

This is the author's final, peer-reviewed manuscript as accepted for publication. The publisher-formatted version may be available through the publisher's web site or your institution's library.

What makes outsourcing effective - a transaction-cost economics analysis

Chenlung Yang, John G. Wacker, Chwen Sheu

How to cite this manuscript

If you make reference to this version of the manuscript, use the following information:

Yang, C., Wacker, J. G., & Sheu, C. (2012). What makes outsourcing effective - a transaction-cost economics analysis. Retrieved from <http://krex.ksu.edu>

Published Version Information

Citation: Yang, C., Wacker, J. G., & Sheu, C. (2012). What makes outsourcing effective? A transaction-cost economics analysis. *International Journal of Production Research*, 50(16), 4462-4476.

Copyright: © 2012 Taylor and Francis

Digital Object Identifier (DOI): doi:10.1080/00207543.2011.600345

Publisher's Link: <http://www.tandfonline.com/doi/full/10.1080/00207543.2011.600345>

This item was retrieved from the K-State Research Exchange (K-REx), the institutional repository of Kansas State University. K-REx is available at <http://krex.ksu.edu>

What Makes Outsourcing Effective – A Transaction Cost Economics Analysis

Chenlung Yang
Department of Technology Management
Chung Hua University
Hsinchu, Taiwan
clyang@chu.edu.tw

John G. Wacker
Supply Chain Management Department
Arizona State University
Tempe, Arizona
john.wacker@asu.edu
j.wacker@cox.net

Chwen Sheu*
Department of Management
101 Calvin Hall
Kansas State University
Manhattan, KS 66506
csheu@ksu.edu

**Corresponding author*

WHAT MAKES OUTSOURCING EFFECTIVE – A TRANSACTION COST ECONOMICS ANALYSIS

1. Introduction

Outsourcing has become an important source of competitive advantage and it is expected to remain an important component of business strategy in future years (Broedner et al. 2009, Kroes and Ghosh 2010, Wee et al. 2010). In their comprehensive review of the outsourcing literature, Hatonen and Eriksson (2009) found a lack of investigation on effective management of existing outsourcing transactions. Considering that many outsourcing decisions lead to failures, it is vital that managers have a good understanding of what makes outsourcing effective. In particular, how can managers safeguard against uncertainties and opportunism typically associated with an inter-organizational transaction such as outsourcing? What governance mechanism can managers adopt to ensure that both the buyer and the supplier work together as intended to accomplish the outsourcing objective, enhancing manufacturing competitiveness?

Outsourcing is essentially an inter-organizational business transaction. Conventionally, the formal governance mechanism of a business transaction is the contract. The contract is the foundation for the overall business transaction and it provides formal control of the interactions between the buyer and the supplier regarding their responsibilities and behaviors (Jiang et al. 2008, Yao et al. 2010). Nonetheless, for various reasons, such as technology and market uncertainties, not all aspects of an inter-organizational transaction are likely to be completely detailed by the contract (Handley and Benton 2009). Consequently, additional control mechanism such as relational adaptation (buyer-supplier collaboration, joint problem solving, and information sharing) becomes necessary for settling contractual disputes and safeguarding completion of transactions (Narasimhan et al. 2010, Peterson et al. 2002, van Hoek 2000). For

instance, Monczka et al. (2008) suggested a buyer-supplier partnership could serve as “dispute prevention” to reduce dispute litigation resulting from contractual conflicts. Cooperative or relational adaptation is especially critical to business transactions in a global business environment where normal contractual guidelines may not account for cultural differences or anticipate all potential changes (Liu et al. 2009). Consequently, proper use of these two governance mechanisms (formal contractual clauses and informal relational adaptation) in accordance with the nature of business transactions is vital to the success of outsourcing.

Transaction Cost Economics (TCE) has been suggested as a theoretical framework to determine an effective institutional structure (markets versus hierarchies) and associated governance mechanisms for supply chain transactions (Grover and Malhotra 2003, Vivek et al. 2008; Williamson 2008). The primary purpose of TCE is to explain why transactions in certain institutional arrangements operate with different degrees of efficiency. TCE posits that the alignment of transaction attributes (asset specificity, uncertainty, frequency of transaction, ease of performance assessment) and institutional structure leads to higher transactions efficiency. Previous supply chain studies have applied TCE to examine the choice and benefits of outsourcing (e.g., Houston and Johnson 2000, McNally and Griffin 2004). What is notably missing from the literature is an understanding of the operationalization of inter-organizational governance mechanism and the strategic influence of selected mechanisms (Houston and Johnson 2000). For instance, three transaction attributes (asset specificity, uncertainty, frequency of transactions) that characterize the nature of transactions (Williamson 1979, 1999) are often used to predict the efficiency of outsourcing decisions. Nonetheless, the use of governance mechanisms, such as legal contractual clauses and relational adaptation (informal buyer-supplier cooperation), to mediate the effectiveness of outsourcing transactions has never been properly

studied. In particular, the central theme of TCE—*how transactions are governed to achieve efficiency*—is not fully addressed in the extant outsourcing research. As the trend and pressure of outsourcing continues (Hatonen and Eriksson 2009), an important question to ask is “How can existing transactions be more effective?” rather than “Should outsourcing be done?”.

This study intends to extend the academic discussion of TCE and outsourcing to the selection and execution of governance mechanisms for effective outsourcing transactions. In reality, businesses need good legal contracts and buyer-supplier cooperation to manage “bounded rationality” in outsourcing (Liu et al. 2009, Monczka et al. 2008). We use contractual governance and relational adaptation as independent variables, as opposed to simply using transaction attributes, to predict the effectiveness of outsourcing as measured by manufacturing competitiveness. This approach allows for the development and testing of a TCE-based outsourcing model regarding the meditational effect of governance mechanisms. Therefore, in response to the call from the literature (Grover and Malhotra 2003, Williamson 2008), our objective is to provide a better understanding as to *how* firms follow up on their outsourcing decisions to enhance manufacturing competitiveness through the combined applications of contractual governance and relational adaptation. The relative efficacy of these two forms of governance is also examined.

The following section reviews relevant literature to develop a TCE-based outsourcing model that depicts the relationship among key TCE variables including transaction attributes, governance mechanism, and manufacturing competitiveness. A number of research hypotheses are proposed, followed by a discussion of research methodology, including samples and measurements. The statistical results and discussion are presented and, finally, managerial implications and suggestions for future research are provided.

2. Theoretical Development

2.1 TCE and SCM

The framework of TCE is frequently used to determine the proper governance structure of corporate transactions and what activities should be internalized versus purchased (Williamson 2008). TCE argues that firms select the organizational structure with the lowest transaction cost that effectively safeguards against partner opportunism, ensures that partners fulfill contractual obligations, and provides a framework for dealing with uncertainties (Kogut 1988, Williamson 1999). Market and hierarchies are two polar modes of institutional arrangements. The market-mode features high-powered incentives, little administrative control, and a legal-rules contract law regime (Williamson 1979, 1985). In contrast, a fully integrated vertical structure, or hierarchy, applies low-powered incentives, considerable administrative control, and the courts are deferential to management. Business transactions often takes place in a hybrid mode, a compromise mode that is located between market and hierarchy arrangements regarding the level of control and the use of contract law regime. The viability of the hybrid approach may depend on the efficacy of the governance mechanisms employed in the transaction. Specifically, detailed and fixed contracts (with multiple clauses) and relational adaptation serve the purpose of safeguards (Peterson et al. 2002), which helps to avoid irrational and opportunistic behaviors and to offset the risks of dependencies resulting from transaction specificity.

Summarizing from Williamson (1979, 1985), Rindfleisch and Heide (1997), and Peterson et al. (2002), Figure 1 displays a general TCE framework regarding the relationships among transaction attributes, institutional structure, hybrid forms of governance mechanism, and transaction effectiveness. Governance mechanism has two basic elements, contractual

governance and relational adaptation. When these two mechanisms are both implemented, it is referred as hybrid governance (Peterson et al. 2002). Overall, TCE proposes to choose the most efficient institutional structure supported by some sorts of governance mechanism and, hence, safeguards against opportunism and contributes to transaction effectiveness.

<Insert Figure 1 here>

The concept of TCE has long been discussed and applied in the fields of strategy, marketing, and organizational behavior. In the operations management area, the concept became popular with the advent of supply chain management research (Grover and Maholtra 2003, Hobbs 1996, Williamson 2008). Supply chain management is a form of vertical inter-organizational relationships. Any transactions between trading partners are managed without common ownership. Based on the concept of TCE, several studies defined a supply chain as a hybrid governance structure and, thereby, justified the outsourcing decision and verified the benefit of the decision. Table 1 is a list of selected literature pertinent to the application of the TCE framework for outsourcing decisions. Most literature either verified the benefits of outsourcing or demonstrated the choice of institutional structure (e.g., make-buy, joint action) based on transaction attributes. For instance, Poppo and Zenger (1998) identified business conditions when a joint action is the preferred inter-organizational structure. They found that asset specificity and performance ambiguity increase dependency between transaction parties and opportunism, which in turn discourages outsourcing. McNally and Griffin (2004) examined the effects of asset specificity, risk, and price emphasis in business transactions on the level of joint action. Rabinovich et al. (2007) found that asset specificity, environmental risk, and performance ambiguity decrease the degree of the reliance on logistic service providers. Verwaal et al. (2008) verified the negative effect of asset specificity and environmental risk on outsourcing.

<Insert Table 1 here>

The literature review reveals one glaringly missing piece in the extant research regarding what makes an inter-organizational transaction like outsourcing effective. In light of the TCE framework in Figure 1, both institutional structure and governance mechanism should be aligned with transaction nature in order to achieve transaction effectiveness. To date, outsourcing studies have extensively examined the relationship between various transaction attributes and institutional structure (outsourcing or not). Nevertheless, the execution and effectiveness of different forms of governance mechanisms, such as legal contract and relational adaptation, have not been properly examined. Moreover, with few exceptions, most studies did not empirically verify the strategic benefits of outsourcing decisions (Kroes and Ghosh 2010). Consequently, a question is raised as to whether outsourcing automatically guarantees success even with perfectly matching transaction attributes (i.e., low levels of asset specificity and environmental risk, and high frequency of transactions). Additionally, what are the roles of popular governance mechanisms, such as contract and buyer-supplier collaboration, to the strategic implications of outsourcing? The extant literature does not offer satisfactory answers to these questions. The discussion of the relationships between transaction attributes and institutional structure along the market-hierarchy continuum is insufficient to describe/prescribe how hybrid governance enhances the effectiveness of transactions. Therefore, this study would contribute to the literature by addressing the research question: ***“How do firms make their outsourcing effective by choosing and executing hybrid forms of governance mechanisms to safeguard against opportunism to achieve manufacturing competitiveness?”***

2.2 Conceptual Model and Research Hypotheses

Figure 2 displays a conceptual model that hypothesizes the relationships among key TCE variables, including environmental risk (technological, behavioral, market), asset specificity (supplier investment), performance ambiguity (difficulty of measuring supplier performance), contractual governance, relational adaptation (buyer-supplier cooperation), and manufacturing competitiveness. The model addresses the research question of what makes an outsourcing decision effective. It considers two primary hybrid governance mechanisms (contractual governance and relational adaptation) as a function of asset specificity, uncertainty, and performance ambiguity (Rabinovich et al. 2007). Contractual governance safeguards opportunism by solidifying *ex ante* agreements with an exchange partner. In contrast, relational adaptation emphasizes coordination, joint problem solving, and information sharing to reduce opportunism since contracts may not be able to control all unforeseen factors (Peterson et al. 2002, Rindfleisch and Heide 1997, Yao et al. 2010). Note that transaction frequency is not included as a transaction attribute since it is considered to be a less significant factor (Rindfleisch and Heide 1997). The research premise is, given an existing outsourcing transaction, that how well firms safeguard and adapt would subsequently influence the effectiveness of outsourcing as measured by manufacturing competitiveness. The remainder of this section uses this conceptual model to develop the related research hypotheses.

<Insert Figure 2 here>

The first transaction attribute in the model, asset specificity, refers to the transferability of investment that support a given transaction between a firm and the provider of a good or service (Rindfleisch and Heide 1997, Williamson 1985). Joskow (1987) investigated the relationship between asset specificity and the length of contracts. When supplier asset specificity increases, the supplier is more vulnerable to holdup in future transactions because of dedicated assets. In

the meantime, the buyer is also vulnerable to holdup because of switching costs (Rabinovich et al. 2007). In other words, transaction-specific investments give rise to a safeguarding problem and mechanisms must be provided to minimize the risk of subsequent opportunistic exploitation (Williamson 1985). As a result, when specificity increases, both sides may rely on establishing certain contract terms to reduce holdup risk (van Hoek 2000). On the other hand, specific investments would increase commitment to the relationship or the level of information interactions engaged in by buyers and suppliers (Anderson and Weitz 1992). Overall, there is general agreement that asset specificity is positively related to both contractual and relational adaptation (Heide and John 1990, 1992, Joskow 1987, Liu et al. 2009, Parkhe 1993).

Accordingly, the following hypotheses are proposed.

H1: There is a positive relationship between supplier asset specificity and the use of contractual governance for safeguarding.

H2: There is a positive relationship between supplier asset specificity and the use of relational adaptation for safeguarding.

The second transaction attribute, environmental risk, results from unexpected variation in circumstances surrounding the transaction. It may include a lack of knowledge about demand, technology, behavior, or providers' performance. Environmental risks are pervasive in all supply chains and have important effects on supplier governance (Buvik 1998, Ellram et al. 2008, Lockamy and McCormack, 2010). When aspects of transactions are highly uncertain, firms face adaptation and information processing problems. A buyer will face safeguarding costs, such as expenditures incurred in fully specifying in advance and continually adjusting to changes. To the extent the relevant contingencies are too numerous or unpredictable to be specified *ex ante* in a contract, an adaptation problem exists (Buvik 1998) and mechanisms must be put in place to permit adjustments to be made as events unfold. More precisely, a buyer could include certain

clauses in the contract to prevent its supplier from being opportunistic (Dahistrom and Nygaard 1999, Jiang et al. 2008). Nonetheless, there are limits on the amount of uncertainty that can be managed through contractual clauses, and firms could choose to rely on coordination and information sharing to improve transaction effectiveness (Grover and Malhotra 2003, Rindfleisch and Heide 1997). In summary, environmental risks may be lessened by both contractual governance and relational adaptation, which supports the development of the following hypotheses.

H3: There is a positive relationship between environmental risk and the use of contractual governance

H4: There is a positive relationship between environmental risk and the engagement of relational adaptation

Another transaction attribute to be considered is performance ambiguity. The newness of technology may drive performance measurement complexity and ambiguity (Ellram et al., 2008). Conceptually, performance ambiguity encourages opportunistic behavior by both supplier and buyer. The supplier can take advantage of poor specifications and not fulfill important requirements (McIvor 2009, Stratman 2008). On the other hand, poor specifications can provide the buyer with the opportunity to claim that some specifications were implicit in the agreement. In either case, the governance mechanism is required to safeguard against the opportunism arising from performance ambiguity. In particular, as performance ambiguity increases, firms are less able to write complete incentive contracts (Jensen and Meckling 1976). To reduce the problem of opportunism, firms must rely not only on contractual terms, but also execute cooperation for safeguarding (Heide and Miner 1992, Houston and Johnson 2000). Therefore, the less exact the performance specifications, the greater the need for control and adaptation. Accordingly, we posit the following hypotheses.

H5: There is a positive relationship between newness of technology and performance measurement ambiguity

H6: There is a positive relationship between performance measurement ambiguity and contractual governance

H7: There is a positive relationship between performance measurement ambiguity and relational adaptation

Several studies have suggested that relational adaptation serves as a substitute for the enforcement of formal contracts and control (Nooteboom et al. 1997, Parkhe 1993). This study uses the likelihood that the contract clauses will be enforced as the presence of formal contractual governance. The informal agreement for sharing information and solving problems reduces the likelihood of enforcing contractual clauses for safeguarding. Moreover, both contractual governance and relational adaptation safeguard against uncertainties and opportunism, and thereby enhance outsourcing performance. Effective contracting practices could make outsourcing outcomes more predictable and mitigate the risks associated with opportunism (Jiang et al. 2008, Liu et al. 2009, Poppo and Zenger 2002). Better control and coordination provisions from contractual governance would then lead to better outsourcing performance (Thomas et al., 2009). Similarly, several studies asserted that information sharing and joint problem solving provide the necessary flexibility to curtail uncertainties and opportunism, which makes a firm more competitive (Dyer and Chu, 2003).

Rindfleisch and Heide (1997) and Grover and Malhotra (2003) asserted most TCE studies failed to demonstrate TCE's performance implications. Several studies (Hatonen and Eriksson 2009, McIvor 2010, Kroes and Ghosh 2010) suggested that research should focus on the impact outsourcing has on a firm's ability to compete. The performance criterion of TCE is often narrowly limited to just the costs and not the benefits from the transaction. The benefit of

outsourcing transactions is derived from the buyer better utilizing its resources, which leads to better competitiveness performance. Since the benefits are realized from the execution of the contract with the support of informal buyer-supplier cooperation, they are considered endogenous variables determined by the governance mechanism. Accordingly, we hypothesize that increases in the use of the contractual governance and relational adaptation will be positively related to overall competitive performance.

H8: There is a negative relationship between relational adaptation and contractual safeguards

H9: There is a positive relationship between contractual governance and manufacturing competitiveness performance

H10: There is a positive relationship between relational adaptation and manufacturing competitiveness performance

3. Research Methodology

3.1. Data and Measures

The data were gathered by the Global Manufacturing Research Group (GMRG). GMRG is a multinational community of researchers studying the improvement of manufacturing practices worldwide (www.gmrg.org). The GMRG consists of leading international academic researchers from over twenty countries who developed the GMRG database survey instrument for use around the world. This survey facilitates a global comparison of the effectiveness of manufacturing practices (Whybark et al. 2009). Since 1985, the GMRG has conducted four rounds of worldwide surveys that have been utilized in many OM studies (Kull and Wacker 2010, Schmenner and Vastag, 2006, Schoenherr 2010). This study used data from the GMRG 4.0 Sample with 969 cases from 17 countries and 22 industry classifications (Table 2). The data were collected during 2007 and 2010.

<insert Table 2 here>

Seven sets of constructs and measures are developed to test the research hypotheses (Table 3). They are Asset Specificity (AS), Environmental Risk (ER), Performance Ambiguity (PA), Newness of Technology (NT), Contractual Governance (CG), Relational Adaptation (RA), and Manufacturing Competitiveness (MC). With the exceptions of Asset Specificity, Performance Ambiguity, and Newness of Technology, all other latent variables were measured by multiple items. The scale for ER assesses the level of uncertainty associated with the market, technology, and behaviorism. Technology risk is caused by failure of the purchased item to meet the requirements of either the buyer's system or the buyer's customer. Market risk is the failure of the purchased item to satisfy customer need. Behavioral risk is the degree to which there is supplier opportunism. As suggested by (Rendfleisch and Heide 1997, p.42), these three risks are combined as indicator variables for the latent construct called environmental risk.

<insert Table 3 here>

The CG scale assesses the likelihood of including and enforcing contractual clauses to protect from termination, quality problems, and late delivery. It measures the probability that a violation of a contract clause will be enforced (Mesquita and Brush 2008). The RA scale measures the commitment both sides make to solving problems, remaining flexible in solving quality issues, sharing schedule information, and relying on implicit agreements to work out details not included in the formal contract (Heide and John 1990, 1992). AS measures the level of the supplier's investment in physical assets and/or processes to meet the buyer's unique needs (Rindfleisch and Heide 1997). PA is the level of difficulty in precisely determining the supplier's performance (Poppo and Zenger 1998). NT is the percentage of the supplier's products developed by recent technology. Finally, the scale for MC has respondents rate their

competitiveness as compared to their major industry competitors (Ketokivi and Schroeder, 2004). It captures the four main dimensions of manufacturing competitiveness: cost, quality, flexibility, and delivery. These four factors are incorporated to make a single competitiveness factor to simplify overall manufacturing competitiveness. The scale was verified by previous GMRG studies (Pagell et al. 2005, Whybark et al. 2009, Kull and Wacker 2010).

3.2 Psychometric Properties

All multiple-item variables were tested for internal consistency using Cronbach's alpha and construct reliability. As shown in Table 3, the Cronbach's alpha coefficients ranged from 0.73 to 0.89, while the construct reliabilities ranged from 0.73 to 0.84. This indicated a high internal consistency of measurement indicators; hence, the reliability of each variable was ensured (Bagozzi and Yi 1988). Since the multi-attributed variables are defined by the literature they have face validity.

Next, convergent validity and discriminant validity were assessed. O'Leary-Kelly and Vokurka (1998) suggested that the use of CFA to assess convergent and discriminant validity is more powerful and requires fewer assumptions than the traditional MTMM (multi-trait multi-method) matrix method. In the CFA model, each item was linked to its corresponding construct and the covariances among those constructs were freely estimated. The resulting model fit indices are $\chi^2(237) = 529.916$, NFI = .92, CFI = .94, RMSEA = .054, which were better than the threshold values recommended by Hu and Bentler (1999). Moreover, all of the factor loadings were greater than 0.50 and were statistically significant at $p < .05$. Overall the convergent validity and unidimensionality were validated (Hair et al. 1998).

A discriminant validity test was performed to establish the distinction among the variables used in this study and can be supported if the average variance extracted (AVE) is larger than the

squared correlations between variables (Fornell and Larcker 1981). As shown in Table 4, all four pairs of the squared correlations were smaller than the AVE of the respective variables. Hence, discriminant validity is supported.

<insert Table 4 here>

4. SEM Analysis and Results

4.1 Full and Partial Mediation Model

Two control factors are included in the study, country and firm size (the total number of plant employees). We found no significant statistical relationship to performance variables. To fully understand the relationships among the transaction attribute variables (AS, ER, PA, governance mechanism (CG, RA), and performance (MC) in Figure 2, we examine two competing models, full and partial mediation, using structural equation modeling (SEM) with the Maximum Likelihood Estimation (MLE) technique. The difference between the full mediation and partial mediation models is that the latter adds the exogenous variables AS, ER, and PA to the former model as predictors of MC. The two models are nested and can be compared with a chi-square difference test with the null hypothesis that the three direct effects/paths between the exogenous variables and dependent variable are zero. The extant literature assumes that transaction attributes (AS, ER, PA) determine outsourcing effectiveness without considering the mediation effect of governance mechanism. Comparison of the two competing models helps in understanding the *total* effects of the transaction attributes with the incorporation of the indirect effects of governance mechanism (CG and RA).

The SEM results of the full mediation model were presented in the first column of Table 5. The overall fit indices of the model are $\chi^2_{(122)} = 545.49$, RMSEA = .059; CFI = 0.92; NFI = 0.90;

GFI = .94, and they are within acceptable scope (Hu and Bentler, 1998), suggesting that the model was a good fit to the data.

<insert Table 5 here>

The statistical results lend support for H1 and H2 that asset specificity (AS) increases the use of both contractual governance (CG) and relational adaptation (RA). Both CG and RA help to reduce irrational and opportunistic behaviors because of the dependencies resulting from transaction specificity. Our samples also rely on legal contracts to curtail early contract termination, late delivery, and poor quality performance due to environmental risk; thus, H3 is supported. This result verifies previous findings that detailed and fixed contracts (with multiple clauses) serve the purpose of safeguarding against opportunism from uncertainties (van Hoek, 2000; Williamson, 2008). To our surprise, environmental risk has a significant negative relationship with buyer-supplier cooperation (RA). As such, H4 is not supported.

As expected, newness of technology (NT) makes it difficult for the buyer to measure supplier performance (PA), supporting H5. Interestingly, performance ambiguity does not increase the use of contractual governance. Instead, our samples resort to informal and mutual cooperation to deal with problems from measurement ambiguity. H7 is supported but not H6. The results indicate that not all uncertainties can be detailed in the contract and informal adaptation is a necessary ingredient to deal with the gray areas of an outsourcing transaction.

Another surprising finding is the non-significant relationship between relational adaptation and contractual governance; thus, H8 is not supported. Mutual trust and collaboration have no significant impact on the enforcement of contractual clauses for safeguarding. (As a side comment, the SEM analysis also failed to find the covariance between contractual governance and relational adaptation.) Finally, as expected, both contractual governance and relational

adaptation improve manufacturing competitiveness, supporting H9 and H10. Both governance mechanisms appear to have significant direct effects on performance, which implies that they could indirectly influence the effects of transaction attributes.

Adding the direct links $AS \rightarrow MC$, $Risk \rightarrow MC$, and $PA \rightarrow MC$ to the full mediation model creates a partial mediation model with $\chi^2_{(119)} = 529.77$. The model specifications, goodness-of-fit statistics and path coefficients of the partial mediation model are also summarized in Table 6. All the fit indices and the significance of paths are virtually identical with the first model. Both models provide the same results for all research hypotheses. However, the χ^2 difference ($\Delta\chi^2_{(3)} = 545.49 - 529.77 = 15.72$) between the two models is statistically significant (the critical $\chi^2_{(3)}$ value is 11.3 for $p < .01$). Accordingly, we reject the null hypothesis, suggesting that not all direct effect paths between exogenous variables and manufacturing competitiveness are zero. Therefore, the second model (partial mediation) is a better fitting model to describe the relationships among all variables. A schematic representation of the final structural model with standardized path coefficients is displayed in Figure 3.

<insert Figure 3 here>

In summary, of 13 causal paths (10 specified in the research hypotheses) in the partial mediation model, nine were found to be statistically significant. The path $ER \rightarrow MC$ that was not specified *a priori* proved to be an essential component of the causal structure. The negative coefficient (-.18) suggests that a higher degree of uncertainties from market, technology, and behaviorism reduce the level of manufacturing competitiveness. Asset specificity and performance ambiguity have non-significant direct effects and minimal influences on manufacturing competitiveness. Nonetheless, their total effects, after consideration of indirect

effects from the CG and RA, reveal interesting findings. The remainder of this section discusses the mediation effect of CG and RA.

4.2 Mediation Effect of Governance Mechanism

A validated partial mediation model allows us to make an in-depth analysis of direct and indirect effects of transaction attributes on performance. Such an analysis is valuable since previous studies primarily focused on the direct effects of transaction attribute, but not their indirect effects through the choice and execution of contractual governance and relational adaptation.

Table 6 summarizes the total and indirect effects of the transaction attributes AS, ER, and PA. Their total effects on manufacturing competitiveness (MC) are greater than their direct effects. In other words, their indirect effects from the execution of contract and cooperation display positive influences on transaction performance. For instance, the direct effect of AS on MC is .03 (non-significant). Nonetheless, AS increases the use of contractual governance (standardized coefficient = .27) and relational adaptation (.26), and both have positive influence on competitiveness (.21 and .13). The indirect effect of asset specificity from both contract and cooperation is .10 ($p < .01$), which in turn increases the total effect to .13 ($.03 + .10, p < .01$). Therefore, the governance mechanism, CG and RA, is essentially a full mediator for the impact of AS on MC. In other words, while asset specificity itself does not have significant influence on manufacturing competitiveness, the practices of contractual governance and relational adaptation indirectly and significantly enhance the effects of asset specificity on transaction performance.

<insert Table 6 here>

Similar observations were made from the other two exogenous variables. The negative effect of environmental risk was reduced from $-.18$ to $-.16$ (both are significant at $p < .01$) with the

indirect effect of .02 from governance mechanism. The influence of performance measurement ambiguity on manufacturing competitiveness turns positive (from $-.03$ to $.05$ with $p < .05$), after incorporating its indirect effect from governance mechanism. It appears that governance mechanism significantly mitigates opportunism problems arising from the difficulties of assessing supplier performance. **Overall, the indirect effect that all transaction attributes received from contractual governance and relational adaptation help to improve their influence (total effects) on manufacturing competitiveness.** Evidently, governance mechanism mediates the effectiveness of outsourcing transactions.

5. Discussion

Previous TCE studies primarily consider transaction attributes to determine whether outsourcing should be done. Our statistical results reveal that, among three transaction attributes, environmental risk is the only factor that has significant direct influence on outsourcing performance, measured as manufacturing competitiveness. Nonetheless, governance mechanism, contractual governance and relational adaptation, mediates the effect of all three transaction attributes. In general, both contractual governance and relational adaptation seem to provide effective safeguards against risk, asset specificity, and performance ambiguity, which ultimately lead to greater competitiveness. Taken together, the results indicate that it is insufficient to review outsourcing decisions by merely examining transaction attributes without considering the meditational effects of governance mechanism.

While the governance mechanism has significant mediation effect, we found that, with the exception of asset specificity, contractual governance and relational adaptation are not equally effective to safeguard against opportunism. Trading parties actively engage in both contractual clauses and informal cooperation to protect special supplier investment. Nonetheless, our sample

firms rely on informal agreements and mutual trust, rather than legal contracts, to deal with measurement difficulties. This is consistent with previous studies arguing that legal contracts cannot address all uncertainties (e.g., Handley and Benton 2009).

Meanwhile, our samples choose to increase contractual governance but not buyer-supplier cooperation to safeguard against environmental risk. In fact, they even reduce the level of relational adaptation in response to increased risk (-.13 at Risk \rightarrow RA). That could be a reaction where, as risk increases, there is more distrust (possibly due to the blame for uncertainties) causing less informal cooperation. During a post-survey interview, a plant manager in China expressed his disappointment with how his supplier, without prior discussion, postponed a delivery due to the upstream material shortage. Disgusted by the supplier's action, the plant manager called off several meetings and reduced the level of interaction with the supplier. It appears when a supplier exhibits that type of behavior, distrust develops and the buyer may choose to curtail informal cooperation and simply rely on formal contracts to manage the outsourcing. Regardless of the real causes of the reduced relational adaptation, our results suggest that firms are missing a great opportunity for improving transaction effectiveness.

6. Conclusions

There is ample evidence indicating that the trend of outsourcing will continue and managers must understand what make their outsourcing transactions effective (Hatonen and Eriksson 2009, Kroes and Ghosh 2010, Wee et al. 2010). What would really interest managers the most from a research perspective is "*Why do some succeed and other fall in their outsourcing endeavors?*" (Hatonen and Eriksson 2009, p. 149). The outsourcing decision must go beyond make-or-buy and address the "how" question in terms of making outsourcing transactions successful.

Accordingly, we identified two specific hybrid mechanisms, legal contract and informal adaptation, along which an outsourcing transaction is structured. We developed and validated a TCE-based outsourcing model that depicts the relationships among key TCE variables. The results suggest that manufacturing firms rely on both types of governance mechanisms to safeguard against special investment, risk, and performance ambiguity, which lead to manufacturing competitiveness.

Overall, this study contributes to the literature by confirming the mediation effects of governance mechanisms, a very important aspect of outsourcing transactions that has not been properly examined. Apparently, the indirect effects of contractual governance and relational adaptation can “make outsourcing effective.” For outsourcing to be a viable strategy, firms must apply both mechanisms properly in alignment with the nature of transaction and environmental conditions. The important managerial and research implication is that it is insufficient to merely discuss the relationships among the attributes of transaction and governance structure along the market-hierarchy continuum. Such discussion fails to recognize how various forms of hybrid governance mechanisms can be implemented to enhance the effectiveness of transactions.

Our results offer valuable suggestions to outsourcing practices. Managers must recognize the *relative efficacy* and the contingency of the two forms of governance, contractual clauses and buyer-supplier cooperation. Contractual governance was found to be very effective for mitigating the risk from market, technology, behaviorism and special investment. A contract is a critical juncture for determining the success of a commercial relationship. In light of the growth of global sourcing, outsourcing involves multiple jurisdictions with an inconsistent legal framework. Companies must carefully study the content and the role of contracts in enhancing global outsourcing performance.

However, the managers must realize the limitations of using legal contract as a governance mechanism. Namely, not all performance measurement difficulties resulted from the use of new technology can be addressed by contractual clauses. Firms must engage in relational adaptation to become flexible when facing performance ambiguity. This finding responds to and validates the call from the literature (Nooteboom et al. 1997, Grover and Malhotra 2003) for more studies on the issue of trust and social norms in TCE and inter-organizational transaction research. Our results suggest managers must engage in the practice of “transformational outsourcing” within which supply chain partners work closely to develop network competence, and the organizational boundaries between buyers and suppliers fade (Hatonen and Eriksson, 2009). The development of informal buyer-supplier collaboration is especially critical for the manufacturing from western world to engage in outsourcing in some Asian countries such as China, Korea, and Japan (Liu et al. 2009).

Another important research implication is regarding the structure of inter-firm relationships for outsourcing management. Outsourcing implies a generic departure from market and an implicit move toward hierarchical governance. Heide (1994) suggested that nonmarket governance cannot be described by a single continuum, and we show that outsourcing can be structured and governed by the combination of different forms of governance mechanisms. This study examines only two particular mechanisms, contract and relational adaptation. Exploring other specific safeguards in response to transaction attributes or a particular environment should be a fruitful avenue for future research. Specifically, the relative efficiency of various hybrid governance mechanisms (e.g., supplier selection, supply base rationalization) in addressing particular opportunistic problems associated with outsourcing should be further studied.

There should always be a caveat regarding the bounded rationality of the limited factors that are considered in any empirical study. There are many factors beyond the current investigation that may affect the statistical results. For example, national differences influence supply chain and outsourcing decisions (Pagell et al. 2005, Schoenherr 2010) and how such differences affect the institutional structure of outsourcing transactions and effectiveness of various governance mechanisms needs to be studied (Liu et al. 2009, Youngdahl et al. 2008). It is also unknown how much industry differences affect the selection and execution of governance mechanism (Rosen et al. 2001, Hartland et al. 2005). In any case, the TCE governance framework presented in this study provides a guideline for a more incisive analysis of how firms govern suppliers to control opportunism. In future studies, more factors can be studied to provide specific guidelines for more detailed analyses.

References

- Anderson, E., B. Weitz. 1992. The use of pledges to build and sustain commitment in distribution channels. *Journal of Marketing Research* **29** 18-34.
- Bagozzi, R.P., Y. Yi. 1988. On the evaluation of structural equation models. *Journal of the Academy of Marketing Science*, 16 (1), 74-94.
- Broedner, P., S. Kinkel. L. Gunter. 2009. Productivity effects of outsourcing: New evidence on the strategic importance of vertical integration decisions. *International Journal of Operations and Product Management*, 29 (2), 127-150.
- Buvik, A. 1998. The effect of manufacturing technology on purchase contracts. *International Journal of Purchasing and Materials Management*, Fall, 21-28.
- Dahistrom, R., A. Nygaard. 1999. An empirical investigation of ex post transaction costs in franchised distribution channels. *Journal of Marketing Research*, 36 (2), 169-170.
- Dyer, J., W. Chu. 2003. The role of trustworthiness in reducing transaction costs and improving performance: empirical evidence from the United States, Japan, and Korea. *Organization Science*, 14 (1), 57-68.
- Ellram, L.M., W.L. Tate, C. Billingham. 2008. Offshore outsourcing of professional services: A transaction cost economics perspective. *Journal of Operations Management*, 26 (2), 148-163.
- Esperne, E. 2009. Outsourcing and Contract Law. *Inside Supply Management*, July, 12-13.

- Fornell, C., D. Larcker. 1981. Structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39-50.
- Grover, V., M.K. Malhotra. 2003. Transaction cost framework in operations and supply chain management research: Theory and measurement. *Journal of Operations Management*, 21, 457-473.
- Hair, J.F., R.E. Anderson, R.L. Tatham, W.C. Black. 1998. *Multivariate Data Analysis* (Fifth Edition). Prentice Hall. Upper Saddle River, NJ.
- Handley, S.M., W.C. Benton. 2009. Unlocking the business outsourcing process model. *Journal of Operations Management*, 27 (5), 344-361.
- Hartland, C., L. Knight, R. Lamming, H. Walker. 2005. Outsourcing: Assessing the risks and benefits for organizations, sectors, and nations. *International Journal of Operations and Production Management*, 25 (9), 831-850.
- Hatonen, J., T. Eriksson. 2009. 30+ years of research and practice of outsourcing – exploring the past and anticipating the future. *Journal of International Management*, 15 (2), 142-155.
- Heide, J.B. 1994. Interorganizational Governance in Marketing Channels. *Journal of Marketing*, 58 (January), 71-85.
- Heide, J.B., G. John. 1990. Alliances in industrial purchasing: The determinants of joint action in buyer-supplier relationships. *Journal of Marketing Research* 27 24-36.
- Heide, J.B., G. John. 1992. Do norms matter in marketing relationships? *Journal of Marketing*, 56 (2), 32-44.
- Heide, J.B., A.S. Miner. 1992. The shadow of the future: Effects of anticipated interaction and frequency of contact on buyer-seller cooperation. *The Academy of Management Journal*, 35 (2), 265-291.
- Hobbs, J. 1996. A transaction cost approach to supply chain management. *Supply Chain Management*, 1 (2), 15-27.
- Houston, M.B., S.A. Johnson. 2000. Buyer-supplier contracts versus joint ventures: Determinants and consequences of transaction structure. *Journal of Marketing Research* 37 1-15.
- Hu, L., P.M. Bentler. 1999. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6 (1), 1-55.
- Jensen, M., W. Meckling. 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305-360.
- Jiang, B., G. Reinhardt, S.T. Young. 2008. BOCOG's outsourcing contracts: The vendor's perspective. *Omega*, 36 (6), 941-949.
- John, G., B.A., Weitz, 1988. Forward integration into distribution: an empirical test of transaction cost analysis. *Journal of Law, Economics, and Organization*, 4, 121-139.
- Joskow, P. 1987. Contract duration and relationship-specific investments: Empirical evidence from coal markets. *The American Economic Review*, 77 (1), 168-185.

- Ketokivi, M.A., R.G. Schroeder. 2004. Strategic, structural contingency and institutional explanations in the adoption of innovative manufacturing practices. *Journal of Operations Management*, 22 (1), 63–89.
- Kroes, J.R, S. Ghosh. 2010. Outsourcing congruence with competitive priorities: Impact on supply chain and firm performance. *Journal of Operations Management*, 28 (2), 124-143.
- Kogut, B. 1988. Joint ventures: Theoretical and empirical perspectives. *Strategic Management Journal*, 9 (4), 319-332.
- Kull, T., J.G. Wacker. 2010. Quality management effectiveness in Asia: The influence of culture. *Journal of Operations Management*, 28 (3), 223-239.
- Levy, D.T. 1985. The transaction cost approach to vertical integration. *Review of Economics and Statistics*, 67, 438-445.
- Liu, Y., Y. Luo, T. Liu. 2009. Governing buyer-supplier relationships through transactional and relational mechanisms: Evidence from China. *Journal of Operations Management*, 27 (4), 294-309.
- Lockamy III, A., K. McCormack. 2010. Analysing risks in supply networks to facilitate outsourcing decisions. *International Journal of Production Research*, 48(2), 593 – 611
- Maltz, A.B. 1994. Outsourcing the warehousing function: Economic and strategic considerations. *Logistics and Transportation Review*, 3, 245-265.
- Masten, S.E., J.W. Meehan, E.A. Snyder. 1991. The cost of organization. *Journal of Economic Behavior and Organization*, 7 (1), 1-25.
- McIvor, R. 2010. The influence of capability considerations on the outsourcing decision: the case of a manufacturing company. *International Journal of Production Research*, 48(17), 5031-5052.
- McIvor, R. 2009. How the transaction cost and resource-based theories of the firm inform outsourcing evaluation. *Journal of Operations Management*, 27 (1), 45-63.
- McNally, R.C., A. Griffin. 2004. Firm and individual choice drivers in make-or-buy decisions: A diminishing role for transaction cost economics? *The Journal of Supply Chain Management*, 4-17.
- Mesquita, L.F., T.H. Brush. 2008. Untangling safeguard and production coordination effects in long-term buyer-supplier relationships. *Academy Management Journal*, 51 (4), 785-807.
- Millstein, J.S., T. Roughton. 2009. Cost-saving strategies for contracts. *Supply Chain Quarterly*, 3-6.
- Monczka, R.M., R.B. Handfield, L. C. Giunipero, J.L. Patterson. 2008. *Purchasing and Supply Chain Management* (4th Edition). South Western Educational Publishing. Cincinnati, OH.
- Narasimhan, R., S. Narayanan, R. Srinivasan. 2010. Explicating the mediating role of integrative supply management practices in strategic outsourcing: a case study analysis. *International Journal of Production Research*, 48(2), 379 - 404.
- Nooteboom, B., J. Berger, N.G. Noorderhaven. 1997. Effects of trust and governance on relational risk. *Academy of Management Journal*, 40 (2), 308-338.

- O'Leary-Kelly, S.W., R.J. Vokurka. 1998. The empirical assessment of construct validity. *Journal of Operations Management*, 16 (4), 387-405.
- Pagell, M., J.P. Katz, C. Sheu. 2005. The importance of national culture in operations management research. *International Journal of Operations and Production Management*, 25 (4), 371-394.
- Parkhe, A. 1993. Strategic alliance structuring: A game theoretic and transaction cost examination of interfirm cooperation. *Academy of Management Journal*, 36(4), 794-829.
- Peterson, H. C., A. Wysocki, S.B. Harsh. 2002. Strategic choice along the vertical coordination continuum. *International Food and Agribusiness Management Review*, 4, 149-166.
- Poppo, L., T. Zenger. 1998. Testing alternative theories of the firm: Transaction cost, knowledge-based, and measurement explanations for make-or-buy decisions in information services. *Strategic Management Journal*, 19 (9), 853-877.
- Rabinovich, E., A. M. Knemeyer, C. M. Mayer. 2007. Why do Internet commerce firms incorporate logistics service providers in their distribution channels? The role of transaction costs and network strength. *Journal of Operations Management*, 25 (3), 661-681.
- Rindfleisch, A., J.B. Heide. 1997. Transaction cost analysis: Past, present, and future applications. *Journal of Marketing*, 61 (4), 30-54.
- Rosen, M.C., J. Bercovitz, S. Beckman. 2001. Environmental supply-chain management in the computer industry: A transaction cost economics perspective. *Journal of Industrial Ecology*, 4 (4), 83-103.
- Schmenner, R.W., G. Vastag. 2006. Revisiting the theory of production competence: Extensions and cross-validations. *Journal of Operations Management*, 24 (6), 893-909.
- Schoenherr, T., 2010. Outsourcing decisions in global supply chains: An exploratory multi-country survey. *International Journal of Production Research*, 48(2), 343-378.
- Stratman, J.K. 2008. Facilitating off shoring with enterprise technologies: Reducing operational friction in the governance and production of services. *Journal of Operations Management*, 26(2) 275-287.
- Thomas, D.J., Warsing, D.P., X. Zhang. 2009. Forecast updating and supplier coordination for complementary component purchases. *Production and Operations Management*. 18 (2), 167-184.
- van Hoek, R.I. 2000. The purchasing and control of supplementary third-party logistics services. *The Journal of Supply Chain Management*, 36(4), 14-26.
- Verwaal, E., A.J. Verdu, A. Recter. 2008. Transaction costs and organizational learning in strategic outsourcing relationships. *International Journal of Technology Management*, 41 (1/2), 38-54.
- Vivek, S., D.K. Banwet, R. Shankar. 2008. Analysis of interactions among core, transaction and relationship-specific investments: The case of off shoring. *Journal of Operations Management*, 26 (2), 180-197.
- Wee, H., S. Peng, P. Wee. 2010. Modelling of outsourcing decisions in global supply chains. An empirical study on supplier management performance with different outsourcing strategies. *International Journal of Production Research*, 48(7), 2081 – 2094.

- Whybark, C., J. Wacker, C. Sheu. 2009. The evolution of an international academic manufacturing survey. *Decision Line*, May, 17-19.
- Williamson, O.E. 1979. Transaction cost economics: The governance of contractual relations. *Journal of Law and Economics* **22** 233-262.
- Williamson, O.E. 1985. *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*. The Free Press, New York.
- Williamson, O.E. 1999. Strategy research: Governance and competence perspectives. *Strategic Management Journal*, 20 (12), 1087-1108.
- Williamson, O.E. 2008. Outsourcing: Transaction cost economics and supply chain management. *Journal of Supply Chain Management*, 44 (2), 5-16.
- Yao, T., B. Jiang, S.T. Young, S. Talluri. 2010. Outsourcing timing, contract selection, and negotiation. *International Journal of Production Research*, 48(2), 305-326.
- Youngdahl, W., K. Ramaswamy, R. Verma. 2008. Exploring new research frontiers in off shoring knowledge and service processes. *Journal of Operations Management*, 26 (2), 135-140.

Table 1. Selected TCE-based outsourcing literature

TCE & Outsourcing literature	Independent variables	Dependent variables	Remark (major findings)
Levy, 1985	Asset specificity (AS), Environmental risk (ER)	Vertical integration	AS and ER increased vertical integration
John and Weitz, 1988	Asset specificity (AS), Environmental risk (ER)	Percentage of direct channel (DC)	AS and ER increased percentage of DC
Heide and John, 1990	Asset specificity (AS), Environmental risk (ER), Performance ambiguity (PA)	Joint action	AS, ER and PA increased Joint action
Masten et al., 1991	Asset specificity (AS), Environmental risk (ER)	Outsourcing	AS and ER decrease outsourcing
Maltz, 1994	Asset specificity (AS), Transaction frequency (TF)	Probability of outsourcing	AS decreased outsourcing; TF increased outsourcing
Poppo and Zenger, 1998	Asset specificity (AS), Performance ambiguity (PA)	Outsourcing	AS and PA discouraged outsourcing
van Hoek, 2000	Asset specificity (AS), Environmental risk (ER), Performance ambiguity (PA)	Details of Contract clause	AS and PA increased contract details
McNally and Griffin, 2004	Asset specificity (AS), Environmental risk (ER)	Joint action	AS and ER discouraged joint action
Rabinovich et al., 2007	Asset specificity (AS), Environmental risk (ER), performance ambiguity (PA)	Reliance on service provider (Percentage of orders managed by a provider)	AS, ER and PA decreased reliance
Verwaal et al., 2008	Asset specificity (AS), Environmental risk (ER)	Outsourcing	AS and ER decreased outsourcing

Table 2. Samples

(a) Country distribution

Country	Frequency	Country	Frequency
(1) Albania	15	(11) South Korea	115
(2) Australia	30	(12) Macedonia	39
(3) Austria	17	(13) Mexico	105
(4) China	57	(14) Poland	57
(5) Croatia	82	(15) Sweden	32
(6) Fiji	110	(16) Switzerland	31
(7) Germany	59	(17) Taiwan	50
(8) Ghana	63	Total	969
(9) Hungary	53		
(10) Italy	54		

(b) Industry distribution

Industry	Freq.	Percent	Industry	Freq.	Percent
Electronic and other Equipment	124	12.8%	Motor vehicles, trailers and semi trailers	18	1.9%
Industrial machines and computer equipment	116	12.0%	Other manufactured transport equipment	16	1.6%
Fabricated metal	115	11.9%	Apparel and Other finished Products	13	1.3%
Food Products GMP	60	6.3%	Lumber and wood products	12	1.2%
Textile Mill Products	37	3.8%	Leather and other products	8	0.8%
Stone clay glass and concrete products	33	3.3%	Primary metal industries	8	0.8%
Furniture and fixtures	30	3.1%	Petroleum refining and related products	5	0.5%
Rubber and Plastic products	30	3.1%	Recycling	2	0.2%
Chemical and allied products	25	2.6%	Miscellaneous Manufacturing	258	26.7%
Measuring analyzing and control photographic, medical equipment	23	2.3%	Total	969	100.0%
Paper and allied products	18	1.9%			
Printing and Publishing and Allied Industries	18	1.9%			

Table 3. Reliability analysis (N = 969)

Dimensions	Items	Factor loading	Cronbach α	Construct Reliability
1. Asset Specificity (AS)	• Physical asset investment (OU11I)	---	---	---
2. Risk/Uncertainty (R) (1=No risk, 7=Extremely risky)	• Technology risk associated with this supplier's products	0.66	0.7279	0.7287
	• Behavioral risk associated with the attitudes of this supplier	0.73		
	• Market Risk associated with the attitudes of this supplier	0.67		
3. Performance measurement Ambiguity (PA)	• Easy to determine the performance of this supplier (OU11B)	---	---	---
4. Newness of Technology	• (%) supplier products tech developed recently (OU9D)	---	---	---
5. Relational Adaptation (RA) (1=Completely Agree, 5=Completely Disagree)	• There is a standard approach when solving a problem with this supplier	0.72	0.8505	0.8425
	• This supplier and my firm are committed to relationship of mutual respect, that is, we do not alter facts to own advantage	0.73		
	• This supplier and my firm are committed to flexibility when solving performance problems	0.75		
	• This supplier and my firm rely on 'implicit agreements' for exchange contingencies not covered by 'formal written agreements'	0.76		
	• This supplier and my firm are committed to working out details after contract is signed	0.63		
6. Contractual Governance (CG) (The likelihood such clauses may be legally enforced: 1 = Clause does not exist; 7-extremely likely.)	• Financial repayment if contract is terminated prior to its ending date	0.68	0.7925	0.801
	• Exclusivity clause (that is, are you an exclusive supplier by contract?)	0.51		
	• Damage for poor technical performance	0.80		
	• Damage for late delivery	0.82		
7. Manufacturing Competitiveness (MC) (How does your plant's performance compare with your major competitors? 1=Far worse, 7=Far better)	• Manufacturing costs	0.59	0.8875	0.8360
	• Product costs			
	• Raw material costs			
	• Product features	0.68		
	• Product performance			
	• Product quality	0.77		
	• Order fulfillment speed			
	• Delivery speed			
	• Delivery as promised	0.78		
	• Delivery flexibility			
	• Flexibility to change output volume			
• Flexibility to change product mix				

Table 4. Discriminant validity analysis

	1	2	3	4	5	6	7
1. Manufacturing Competitiveness	(0.503)						
2. Contractual Governance	0.200	(0.509)					
3. Cooperative Adaptation	-0.077	-0.104	(0.518)				
4. Performance Ambiguity	-0.095	-0.102	0.343	(---)			
5. Asset Specificity	-0.022	0.236	0.071	-0.025	(---)		
6. Environmental Risk	-0.115	0.116	0.110	0.216	0.041	(0.472)	
7. Newness of Technology	-0.079	0.025	-0.029	-0.086	-0.023	0.021	(---)

Note: the numbers in the lower triangular matrix are correlations; the numbers in parentheses are AVE.

Table 5. SEM results

Path (Hypothesis)	Full Mediation		Partial Mediation	
	Std. parameter estimate (<i>t</i> -value)	Significance	Std. parameter estimate (<i>t</i> -value)	Significance
AS → CG (H1)	.27 (6.03)	Supported **	.27 (6.06)	Supported **
AS → RA (H2)	.27 (6.37)	Supported **	.26 (6.25)	Supported **
Risk → CG (H3)	.15 (3.21)	Supported **	.16 (3.43)	Supported **
Risk → RA (H4)	-.15 (-3.06)	Not supported **	-.13 (-2.64)	Not supported **
NT → PA (H5)	.09 (2.69)	Supported **	.09 (2.69)	Supported **
PA → CG (H6)	.03 (.53)	Not supported	.03 (.63)	Not supported
PA → RA (H7)	.49 (10.33)	Supported **	.49 (10.42)	Supported **
RA → CG (H8)	.12 (1.84)	Not supported	.12 (1.83)	Not supported
CG → MC (H9)	.18 (4.19)	Supported **	.23 (4.52)	Supported **
RA → MC (H10)	.18 (3.84)	Supported *	.13 (2.03)	Supported *
AS → MC (added)			.03 (.80)	Insignificant
Risk → MC (added)			-.18 (-3.87)	Significant**
PA → MC (added)			-.03 (-.74)	Insignificant
Fit indices	Chi-square/df = 545.49/122, RMSEA = .059 (0.054 ; 0.065); CFI = 0.92; NFI = 0.90; GFI = .94		Chi-square/df = 529.77/119, RMSEA = .059 (0.054 ; 0.064); CFI = 0.92; NFI = 0.91; GFI = .94	

* $p < .05$; ** $p < .01$

Table 6. Analysis of total and indirect effects of transaction attributes

Path (Transaction attributes to Manufacturing competitiveness)	Total Effect¹	Direct Effect¹	Indirect Effect¹
AS → MC	.13**	.03	.10** = [.27 + .26(.12)](.21) + .26(.13) Decomposition CG: AS →CG→MC & AS→RA→CG→MC; RA: AS→RA→MC
Risk → MC	-.16**	-.18**	.02 = [.16 + (.13)(.12)](.21) + (-.13)(.13) Decomposition CG: Risk →CG→MC & Risk→RA→CG→MC RA: Risk→RA→MC &)
PA → MC	.05	-.03	.08** = [.03+.49(.12)](.21) + .49(.13) Decomposition CG: PA →CG→MC & PA→RA→CG→MC RA: PA→RA→MC

¹Standardized coefficient (* $p < .05$; ** $p < .01$)

Figure 1. TCE framework

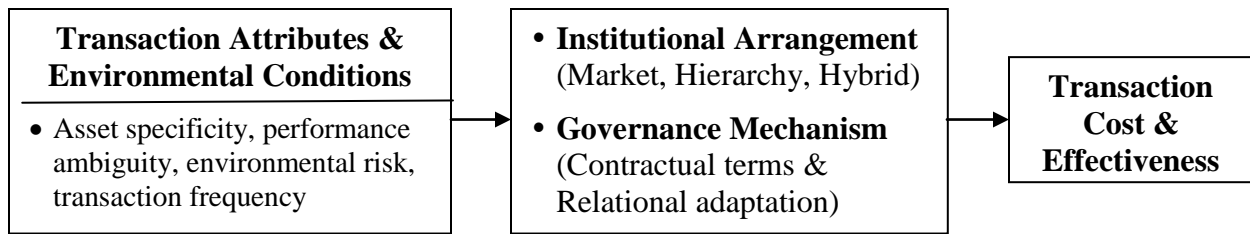


Figure 2. The hypothesized model

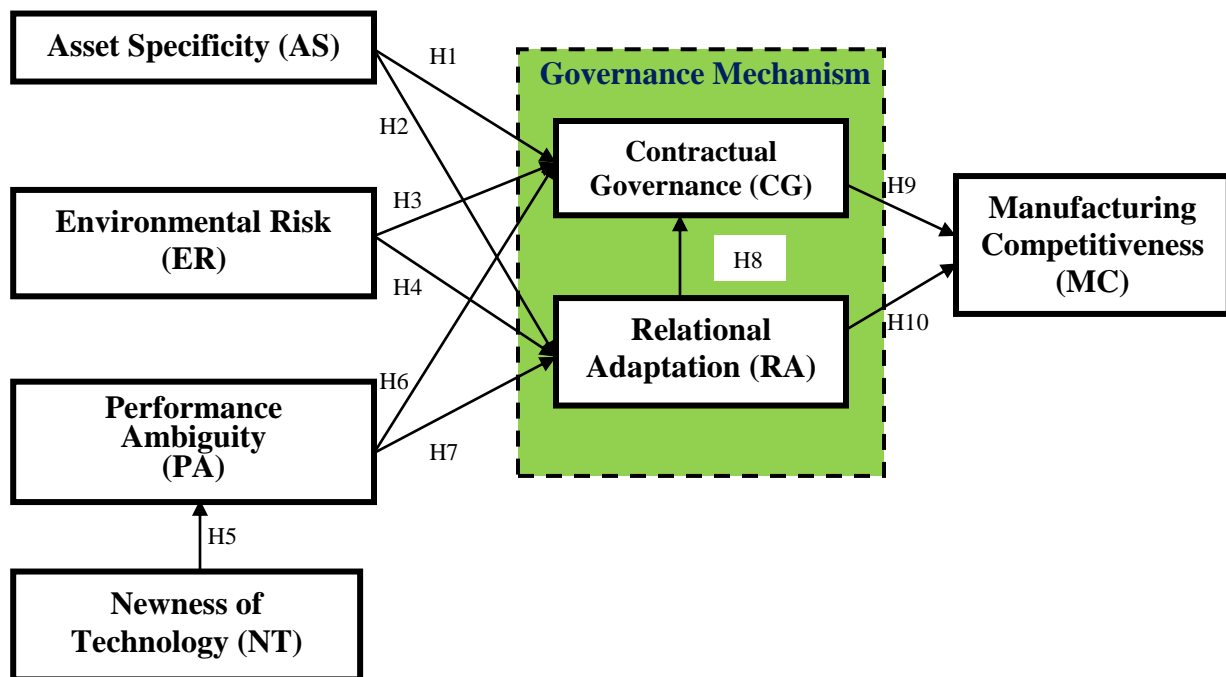
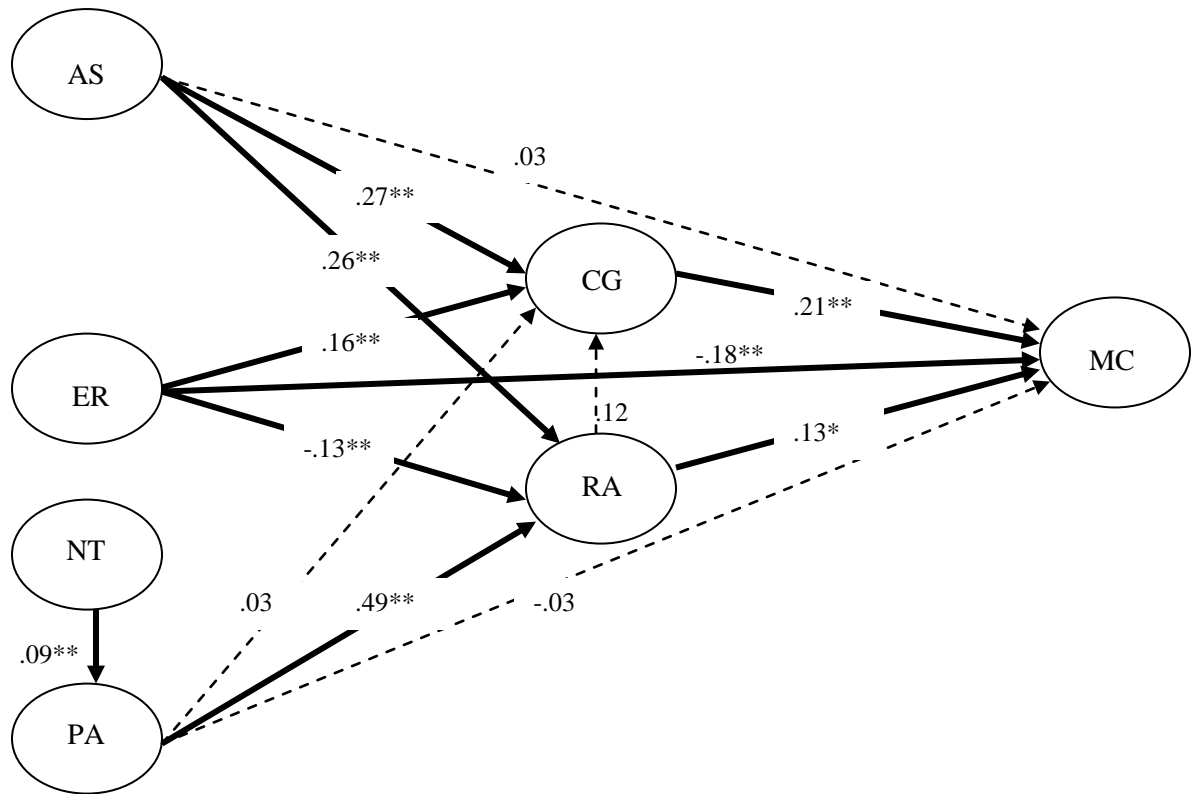


Figure 3. Final structural model (partial mediation)



* $p < .05$; ** $p < .01$

Note:

(a) Dashed arrows denote path for which coefficients are not significant at the .05 level.

(b) For the revised model excluding insignificant paths, Chi-square/df = 532.41/123, RMSEA = .059 (0.054; 0.064); CFI = 0.92; NFI = 0.91; GFI = .94