. It can further serve as

a basis for *value adding activities* (partnerships, alliances) that go beyond governance. In this study, we conceptualize relationalism based on the behavior of engaging in a dyadic relationship. This involves dimensions of flexibility, shared problem solving, voluntary information exchange, and restraint in the use of power by both parties [Heide and Miner 1992].

IV. TRANSACTION COSTS AND RELATIONALISM

Concern over opportunistic behavior is a primary motivator for firms to incur transaction costs. Within the structure of a buyer-supplier dyad, the assessment of transaction costs by the buyer reflects the supplier's opportunistic propensity. This assessment by the buyer could subsequently lead to behaviors that gauge and react to these costs. While classical TCT predicts hierarchical relationships as an appropriate response to high transaction costs, this response is usually temporal. Firms might act to mitigate transaction costs in the first period by setting up hierarchical relationships in second period. However, concurrently there exists a level of relationalism within the dyad. While transaction costs indicate economic controls and protections on the part of participants, relationalism recognizes relationship preservation as the response to opportunism [Macneil 1980]. In dyads characterized by high relationalism, anticipation of future exchange is viewed as a safeguard for relationship-specific investments because it provides a restraint against opportunism [Heide and John 1990]. Further, self-regulation rather than economic or legal recourse indicates the collaborative orientation required for relationalism [Frazier et al. 1988].

Some studies discuss relationalism in the context of TCT. For instance Jones, et al. [1997] argue that a combination of specific conditions in the transactional environment could propel forms of relationalism.³ The conditions could include customized exchanges high in human asset specificity that require cooperation among exchange parties in order to transfer tacit knowledge. Similarly, tasks that require specialized inputs create behavioral dependence that could heighten the need for cooperative activities. Our primary concern, however, is the manifestation of transaction costs in the dyad.

In general, the costly monitoring and control behaviors incurred in response to potential opportunism are incongruent with the state of relationalism in the dyad. Therefore, we are concerned with the incongruity at any instant between the perceived economic costs in the dyad due to potential opportunism with the level of prevalent relational behavior. In similar vein, Parkhe [1993] found that cooperation in alliances was negatively related to perceptions of opportunistic behavior on the part of the partner. If high levels of monitoring and control characterize a dyadic relationship, then we expect a lower level of relational behavior. Thus,

Hypothesis 1: Assessment of transaction costs in a dyad will be negatively related to the extent of relationalism within that dyad.

³Jones et al. [1997] use the term *network governance* to refer to joint relationships with social controls between entities.

V. THE ROLE OF INFORMATION TECHNOLOGY

Proponents of the information processing view of organizational design have long maintained that uncertainty in the environment gives rise to a need for information processing that should match with capabilities in order to improve performance [Daft and Lengel 1986; Galbraith 1977]. Uncertainty in the transactional environment can increase the potential for opportunism (e.g., due to information asymmetry between the parties) and consequently increase the transaction costs incurred by the parties involved. IT is one prominent mechanism that can be used to better manage these transaction costs by improving interorganizational information processing capabilities [Zaheer and Venkatraman 1994]. Venkatraman [1991] proposes the concept of electronic integration to promote collaboration between partners and reduce uncertainty in the transaction set. This integration could involve automation of exchange procedures and documents and the sharing of applications and databases.

IS researchers have mainly focused on the impact of IT in reducing coordination costs. This includes the cost of exchanging information and incorporating that information into decision processes as well as the cost incurred by the firm due to delays in the communication channel [Clemons et al. 1993]. Within the context of TCT, this is a major component of transaction costs. However, the other major component, transaction risk, includes the risk of opportunistic behavior as well as the risk due to information asymmetry among the parties. One party could shirk responsibilities due to the inability of the other party to monitor. In addition, as indicated earlier, one party could take advantage of the relation-specific investments of the other. In addition to coordination cost, IT can reduce transaction risk by providing effective monitoring capabilities.

In sum, it is our contention that under conditions of high-perceived transaction costs, buyers may seek bilateral investments in IT as mechanisms to manage these costs. These mechanisms could include automation of the exchange processes, better visibility of the processes through information tracking and sharing of databases and applications. We propose that such use of IT within the dyad might be motivated by high transaction costs but will positively affect the level of relationalism. Four arguments can be put forth to support this contention. First, as IT increases the information processing capabilities of a relationship through faster and more accurate exchanges, it requires and enables greater interfirm cooperation in order to make these investments more effective. The nature of interorganizational IT sets the stage for bilateral initiatives in order for rational actors to gain from their investments.⁴ Lack of cooperation on standards and processes can suboptimize benefits obtained from the IT investments. Second, the greater the focus of IT on routine automation and monitoring of exchange data, the more the ability of managers and other boundary spanners to waste less time in regulating operational exchange and more in cooperative activities, many of which require face to face interaction [Bensaou 1997]. Third, new IT enables new forms of electronic cooperation using distributed CAD/CAM systems and other collaborative systems. These systems can lead to relationalism when managers realize the value-added benefits (e.g., cross-company designs) of cooperative behavior. Fourth, many of today's open architectures (e.g. the Internet) may provide cooperation capabilities without the cost and risk of ownership. And even if there is relation-specific capital, cooperation may be required to recoup these investments on a long-term basis. In addition,

⁴This could be reflective of an economic hostage situation where both parties have offsetting investments. However, even though the relationship may be initially based on economic safeguards, we would argue that it sets the stage for informal and social governance structures.

there is some empirical evidence that supports the use of IT and the overall closeness of buyer-supplier relationships [Stump and Sriram 1996].

Therefore, we expect that high-perceived transaction costs would lead to higher use of IT, which in turn would lead to greater levels of relationalism. The duality of IT as both a control mechanism as well as a relationship building mechanism is reflected in this thesis. This can be stated in the form of the following hypothesis:

Hypothesis 2: The use of IT in the dyad will positively mediate the relationship between perceived transaction costs and relationalism.

VI. METHODOLOGY

A survey instrument was used to test the hypotheses proposed. Survey instrumentation allows for a rich assessment of the constructs and facilitates statistical testing of the relationships using a large sample. The unit of analysis for this study was the buyer-supplier dyad. Since the interest was in perceived transaction costs from the vantage point of the buyer, data were gathered from organizational buyers. To limit industry affects, data were restricted to dyadic exchange relationships of electrical equipment manufacturers (OEM) and their component suppliers. This industry reflects a wide range of purchasing arrangements and provides a sampling frame of adequate size. Within the set of buying organizations, the person most knowledgeable of supplier relationships would be the most senior purchasing manager. Consistent with the guidelines of Huber and Power [1985], these individuals were targeted.

An initial set of 1,000 purchasing managers was targeted.⁵ These individuals were asked to identify a single supplier that satisfied four conditions:

- The supplier provides an important input (electronic component) to the production process.
- The company has a relationship (and not a one-time purchase) with this supplier.
- All purchases from this supplier consist mainly of a particular type of component rather than a wide variety of dissimilar components.
- There is an electronic linkage between the company and this supplier (e.g., EDI, extranet, intranet, Internet, etc.).

Respondents were then asked to fill out a carefully designed instrument specifically with respect to the dyadic relationship involving the selected supplier (Supplier S) and component (Component C). Of the 730 organizations that satisfied these criteria, 203 (27%) responded after two rounds of solicitation. To ensure no response bias, difference tests (t-tests and Chi-squared analysis) were conducted on sales volume, number of employees, product type, component type, and order frequency between early and late respondents. No differences were significant (at the $p < 0.01$ level).

⁵The initial list was obtained from a professional information service affiliated with a number of prestigious IS magazines.

MEASUREMENT OF CONSTRUCTS

Constructs were developed based on validated measures in the literature. Rich multidimensional conceptualizations of all three major constructs were used. Transaction costs were measured based on the Pilling et al. [1994] construct consisting of four dimensions: *effort and cost* required in (1) developing the relationship, (2) monitoring the performance of Supplier S, (3) addressing problems that might arise in the relationship with Supplier S, and (4) the likelihood of Supplier S taking advantage of the relationship. Each dimension was measured using multi-item scales adapted from Pilling et al. Some scales were reversed to reduce method bias. Collectively, the dimensions reflect content validity of the construct, incorporating elements of coordination costs and transaction risk discussed earlier. The construct of relationalism was assessed based directly on concepts described and measures validated by Heide and Miner [1992]. Four dimensions of relationalism were (1) flexibility in the relationship, (2) voluntary exchange of useful information, (3) extent of shared problem solving, and (4) restraint in the use of power. Respondents were given a series of statements and asked to indicate their accuracy in describing the state of the relationship. It is important to note that these four dimensions characterize the extent of commitment to cooperative behavior. Finally, IT use was assessed by drawing from the broad concepts of automating, monitoring, and informing [Zuboff 1988] the activities involved in a customer life cycle [Ives and Learmonth 1984]. Automating refers to IT-based automatic (versus manual) routinization of tasks, monitoring describes IT-based surveillance and control, and informing refers to use of IT to generate access to relevant information regarding productive and administrative processes. These three dimensions were operationalized as (1) automation of these activities through IT, (2) monitoring of interactions through IT by having better information flows, and (3) exchange and sharing of databases and files. Each dimension was operationalized using multi-item scales adapted from Premkumar and Ramamurthy [1995] and reflects the extent of use of IT within the context of the dyad. The complete set of items is provided in Appendix A. Figure 1 describes the model being tested.

SAMPLE PROFILE

Tables 1 through 3 illustrate the profile of the sample used for data analysis. The majority of respondents (66%) were responsible for the management of purchasing activities within the firm, as reflected by their title. This included 11 percent in the top management cadre and 32 percent in other management classes (IS, case, supplier-relationship, etc.) who would be in a position to respond to the instrument. The components purchased were all electronic, with a large proportion of them being classical components like integrated circuits, semiconductors, etc. Finally, as shown in Table 3, the sample reflects a wide range of sizes, with about half the sample organizations having sales exceeding \$50 million.

VII. RESULTS

MEASUREMENT MODELS AND VALIDATION

Each individual first order construct was initially analyzed through item-to-total correlations. Items with these correlations as well as commonalities less than 0.40 are dropped. The remaining items are subject to confirmatory factor analysis [Lichtenstein et al. 1993]. In Table 4, item-to-total correla-

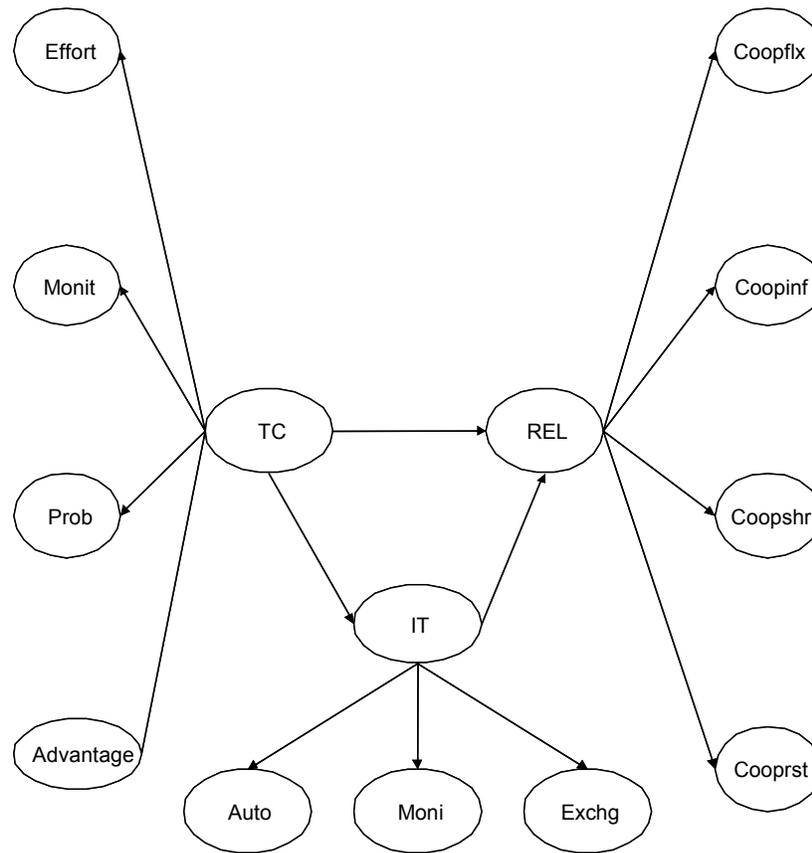


Figure 1. Research Model

Table 1. Job Title

Value of Variable	Actual Meaning	Percentage
1	Top Management Cadre (e.g., Director of Purchasing with significant purchasing responsibility)	7.9
2	Top Management Cadre (same cadre and purchasing responsibility as (1), but not directly related to purchasing)	3.0
3	Management Cadre (e.g., Purchase Manager, Procurement Manager, with lesser purchasing responsibility; occurred most frequently)	55.2
4	Other management	31.0
Missing		2.9

Table 2. Characterization of Component

Value of Variable	Actual Meaning	Percentage
1	Instruments, equipment.	4.9
2	Electrical goods (relays, transformers, etc.)	19.2
3	Mechanical devices (lifts, valves, etc.)	4.4
4	Electronic goods (e.g., ICs, electronic components, semiconductors, etc.) occurring most frequently	36.9
5	Materials, metals, etc.	5.9
6	Chemicals, plastics, molded articles.	4.4
7	Related to computers, software, motherboards, peripherals, etc.	12.8
8	Others (e.g., education, medical services, etc.)	4.9
Missing		6.4

Table 3. Size of Responding Firms

Sales Volume (Million Dollars)	Percentage
— 10	20.2
10 — 50	29.6
50 — 100	8.9
100 — 500	10.3
500 —	18.2
Missing	12.8

tions and factor reliability are obtained from reliability analysis, and completely standardized loadings of indicators on the first order construct are obtained from confirmatory factor analysis. The model fit indices for each individual first order construct are presented in the column labeled "Statistics." Except for the dropped items, all item-to-total correlations and loadings are calculated from the purified models. All remaining indicators have at least 50 percent of their variance in common with the construct [Sharma 1996].

Convergent validity for each first order construct was evaluated by calculating the reliability for each construct [Fornell and Larcker 1981, pp. 45-46]. For example, reliability for effort is .75 (the sum of the item loadings²/[the sum of the item loadings² + error loadings]). Based upon the numbers shown in the final model in Figure 2, the reliability for effort is $(.63+.49+.87+.86)^2 / ((.63+.49+.87+.86)^2 + (.77+.87+.50+.52))$, which is greater than the recommended heuristic of 0.7 for strong convergent validity [Jöreskog and Sörbom 1989; Kline 1998]. As shown in Table 5, all first order constructs have good convergent validity.

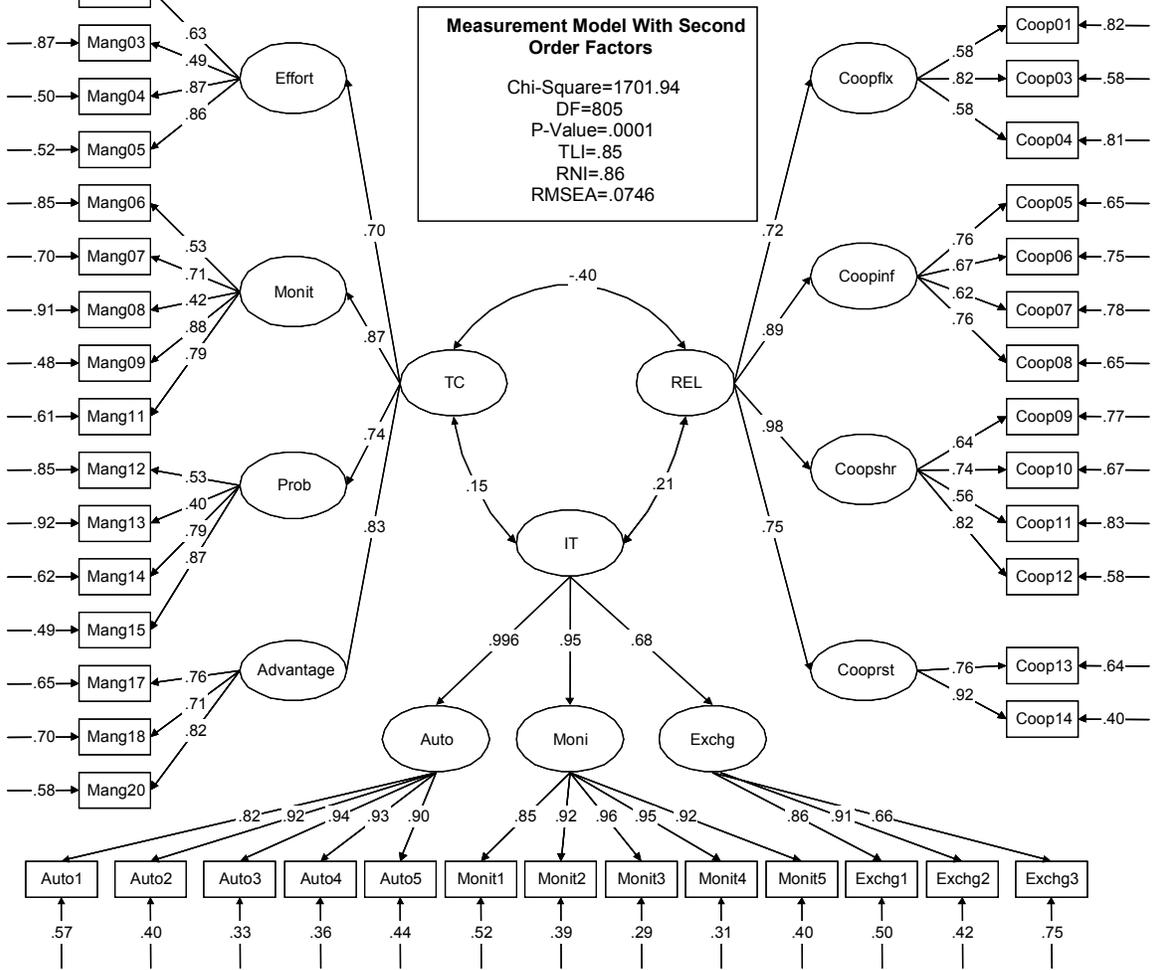


Figure 2. Measurement Model with Second Order Factors

Table 4. Factor Analysis for Each Individual Construct

Second Order Construct	First Order Construct	Indicator Variable*	Item-to-Total Correlation	Completely Standardized Loadings of Indicators on the First Order Construct	Statistics
Transaction Cost	Effort	Mang01	-.15	.17	$\chi^2 = 1.15$ ($p=.56$), $DF = 2$ TLI=1.00, RNI=1.00, RMSEA = .00 Factor Reliability = .79
		(dropped)	.56	.64	
		Mang02	.42	.47	
		Mang03	.74	.87	
		Mang04	.73	.85	
	Monitor	Mang06	.55	.53	$\chi^2 = 39.33$ ($p=.0001$), $DF = 5$ TLI=.81, RNI=.91, RMSEA = .19 Factor Reliability = .80
		Mang07	.56	.71	
		Mang08	.42	.41	
		Mang09	.73	.88	
		Mang10	.31	.26	
		(dropped)	.66	.80	
	Problem	Mang12	.51	.46	$\chi^2 = 38.31$ ($p=.0001$), $DF = 2$ TLI=.55, RNI=.85, RMSEA = .30 Factor Reliability = .74
		Mang13	.43	.35	
		Mang14	.55	.77	
		Mang15	.64	.93	
Advantage	Mang17	.63	.72	$\chi^2 = .00$ ($p=.0001$), $DF = 0$ TLI=., RNI=1.00, RMSEA = .00 Factor Reliability = .80	
	Mang18	.62	.71		
	Mang20	.70	.85		
Relationalism	Coopflex	Coop01	.42	.50	$\chi^2 = .00$ ($p=.0001$), $DF = 0$ TLI=., RNI=1.00, RMSEA = .00 Factor Reliability = .68
		Coop02	.295	.36	
		(dropped)	.60	.90	
		Coop03	.47	.58	
	Coopinfor	Coop05	.64	.74	$\chi^2 = 2.5238$ ($p=.0001$), $DF = 2$ TLI=.993, RNI=.997, RMSEA = .0362 Factor Reliability = .80.
		Coop06	.56	.64	
		Coop07	.60	.69	
		Coop08	.64	.76	
	Coopshare	Coop09	.59	.76	$\chi^2 = 13.32$ ($p=.0001$), $DF = 2$ TLI=.86, RNI=.95, RMSEA = .17 Factor Reliability = .79
		Coop10	.68	.83	
		Coop11	.47	.51	
		Coop12	.64	.72	
	Cooprst	Coop13	.65	.98	$\chi^2 = .00$ ($p=.0001$), $DF = 0$ TLI=., RNI=1.00, RMSEA = .00 Factor Reliability = .68.
		Coop14	.57	.71	
		Coop15	.30	.32	

Table 4. Factor Analysis for Each Individual Construct (Continued)

Second Order Construct	First Order Construct	Indicator Variable*	Item-to-Total Correlation	Completely Standardized Loadings of Indicators on the First Order Construct	Statistics
IT	Auto	Auto1	.81	.82	$\chi^2 = 18.04$ ($p=.0001$), $DF = 5$ TLI=.98, RNI=.99, RMSEA = .11 Factor Reliability = .96
		Auto2	.89	.92	
		Auto3	.92	.95	
		Auto4	.91	.93	
		Auto5	.87	.89	
	Monit	Monit1	.84	.85	$\chi^2 = 18.75$ ($p=.0001$), $DF = 5$ TLI=.98, RNI=.99, RMSEA = .12 Factor Reliability = .96
		Monit2	.90	.92	
		Monit3	.93	.96	
		Monit4	.92	.95	
		Monit5	.90	.92	
	Exchange	Exchg1	.75	.85	$\chi^2 = 0$ ($p=.0001$), $DF = 0$ TLI=., RNI=1.00, RMSEA = .00 Factor Reliability = .84
		Exchg2	.79	.93	
		Exchg3	.59	.63	

*Some indicator variables (e.g., Mang16, Mang19) were dropped from the model based on purification criteria: items were dropped if their item-to-total correlation and commonalities (square of completely standardized loadings) are both lower than .40. The table shows item-to-total correlations and completely standardized loadings for items remaining in the model. Subsequently item Coop 15 was dropped from the measurement model because of values less than 0.40 in the above table.

Discriminant validity analyses are conducted among all first order constructs that are under the same second order construct⁶ [Fornell and Lacker 1981]. As shown in Table 5, 21 out of 30 average extracted variances are greater than the corresponding shared variances between constructs, indicating that discriminant validity is reasonable.

⁶For example, transaction cost is a second order construct. It has four first order constructs: effort, monitor, problem, and advantage. Suppose we are examining discriminant validity between effort and monitor.

1. First, calculate average variance extracted (AVE) for each construct: effort and monitor. AVE for effort is .45 ($= (.63^2+.49^2+.87^2+.86^2)/((.63^2+.49^2+.87^2+.86^2) + (.77+.87+.50+.52))$), and the AVE for monitor is .40 [Fornell and Larcker 1981, p. 46].
2. Second, calculate the shared variance between these two first order constructs (effort and monitor), which is .37 ($= (.70*.87)^2$). Please note, we use the second order factor model to derive the shared variance between these two first order factors.

Third, compare the AVEs with the shared variance, if the AVEs for the constructs are greater than the shared variance between the two first order constructs, then the discriminant validity between the two first order constructs is satisfied. In this case, .45 and .40 are greater than .37, thus, we can conclude that the discriminant validity between effort and monitor is satisfied.

Table 5. Discriminant Validity Analysis

Contrast Between Construct 1 and Construct 2	Loadings of Construct 1 on the Second Order Construct	Loading of Construct 2 on the Second Order Construct	Shared Variance Between Construct 1 and Construct 2	AVE for Construct 1 \geq Shared Variance [†]	AVE for Construct 2 \geq Shared Variance ⁺
Effort (Reliability = 0.75)					
vs. Monitor	0.70	0.87	0.37	Yes	Yes
vs. Problem	0.70	0.74	0.27	Yes	Yes
vs. Advantage	0.70	0.83	0.33	Yes	Yes
Monitor (Reliability = 0.76)					
vs. Problem	0.87	0.74	0.42	Yes	Yes
vs. Advantage	0.87	0.83	0.52	No	Yes
Problem (Reliability= 0.70)					
vs. Advantage (Reliability = 0.73)	0.74	0.83	0.38	Yes	Yes
Coopflx (Reliability = 0.65)					
vs. Coopinf	0.72	0.89	0.41	Yes	Yes
vs. Coopshr	0.72	0.98	0.49	No	No
vs. Cooprst	0.72	0.75	0.29	Yes	Yes
Coopinf (Reliability =0.74)					
vs. Coopshr	0.89	0.98	0.76	No	No
vs. Cooprst	0.89	0.75	0.45	Yes	No
Coopshr (Reliability = 0.73)					
vs. Cooprst (Reliability = 0.73)	0.98	0.75	0.54	No	Yes
Auto (Reliability = 0.91)					
vs. Monit	0.996	0.95	0.89	No	No
vs. Exchange	0.996	0.68	0.45	Yes	Yes
Monit (Reliability =0.92)					
vs. Exchange (Reliability = 0.78)	0.95	0.68	0.41	Yes	Yes

[†]Yes indicates that the average variance extracted (AVE) is at least equal to the shared variance implying discriminant validity

Since the objective was to capture the common variance among first order constructs in a higher order latent measure for each of the three major concepts in the model, a second order model was tested. A second order factor models the correlations among the first order constructs as a higher order latent factor [Segars and Grover 1998]. Therefore, while the first order measurement model simply models the six correlations among the four first order factors in each of relationalism and

transaction cost, the second order model has four paths to the higher order construct as shown in Figure 2. Comparisons are conducted between the second order factor measurement model and the first order factor measurement model for both relationalism and transaction costs in Table 6. In both cases, the second order factors model is not statistically different from first order model. Thus, based on the parsimony principle (i.e., the second order models have four paths instead of six correlations), it is superior to use the second order factor model.⁷ The results for the entire measurement model (i.e., all constructs) is summarized in Table 5 for the first order model, and pictorially depicted in Figure 2. Here again, the models demonstrate comparable fit (i.e., RMSEA is comparable), indicating the appropriateness of accepting the higher-order factor model.

Table 6. Goodness of Fit Indices Comparison of Second Order Factor Model with First Order Factor Model

	Relationalism		Transaction Cost	
	Second Order Model	First Order Model	Second Order Model	First Order Model
Chi-Square	115.81	114.88	250.96	244.31
DF	61	59	100	98
p-Value	.0001	.0001	.0001	.0001
TLI	.93	.93	.87	.87
RNI	.95	.95	.89	.90
RMSEA	.07	.07	.09	.09

Table 7. Whole Measurement Model with Only First Order Factors

Goodness of Fit Index	
Chi-Square	2666.25
DF	1404
p-Value	.0001
TLI	.84
RNI	.84
RMSEA	.07

⁷Since there are only three first order factors for IT, this kind of comparison is not applicable because a correlated three-factor model and a higher order factor model with three factors are mathematically equivalent.

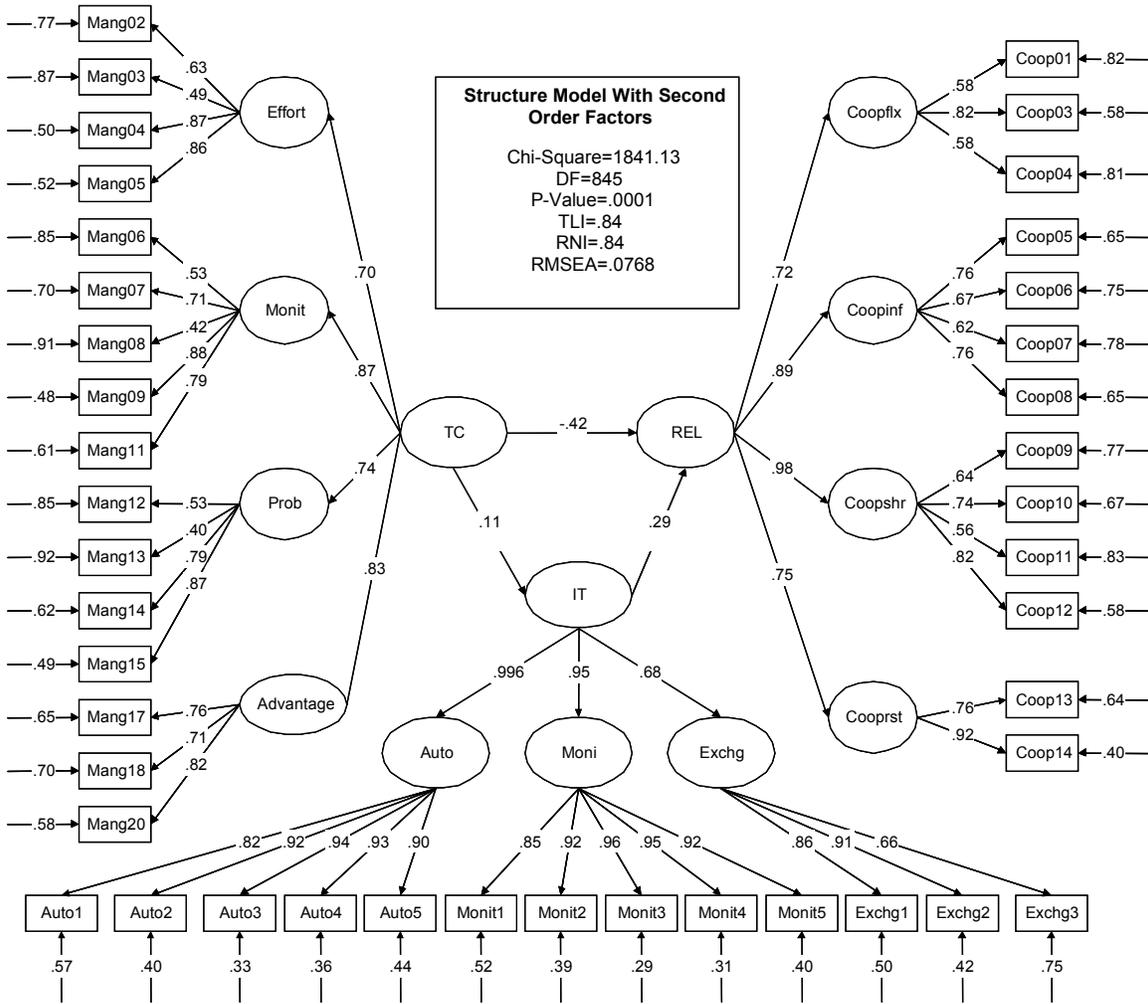


Figure 3. Structure Model

HYPOTHESES TESTING

Structural modeling permits simultaneous estimation of relationships within their network of constructs and is a powerful method to examine direct and mediating effects. The results of the structural model are depicted in Figure 3.⁸ In this model, only the causal paths were estimated. The fit indices indicate a good fit, with the exception of the Chi-square index, which is sensitive to sample size [Kline 1998]. However, a more accurate test is the Chi-square value/degrees of freedom that is less than 3, indicating a good fit [Kline 1998].

The results indicate a strong negative relationship between perceived Transaction Costs and Relationalism (-0.42; $p < 0.01$).⁹ This provides strong support for Hypothesis 1. The mediating role of IT (Hypothesis 2) was also supported as indicated by a significant relationship between transaction costs and IT use (0.11, $p < 0.05$), as well as between IT use and relationalism (0.29, $p < 0.01$). The total indirect effect of IT on the relationship between IT and relationalism is, therefore, positive and significant, as hypothesized.

The results clearly indicate that in conditions of high-perceived transaction costs there is low relationalism within the buyer-supplier dyad. From a TCT perspective, this reflects the fact that high opportunism perceived by buyers results in lower levels of relational governance. More importantly, as hypothesized, the role of IT in the relationship (although not very strong) seems promising. If we presume that high relationalism is a desirable condition, then it seems as if IT use in response to high transaction costs leads to higher levels of relationalism. Alternatively stated, IT use plays a positive role in reducing the negative impact of transaction costs on relationalism. While initial use might be motivated by the need to reduce the effect of high transaction costs by investments in better automation, monitoring, and information exchange systems, the use of these systems within the bilateral structure of the dyad leads to greater use of social and relational controls.

VIII. COMPETITIVE VERSUS COOPERATIVE CYCLES

We can characterize the governance structure between buyers and suppliers in terms of competitive and cooperative cycles. The competitive cycle, epitomized by TCT, uses economic arguments to frame the relationship. As suggested by this study, the state of transaction costs stems from buyers' perceptions of the supplier engaging in opportunistic behavior. The consequences of these perceptions can be reflected in behaviors that seek to reduce opportunism. The economic perspectives espouse rational approaches to do this. Alternatively, the state of relationalism within the dyad reflects aspects of social control. Its users seek to create normative integration by creating an environment where the goals of the collective organizations are internalized [Ghoshal and Moran 1996]. Both the social state of the relationship (relationalism), as well as the rational state (transaction costs and opportunism) coexist within the dyad to different degrees and, as suggested by this study, are in conflict (i.e., negatively correlated). While the cross sectional data analysis precludes

⁸A two-step approach was followed for the structural model with fixed measurement model loadings in model specification [Anderson and Gerbing 1988].

⁹The significant result was robust across three equal subgroups of the sample divided based on high, medium, and low transaction costs. The direct effect of perceived transaction costs on relationalism in each case was negative and significant at $p < 0.01$.

us from making strong causal claims, we would suggest that firms evolve in their relationships to reduce this conflict. One exogenous variable that has been widely studied in this regard is trust [e.g., Zaheer, et al. 1998], which is argued to reduce perceived transaction costs and build relationalism. Another, as we are discovering is investment in and use of IT.

IX. THE ROLE OF IT

There has been some research that suggests that in the U.S. automobile industry, IT promotes competitive rather than cooperative behavior by automating transactions across industry-wide platforms [Bensaou 1997]. Our results suggest that IT use within the OEM electronic industry does facilitate relationalism.¹⁰

From a competitive perspective, the use of IT could be interpreted as a decision made in response to high transaction costs. These could be in the form of IT use that facilitates control of opportunistic tendencies: buyers use IT systems to automate transactions, thereby reducing the uncertainty inherent in ordering, shipping, inventory control, and invoicing. Similarly, IT systems can facilitate careful monitoring of transactions, reducing the ability of suppliers to engage in hidden agendas invisible to the buyer. However, we also find that IT use in turn has a positive impact on relationalism. This would suggest that in decisions to facilitate IT use through the (presumed) agreements between the two parties, cooperative behavior manifests itself. Unfortunately, the results provide little insight into the process through which rational and social controls emerge through IT. We suspect, however, that the results might be different if there had been asymmetrical investments in IT between the two parties.¹¹ In cases where IT investments are asymmetrical, opportunistic behavior rather than relationalism is reinforced, since one party can take advantage of the unique commitment of the other. In cases where IT investment is balanced [Young-Ybarra and Wiersema 1999] or where IT ownership is irrelevant (i.e., the open Internet architectures prevalent today), firms would do well to engage in IT use within the dyad. Nonspecific IT investments allow reduced coordination costs without increased risk of ownership. Balanced investments in IT allow for reduced opportunism and an increased ability to invest in relationalism. A consequence of this will be consistent with the "move to the middle" hypothesis, where buyers forgo the advantages of markets to focus on a few high quality relationships with suppliers [Clemons and Row 1992].

X. THE RELATIONALISM CAVEAT

This study presumes that relationalism is a positive attribute sought within every dyad. This is true from two vantage points. First, partners can achieve an advantage by incurring lower transaction costs. Second, such governance based on trust may allow partners to make investments in relationship-specific investments, share proprietary knowledge, and engage in value-added activities. Such initiatives may result in relational rents that competitors do not obtain due to their unwillingness to engage in these initiatives because of the high costs of safeguarding them [Dyer and Singh 1998].

¹⁰Interestingly, more recent development of business-to-business exchanges like Covisint between GM and Ford is reflective of greater (potential) collaboration.

¹¹Any asymmetric investments were not assessed in our study.

However, there are some caveats. Any long-term relationship can create significant levels of dependence (and vulnerability) for both partners. When partners have invested relational capital in each other, they might be forced to pass on better exchange relationships in the future. Therefore, any asymmetry in the performance of one partner (e.g., lags behind in technology) becomes inextricably linked to the other. Even within the context of interorganizational systems, conflicts can arise [Kumar and van Dissel 1996] and must be constantly managed for success. The most effective governance structure will be contingent on the interplay of cooperative and competitive cycles pertaining to the relational context in question.

XI. LIMITATIONS AND FUTURE RESEARCH

Our study makes important theoretical and empirical contributions to the literature on the governance structure in buyer-supplier relationships and the role of IT within that structure. However, the validity of the implied causal links of the model is limited by the cross-sectional nature of the research design. For instance, our results support the notion that perceived transaction costs give rise to lower levels of relationalism. However, it is also conceivable that a reverse sequence of events is operating and the existence of high relationalism *ex ante* creates a lower perception of transaction costs. While our results are consistent with theoretical specification of events, alternative explanations of the results cannot be completely eliminated. We, therefore, encourage further investigation of the findings based on in-depth case studies. Longitudinal studies can also enhance our understanding of the competitive and cooperative conflict within the relationship as it evolves, the demarcation of reverse causality, the emergence of specific governance structures in response to transaction costs, and factors that could lead to relational behaviors and value-added outcomes.

It could be also argued that even though complex multidimensional variables were examined in the model, the model is oversimplified. A plethora of additional constructs have been studied as antecedents to relationalism and could better contextualize the model. For instance, Saxton [1997] studied the impact of reputation, length of the relationship, and partner similarity and their impact on alliance outcomes. Jones et al. [1997] discuss environmental variables like task complexity, customization, human asset specificity, and frequency of exchanges as antecedent variables that would lead to more social (network) governance. Also, trust [Zaheer et al. 1998] as an exogenous variable could have a potential mitigating influence on both transaction costs and relationalism. With the number of relationships expanding, this area provides fertile ground for developing a more refined network of nomological constructs to better understand the dyadic relationship.

This study also inferred the level of relationalism from the buyer side of the dyad. While we have no reason to believe that this misrepresented the actual cooperative behavior (as measured), a more robust study would examine both sides of the dyad. Additional information on the broader structure of competitive markets (e.g., number and power of buyers and suppliers) could add rich insight into the interpretation of dyadic governance structures.

We would also like to see further work on the types of IT involved in the relationship, rather than just the manifestation of these technologies as assessed in our IT use variable. Better understanding of the relationship-specific versus nonspecific (open) nature of the investment, particularly in today's e-commerce environment would shed light on the rationale behind the cooperative IT cycles. There is evidence that suggests that IT can support a variety of governance modes (i.e., mixed modes of hierarchies and markets) [Holland and Lockett 1997]. This study supports the role of IT in relational governance. Interesting questions regarding the types of IT and their role in various governance modes should also be examined.

Finally, as indicated above, there are two sides to relationalism. We tend to focus on the positive side, which was presumed throughout much of this manuscript. However, the negative implications and tradeoffs involved in locking into a relationship as it pertains to performance are very critical to developing prescriptive implications for this line of research.

XII. CONCLUSION

This study attempts to bridge the gap between predictions of TCT and the relationship orientation observed in today's buyer-supplier environment. In doing so, it attempts to frame the behavioral concept of relationalism within the TCT framework. It also represents one of the first studies in the IS literature to capture, operationalize, and validate rich multidimensional constructs of perceived transaction costs, relationalism, and IT use. Further, a large sample within the OEM electronics industry was used to test the proposed hypotheses using structured equation modeling.

In general, both hypotheses were supported. What is particularly encouraging is that the use of IT has a positive, albeit moderate, mediating effect on the negative relationship between transaction costs and relationalism. This suggests that organizations might consider IT investment decisions as an appropriate mechanism to facilitate cooperative behavior between companies. This is true despite the fact that investments in IT might initially be made to alleviate opportunism.

The general framework of this study provides tremendous opportunities for researchers to further explore the evolution of competitive and cooperative mechanisms implicit in the model. This line of inquiry is critical in contemporary environments where (1) choice of governance structures and their effectiveness is increasingly within the control of the dyadic players and (2) relationalism is becoming more pervasive with increasing hypercompetition and knowledge-based exchanges between firms.

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APPENDIX A: INSTRUMENTATION¹²

PERCEIVED TRANSACTION COSTS

This Section discusses issues on *how you established and are maintaining your working relationship* with Supplier S. We want to measure the amount of effort and costs that were required to set up and maintain this relationship. Please indicate the extent to which you agree with the following statements by circling the appropriate number:

In developing an association with Supplier S (with respect to Component C):

- It was understood in advance what this relationship would involve (Mang01)
- Significant effort was required to gather the information necessary to outline the working relationship with Supplier S (Mang02)
- It was straightforward and easy to work out the main issues and necessary details of the relationship with Supplier S (Mang03)
- There were many unspecified terms which had to be worked out as the relationship with Supplier S developed (Mang04)
- It required significant effort to determine individual roles to be performed by our firm and Supplier S (Mang05)

In Monitoring the performance of Supplier S:

- It is easy to tell if we were receiving fair treatment from Supplier S (Mang06)
- It takes significant effort to detect whether or not Supplier S conforms to specifications and quality standards (Mang07)
- We are in a good position to evaluate how fairly our Supplier S deals with us (Mang08)
- Accurately evaluating Supplier S requires a lot of effort (Mang09)
- There is not much concern about Supplier S taking advantage of this Relationship (Mang10)
- It is costly, in time and effort, to clearly monitor the performance of Supplier S (Mang11)

¹²Note that some of the items are reverse coded.

In addressing problems that might arise in the relationship with Supplier S:

- The approach to solving problems in our relationship with Supplier S is clear-cut (Mang12)
- There are standard solutions or approaches to problems that might occur with Supplier S (Mang13)
- Problem-solving is often challenging, due to the nature of Component C (Mang14)
- Although solutions to problems can be achieved, they would often need to be highly customized (Mang15)

Concerning the likelihood of Supplier S taking advantage of its relationship with our firm:

- There are no incentives for Supplier S to pursue their interests at the expense of our interests (Mang16)
- It is easy for Supplier S to alter the facts in order to get what they wanted (Mang17)
- There is a strong temptation for Supplier S to withhold or distort information for their benefit (Mang18)
- It is difficult for Supplier S to promise to do things and get away without actually doing them later (Mang19)
- There exists, from Supplier S's perspective, a significant motivation to take advantage of unspecified or unenforceable contract terms (Mang20)

RELATIONALISM

Please indicate the extent to which you believe that the following descriptions regarding your relationship with Supplier S are completely accurate (1) or completely inaccurate (7) (Please circle the appropriate number):

Flexibility:

- Flexibility in response to requests for changes is a characteristic of this relationship (Coop01)
- When some unexpected situation arises, the parties would rather work out a new deal than hold each other to the original terms (Coop02)
- It is expected that the parties will be open to modifying their agreements if unexpected events occur (Coop03)
- Changes in previously agreed prices are not ruled out by the parties, if considered necessary (Coop04)

Information exchange:

- In this relationship, it is expected that any information that might help the other party will be provided to them (Coop05)
- Exchange of information in this relationship takes place frequently and informally and not only according to a prespecified agreement (Coop06)
- It is expected that the parties will provide proprietary information if it can help the other party (Coop07)
- It is expected that the parties keep each other informed about events or changes that may affect the other party (Coop08)

Shared problem solving:

- In most aspects of this relationship the parties are jointly responsible for getting things done (Coop09)
- Problems that arise in the course of this relationship are treated by the parties as joint rather than individual responsibilities (Coop10)
- The parties in this relationship do not mind owing each other favors (Coop11)
- The responsibility for making sure that the relationship works for both parties is shared jointly (Coop12)

Restraint in the use of power:

- The parties feel it is important not to use any proprietary information to the other party's disadvantage (Coop13)
- A characteristic of this relationship is that neither party is expected to make demands that might be damaging to the other (Coop14)
- The parties expect the more powerful party to restrain the use of its power in attempting to get its way
- Time (Coop15)

IT USE**Automating the Interactions with IT**

The following activities pertain to your firm's interactions with Supplier S. Please indicate the extent to which these activities are *carried out manually* or *executed automatically* by the application of information technology.

- Exchanging information in components requirements, availability, price, etc (Auto1)
- Ordering Components C (Auto2)
- Shipping and receiving Components C (Auto3)
- Inventory control (for Components C) (Auto4)
- Invoicing and payment for Components C (Auto5)

Monitoring the Interactions with IT

Please indicate the extent to which information technology has helped in *monitoring, tracking, and discovering problems*, etc. with respect to the following activities that pertain to your firm's interactions with Supplier S:

- Exchanging information in components requirements, availability, price, etc (Monit1)
- Ordering Components C (Monit2)
- Shipping and receiving Components C (Monit3)
- Inventory control (for Component C) (Monit4)
- Invoicing and payment for Components C (Monit5)

The following questions pertain to your electronic linkage with Supplier S

Please indicate the extent of your company's computing interaction with Supplier S:

- Our company shares databases with Supplier S (Exchg1)
- Our company share application with Supplier S (Exchg2)
- Our company exchanges files with Supplier S (Exchg3)

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