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# Governance decisions for the offshore outsourcing of new product development in technology intensive markets

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ABSTRACT

This study addresses how buyers organize their offshore outsourcing new product development relationships. Building on transaction cost economics and resource dependence theories, we propose a model of the influence of key new product development offshore outsourcing factors on two important buyers' governance decisions (i.e., supply concentration and degree of supplier involvement). The antecedents, drawn from the marketing, management, and international business literatures, include: three sources of asset specificity (degree of modularity, strategic value of the project, and technology specificity) and two sources of uncertainty (cultural distance and technological discontinuity). The results, derived from an analysis of 200 offshore outsourcing new product development relationships, provide new insights for academics and practitioners.


## 1. Introduction

The study of globalized, rapidly changing technology-intensive (TI) markets has attracted research attention in the marketing, management and international business disciplines (John, Weiss, & Dutta, 1999; Matthews & Cho, 1999; Stremersch, Allen, Benedict, & Ruud, 2003). TI markets are characterized by uncertainty due to heterogeneous and rapidly changing technologies, and by the fact that buyers frequently lack relevant prior experience. To survive, firms increasingly build new product development (NPD) capabilities and achieve strategic flexibility by outsourcing and building close supplier relationships in offshore markets (Carson, 2007; Kotabe & Murray, 1990; Yalcinkaya, Calantone, & Griffith, 2007). For example, IBM, Accenture, Electronic Data Systems, Computer Sciences Corp. and HP all recently signed global sourcing contracts exceeding $1 billion in value; growing foreign companies, such as TCS, Infosys and Wipro, are rising in the top 10 supplier ranks (12 July 2006 in *The Wall Street Journal*; 28 December 2007 in *Business Wire*).

Offshore outsourcing creates avenues for inter-firm learning and provides for global leverage. Building NPD partnerships with offshore suppliers provides buyer firms with substantial advantages, such as the ability to increase product variety, decrease necessary NPD resources and costs required to bring new products to market, and speed up the introduction of innovative products. Partnering with offshore suppliers, however, can also create supplier–buyer dependence, risks of leakage of tacit know-how, and loss of knowledge-based capabilities (Heide & Weiss, 1995; Stremersch et al., 2003). Dependence on suppliers for product design may put intellectual property (IP) in jeopardy, casting doubt on how much intellectual property the firm really owns. This threat increases when collaborating on a global scale due to differences in IP protection

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across markets, cultural distance, and so on; for example, business press discusses security risks and breaches of negotiated contracts (e.g., counterfeit and/or over-quota production; *Fortune*, 1 May 2006). Surprisingly, little research has investigated governance structures of these relationships, and thus we investigate how buyers organize offshore outsourcing NPD relationships in the face of asset specificity and uncertainty.

Based on the rationale of transaction cost economics (TCE) and resource dependence theory (RDT), we model buyers' governance decisions of their NPD offshore outsourcing by theorizing the influence of asset specificity and uncertainty (two categories of independent constructs) on supply concentration and degree of supplier involvement (two focal governance decisions; Heide & Weiss, 1995; Rindfleisch & Heide, 1997; Stremersch et al., 2003). We argue that NPD offshore outsourcing is a managerial decision to market exchange (as opposed to internalization) in order to (1) reduce transaction costs and resource dependence, and (2) enhance efficiency and effectiveness. After laying the theoretical foundation, we discuss the research design, secondary data sources from 200 NPD relationships, and analysis techniques. We then present the findings and implications for international marketing academics and practitioners.

## 2. Theoretical foundation

Much of the buyer–supplier governance literature derives from TCE (e.g., Brush & Rexha, 2007; Chen & Chen, 2003; Dong, Zou, & Taylor, 2008). TCE focuses on matching transaction characteristics with governance mechanisms to minimize transaction costs (Rindfleisch & Heide, 1997). Early TCE research was criticized for a number of reasons, in particular for ignoring the interrelatedness in multiple exchanges (Heide & John, 1992). RDT has been employed to account for inter-firm relationships. These are viewed as sources for distinctive resources (e.g., Heide & John, 1992). However, RDT-adapted TCE is still challenged; specifically, Williamson (1991) notes that fast changing markets (e.g., TI markets) create additional contextual concerns not considered by extant TCE perspectives.

Consistent with Williamson (1991), these are two fundamental problems in TI markets from a buyer's perspective. First, rapid technological change and intense competition create the risk of obsolescence of knowledge and capabilities (Kotabe & Murray, 1990; Lehrer & Asakawa, 2002; Swan & Allred, 2003). Buyers seek to outsource NPD activities and to combine suppliers' R&D resources and capabilities with their knowledge base (Howells, James, & Malik, 2003), resulting in enhanced flexibility and productivity as well as lower transaction and production costs. Second, buyers face multiple costs and threats (Appleyard, 2003; Kotabe & Murray, 1990). These include functional mismatches and coordination difficulties; switching costs due to earlier commitments to technologies or suppliers (Heide & Weiss, 1995; Stump & Heide, 1996); external dependence, possibly including the gradual loss of internal NPD and other knowledge-based capabilities (Appleyard, 2003; Mikkola, 2003). The most important risk may be leakage through suppliers of technical and marketing know-how to competitors (especially at the design stage; Dutta & Weiss, 1997; Williamson, 1991).

Governance in TI markets has become more important due to increasing globalization, heightened competitiveness, and the dramatic growth of TI markets. Surprisingly, there is a paucity of studies on how global NPD processes in TI markets should be governed to maximize outcomes and minimize risks (Kotabe & Murray, 1990). We embed our theoretical arguments in TCE and RDT, which emphasize the costs and the risks associated with inter-organizational relationships. Based on the assumptions that parties are motivated by economic self-interest, may engage in opportunistic behavior, and are limited in their cognitive capabilities (i.e., bounded rationality), TCE examines how firms match transactions of different characteristics with governance mechanisms to minimize costs and risks (Williamson, 1985). Opportunism and bounded rationality give rise to problems of safeguarding, adaptation, and performance evaluation because: (1) the relationship may be supported by transaction-specific assets (i.e., assets are not redeployable); (2) environmental uncertainty leads to the inability to specify ex ante the conditions surrounding an exchange; and (3) behavioral uncertainty, or uncertainty related to the outcome of the transaction partner's behavior. Transaction costs include the actual and opportunity costs of various governance structures; risks arise from transaction-specific factors, such as asset-specificity and uncertainty (Walker & Weber, 1984; Williamson, 1981). Overall, TCE explains how buyers organize their outsourcing initiatives, taking into account the extent of transaction-specific investments and the uncertainty arising from buyer bounded rationality and supplier opportunism.

Complementing TCE, RDT maintains that insufficient resources and/or capabilities to complete a task internally creates dependence on outsiders and introduces new uncertainties (Ganesan, 1994). Uncertainties arise because resource flows are not under the firm's control and may not be predicted accurately. RDT views inter-firm governance as a strategic response. Firms seek to reduce external uncertainty and manage dependence by establishing exchange relationships with other firms (Heide & John, 1988). In the case of NPD offshore outsourcing relationships, buyers need to control key technologies in the value chain and manage technological turbulence in their operating environment. These NPD relationships can help reduce NPD costs through specialization and information exchange, as well as make available technologies the firm cannot develop in-house (Tidd, 1995). Transaction or relationship-specific investments may increase buyers' switching costs and dependence on suppliers, as "their presence makes exchange partners irreplaceable or replaceable only at a cost" (Heide, 1994, p. 73). Buyers lacking performance evaluation expertise may face governance problems due to opportunistic behavior.

TCE and RDT together help to explain efficiency and effectiveness in organizing relationships (Heide, 1994; Stump & Heide, 1996). Specifically, **if** (1) the relationship is supported by asset-specific investments, (2) the buyer

lacks the expertise necessary to evaluate performance quality, (3) the buyer's knowledge frequently becomes obsolete due to rapid change, and/or (4) the supplier's capabilities makes the relationship irreplaceable or replaceable only at high cost, **then** the supplier may be tempted to exhibit opportunistic behavior in the forms of moral hazard,[3] adverse selection[4] and/or imperfect commitment (Rindfleisch & Heide, 1997; Wathne & Heide, 2000). Firms attempt to address these governance problems by correctly structuring their relationships.

In the case of NPD offshore outsourcing relationships, we investigate key factors related to *asset specificity* and *uncertainty* as to their influence on *supply concentration* and *degree of supplier involvement*, two focal governance decisions. Supply concentration pertains to the number of suppliers, which can range from one to many suppliers (respectively, high to low concentration). It is a decision the buyer needs to make (Heide & John, 1988; Tidd, 1995). Second, supplier involvement reflects the extent of supplier influence on decision-making during early NPD stages, the control the buyer retains over the design, the frequency of design-related communication, and other factors (Carson, 2007; Wasti & Liker, 1997). High supplier involvement entails working closely with a supplier, which allows the buyer to monitor both performance and compliance and provides access to the supplier's distinctive NPD resources and capabilities (Das & Teng, 2000). The intangible nature of early tasks (e.g., idea generation, design) means that the diffusion risk of tacit know-how or core technologies increases as supplier involvement increases (Wagner & Hoegl, 2006).

## 3. Hypothesis development

We develop a model of governance decisions with supply concentration and degree of supplier involvement as dependent constructs and the following as independent constructs: (1) related to asset specificity, we specify the degree of modularity (H1), the strategic importance of the development project (H2), and the specificity of the project technology (H3); and (2) related to uncertainty, we specify cultural distance (H4), and technological discontinuity (H5). The model is presented in Fig. 1.

### 3.1. The effects of asset specificity

According to TCE, buyer asset specificity may arise as a result of prior commitments (1) to a technology (transaction-specific assets) and/or (2) to a particular supplier (relationship specific assets) (Rindfleisch & Heide, 1997; Williamson, 1985). Asset specificity relates to specialized

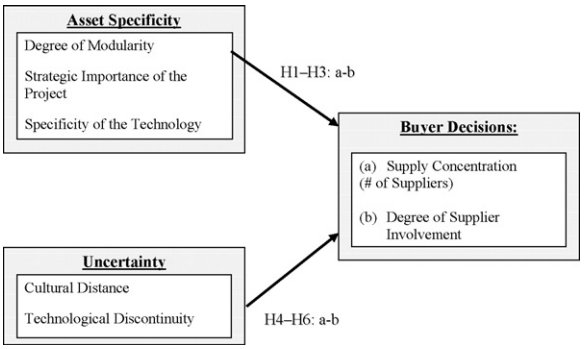


**Fig. 1.** Hypothesized buyer decision model.

knowledge or tools having little or no other use (Williamson, 1985). In RDT terminology, such assets may cause dependence since their presence increases switching costs and makes exchange partners irreplaceable. Essentially, switching costs engender dependence by affecting the replaceability of the exchange partner (Heide, 1994), resulting in a disincentive to explore new suppliers (Heide & Weiss, 1995; Swan & Allred, 2003). TCE and RDT predict that suppliers may then act opportunistically, thus requiring the buyer to safeguard the asset and closely monitor the supplier (Heide & John, 1990). In the NPD outsourcing context, we propose three constructs related to asset specificity and the irreplaceability of the offshore supplier: modularity, strategic importance of the project, and specificity of the technology.

**Modularity** refers to standardizing the interfaces between components and specifying greater reusability and commonality among product families (Schilling, 2000). High modularity occurs when components can be disaggregated and recombined into new configurations with little loss of functionality (Mikkola, 2003; Schilling & Steensma, 2001). The components are relatively independent, but require compatibility with system architectures (Garud & Kumaraswamy, 1993; Sanchez, 1995). Modularity enables embedded coordination through adherence to shared objectives and common standards; this links geographically dispersed developers (Kogut & Kulatilaka, 1994) and makes offshoring of NPD possible (Mikkola, 2003). Modularity reduces the likelihood of functional mismatches, and minimizes the buyer's switching costs and external dependence. Modularity also involves less disclosure of *overall* design plan, and reduces the risk of technology know-how leakage because knowledge of suppliers is module specific (Sanchez, 1999). Tight control and intense monitoring of supplier behavior become less necessary as interdependency is reduced; overall, the need for high supplier concentration or involvement is lower (Sanchez, 1995). Thus:

**H1.** The higher the degree of modularity of development systems, the lower both (a) supply concentration and (b) the degree of supplier involvement in the NPD process.

**Strategic importance of the project** reflects the impact of the offshore outsourcing project on profitability and productivity (Swan & Allred, 2003). Important projects

[3] The *moral hazard problem* occurs as a result of shirking or evasion of obligations in the ongoing relationship. These are considered forms of opportunism since one of the parties to the exchange is purposely withholding effort or somehow refraining from performing agreed-on actions (Wathne & Heide, 2000).

[4] *Adverse selection* indicates a situation where one party/supplier deliberately committing to a contract that they know they would not be able to fulfill. This may be viewed as opportunism in the sense that one party purposely withholds critical information (Wathne & Heide, 2000).

tend to tap the firm's technological core and source of competitive advantage, and thus buyers are reluctant to relinquish control and become dependent on suppliers (Wasti & Liker, 1997; Weiss & Heide, 1993). The higher the importance, the more likely the buyers will protect their tacit technological knowledge against threats of opportunism (Dutta & Weiss, 1997), safeguarding against hazards by closely monitoring a few carefully chosen suppliers. In the context of offshore NPD outsourcing, buyers may thus choose less supplier involvement to safeguard IP while collaborating with a few suppliers (i.e., high concentration). Not only may the likelihood of a single supplier transmitting the buyer's tacit knowledge be less compared to the potential leakage from multiple suppliers, but such threats may be reduced through the building of trust and other social norms, which may be more feasible in a high concentration context (Heide & John, 1992). Thus:

**H2.** The greater the strategic importance of the project to the buyer (a) the higher the supply concentration and (b) the lower the degree of supplier involvement in the NPD process.

**Specificity of the project technology** is important in NPD because many aspects of product development are proprietary. Proprietary technologies are desirable because they create more opportunities for differentiation and competitive advantage (Gatignon & Xuereb, 1997; Kleinschmidt & Cooper, 1991). Outsourcing highly asset-specific resources such as proprietary technologies means high transaction risks. When proprietary technologies are developed by suppliers, switching suppliers may be prohibitively costly and result in significant delays (Heide & Weiss, 1995; Swan & Allred, 2003). This may lead buyers to be "locked in," and suppliers to behave more opportunistically and to pursue their own self-interests (Wathne & Heide, 2000; Weiss & Heide, 1993). In the context of NPD offshore outsourcing, we theorize that buyers organize their relationships with less supplier involvement and with multiple technology providers (i.e., low concentration) to mitigate opportunism and to avoid lock-in (Heide & John, 1988). Thus:

**H3.** The greater the specificity of the project technology to the buyer, the lower both (a) the supply concentration and (b) the degree of supplier involvement in the NPD process.

### *3.2. The effects of uncertainty*

Bounded rationality, one of the TCE assumptions, indicates that decision makers have constraints on their cognitive capabilities and limits on their rationality (Rindfleisch & Heide, 1997; Williamson, 1985). This becomes especially problematic in uncertain turbulent environments because of behavioral and environmental uncertainties (Rindfleisch & Heide, 1997). Buyers' limited cognitive ability diminishes their ability to predict and measure the behavior of their suppliers as well as the changes in their industries. The effect of behavioral uncertainty is manifest in a performance evaluation problem, because of difficulties in verifying whether compliance with established agreements has occurred (Heide & John, 1990; Stump & Heide, 1996; Wathne & Heide, 2000). Environmental uncertainty, on the other hand, entails difficulty in specifying all future contingencies in a contract and requires the ability to adapt contracts under uncertainty (Buvik & John, 2000). In the context of NPD offshore outsourcing and given rationality, we propose that the cultural distance between the partners may impact performance evaluation, while technological discontinuity may create an adaptation problem. These relationships are advanced following.

**Cultural distance** exists between the national cultures of the partners in an offshore outsoucing relationship (Kogut & Singh, 1988; Ojala & Tyrvainen, 2007; Sousa & Bradley, 2006; Shenkar, 2001; Tihanyi, Griffith, & Russell, 2005). Cultural distance is related to the perceived investment risks associated with different host country economic, legal, political and cultural systems. As Brouthers (2002) suggests, investment risk can impact the asymmetry of information as well as the exposure of assets. Hence we argue that as the cultural distance between the partners in one specific outsourcing relationship increases, the buyer firm may choose to engage in offsetting relationships with multiple suppliers to diversify their risks and maintain their flexibility.

A crucial assumption of TCE is that rational managers' act in their own self-interest, which is emphasized in individualistic countries (versus collectivist; Hofstede, 1980; Sharp & Slater, 1997). Cultural distance may be a barrier to achieving project goals, giving rise to information asymmetry or behavioral uncertainty conditions (Anderson, 1985; Krafft, 1999; Tihanyi et al., 2005). Cultural distance may further impede goal congruence as well as the buyer's monitoring ability in the offshore context due to differences in national cultural distance (Merchant, 2003). Accordingly, to prevent any impact of such discrepancies and resulting hazards, buyer firms will choose to relinquish supplier involvement to their NPD processes. More formally:

**H4.** The greater the cultural distance between the buyer and the offshore supplier, the lower both (a) the supply concentration and (b) the degree of supplier involvement in the NPD process.

**Technological discontinuity** refers to unpredictability in the buyer firm's operating environment that often leads to the obsolescence of products, technologies and know-how (Schilling & Steensma, 2001). Technology discontinuity means uncertainty that is beyond the direct control of either the buyer or the supplier (Buvik & John, 2000; Weiss & Heide, 1993). In the context of TI markets, technological discontinuity creates uncertainty regarding developing the component (due to changes in component specifications), as firms struggle to understand new and incompletely specified processes or products (Burkhardt & Brass, 1990; Rindfleisch & Heide, 1997). An increasing rate of technological change escalates the importance of flexibility (John et al., 1999). Therefore, we theorize that buyers will source their NPD components and activities from multiple suppliers (i.e., low concentration) to limit their overall risks of being too strongly tied to any one

technology. On the other hand, supplier involvement in earlier NPD stages may gradually increase the buyers' external dependence, leading to gradual loss of opportunity identification and idea generation capabilities. To maintain flexibility and avoid dependence, buyers may choose to forgo supplier input and decrease involvement. Hence:

**H5.** The greater the technological discontinuity in the buyer firm's industry, the lower both (a) the supply concentration and (b) the degree of supplier involvement to NPD process.

## 4. Methodology

The data on NPD offshoring agreements among U.S. and non-U.S. firms were extracted from the Securities Data Corporation (SDC) Thompson Platinum database (January 1982 to December 2004). The initial search yielded 1568 agreements. To focus on TI markets, non-high technology industries ($n = 17$), reseller/distribution contracts (151), and equity/joint ventures (423) were eliminated. Further, lack of a public U.S. parent company (481) and/or a cross-border agreement (249) resulted in exclusion. The procedure yielded 200 agreements announced from April 1986 to July 2004 and pertaining to 22 countries and 24 industries at the 3-digit SIC level.

In relation to the sample, the majority of the buyers (i.e., 146; 73%) operated in manufacturing industries, followed by information technology (34; 17%) and telecommunications (19; 10%); 162 (81%) entailed agreements with a supplier operating outside the buyer's industry (i.e., the buyer firm SIC code was different from the supplier firm's SIC code). Termination dates were undisclosed in 172 (86%); there was no significant difference ($p < 0.05$) in supply concentration or supplier involvement based on whether the agreement had a prespecified duration. *T*-tests also revealed no significant differences in dependent variables based on country or industry, indicating lack of potential biases resulting from these demographics.

### 4.1. Variable operationalization

Given the nature of the data, consistent with content analysis guidelines (e.g., Kolbe & Burnet, 1991), records retained were examined by two independent judges. Judges received extensive training in the use of the coding categories. The inter-rater reliability was above 90%; disagreements with regards to the coding of the variables (based on the offshore outsourcing announcement text) were resolved through discussion.

**Supply concentration** is the number of suppliers with whom the buyer collaborates to execute NPD activities. A single supplier is the highest concentration; the higher the number of suppliers, the lower the supply concentration. The number of ongoing relationships the buyer firm had with alternative suppliers was obtained from outsourcing announcements in *Factiva Press Releases* and in the *Compustat Database* (Ghosh & John, 2005; Kim & Park, 2002; Stremersch et al., 2003). **Supplier involvement** is the degree to which the supplier influences a buyer's product designs and pre-development decisions. Based on the announcement's text obtained from the *SDC Platinum Database*, supplier involvement was measured as a combination of four categorical variables: first, NPD stage input, coded 0 if the supplier contributed to later NPD stages versus 1 for the earlier stages of NPD; next, three binary variables were coded as 1 if manufacturing, R&D and/or exploration collaboration, respectively were mentioned (i.e., whether the buyer–supplier relationship entailed joint development of the product, joint idea generation and/or joint opportunity analysis) and 0 otherwise.

Degree of **modularity** was the extent to which the NPD system architecture allowed the mixing and matching of components and transactions. It was operationalized using industry level proxies (Schilling & Steensma, 2001). Based on the industry code of the specific offshore outsourcing arrangement, the overall use of modular systems was estimated using three measures: the use of externalization (i.e., the ratio of $ amount of total shipments to $ amount spent on production workers); the degree of alliance formation (i.e., counts of alliances by industry divided by the number of firms in the industry); and the use of computer networks in the outsourcing of R&D by employment. These figures were obtained from the *US Census Bureau*, the *SDC Platinum Database* and *the RDS TableBase*, respectively.

**Strategic importance of the project**, following Kallunki, Larimo, and Pynnonen (2001), was measured as the logarithm of the ratio of the announced contract size to the size (annual revenue) of the buyers (reported in the *SDC Platinum* and *Compustat Databases*, respectively).

To assess **specificity of the project technology**, combined resources were defined as asset specific if they included (1) licensed and patented technologies; (2) proprietary innovations developed by particular suppliers; and (3) technological products to be co-developed by the buyer and supplier (as indicated in *Factiva Press Releases* and *SDC Platinum Database*). These categories were coded with the dummy variable 1 if the offshore outsourced functions were asset specific, otherwise as 0.

**Cultural distance** was measured similar to Kogut and Singh (1988)'s index (following adaptations recommended by Shenkar (2001) and Tihanyi et al. (2005)). The composite index is based on the deviation of each country from the U.S. along the five Hofstede (1980) cultural dimensions (i.e., power distance, individualism/collectivism, masculinity/femininity, uncertainty avoidance, long-term orientation), corrected for the variance of each dimension. The index is:

$$Cd_j = \sum_{i=1}^{5} \frac{\{(I_{ij} - I_{iu})^2 / \upsilon_i\}}{5}$$

where $Cd_j$: the cultural distance between the home country (U.S.) and the host countries; $I_{ij}$: the index value for cultural dimension $i$ of country $j$; $\upsilon_i$: the variance of the index of dimension $i$; $U$: home country (i.e., U.S.).

**Table 1**
Descriptive statistics ($n = 200$)

| | Mean | Standard deviation |
|---|---|---|
| Supply concentration | 5.47 | 9.92 |
| Supplier involvement | 0.954 | 0.797 |
| Modularity | 3.903 | 1.486 |
| Strategic importance of the project | −2.165 | 3.480 |
| Specificity of the project technology | 0.366 | 0.483 |
| Cultural distance | 1.137 | 1.129 |
| Technological discontinuity | −0.076 | 1.363 |

**Technological discontinuity** was assessed using Schilling and Steensma's (2001) measurement of total factor productivity (TFP) growth for each offshore outsourcing announcement industry and was acquired from *Bartelsman-Gray Database*. This index is based on a five-factor production function (production work hours, capital, non-production workers, non-energy materials, and energy); it represents the difference between the growth rate of output (real shipments) and the revenue-share weighted average of the growth rate of each function.

## 5. Data analysis and results

Structural equation modeling using EQS was used. Table 1 has descriptive statistics. Table 2 presents the results.

The first three hypotheses were related to asset specificity. H1a theorized that more modularity relates to lower supply concentration; this was supported ($\beta = 0.368$, $p < 0.01$). H1b states that the higher the modularity, the lower the degree of supplier involvement. The results contradicted H1b ($\beta = 0.125$, $p < 0.05$). H2a, theorizing that the greater the strategic importance to the buyer the higher the supply concentration, was supported ($\beta = -0.355$, $p < 0.01$). However, H2b, which theorized that the greater the strategic importance, the lower supplier involvement to NPD process, was not supported by the data; rather, the opposite was found to be significant ($\beta = 0.115$, $p < 0.05$). H3a theorized that the greater the specificity, the lower the supply concentration. H3a was not supported ($\beta = -0.016$, $p > 0.10$). H3b, which argued that the greater the specificity, the lower the degree of supplier involvement, was supported ($\beta = -0.159$, $p < 0.01$).

The remaining hypotheses were related to uncertainty. H4a argued that the greater the cultural distance, the lower the supply concentration; this was supported ($\beta = -0.152$, $p < 0.05$). However, H4b, which argued that the greater the cultural distance the lower supplier involvement, was not supported ($\beta = -0.093$, $p > 0.10$). H5a theorized that the greater the technological discontinuity, the lower the supply concentration. H5a was not supported ($\beta = 0.033$, $p > 0.10$). However, H5b was supported ($\beta = -0.161$, $p < 0.01$); it hypothesized the greater the technological discontinuity, the lower supplier involvement.

## 6. Discussion

To survive in TI markets, firms increasingly strive to build NPD capabilities and increase strategic flexibility through outsourcing NPD activities offshore and building close supplier relationships. The current study, built upon transaction cost economics and resource dependence theories, proposes a model of the influence of key NPD offshore outsourcing factors on buyers' decisions regarding supply concentration and the degree of supplier involvement (i.e., buyers' decisions regarding governance). The findings provide unique and useful insights into the organization of NPD offshore outsourcing for both academics and practitioners.

In relation to **supply concentration**, the findings of this study indicate that modularity increases supply concentration, while the strategic importance of the project and cultural distance both decreases supply concentration. Consistent with the precepts of TCE and RDT, our findings demonstrate that firms operating in TI markets, when engaging in offshore outsourcing of NPD processes, work to minimize their exposure to transaction costs, risks, and dependencies. Consistent with Williamson's (1991) concern in fast moving markets and the extant modularity literature (e.g., Sanchez, 1999), which argues for modularity as a protective mechanisms to minimize technological leakage, the findings of this study show that firms organize their offshore outsourcing NPD process relationships by working toward low supplier concentration, thus lowering transaction costs and risks. Extending the work of Wasti and Liker (1997) and Weiss and Heide (1993), we found that as the strategic importance of a project increased, firms strived to minimize exposure to transaction costs and risks by limiting the number of suppliers from which that they sourced their NPD globally. This effect, coupled with the findings pertaining to cultural distance (wherein increased difficulty in transacting with culturally dissimilar partners increases costs), extends the

**Table 2**
Buyer decision model results ($n = 200$)

| | Dependent variable: supply concentration ($R^2 = 0.31$) | | Dependent variable: supplier involvement ($R^2 = 0.09$) | |
|---|---|---|---|---|
| | Std Beta | *t*-value | Std Beta | *t*-value |
| Modularity | 0.368 | 6.179 ($p < 0.01$) | 0.124 | 1.820 ($p < 0.05$) |
| Strategic importance of the project | −0.355 | −5.958 ($p < 0.01$) | 0.115 | 1.674 ($p < 0.05$) |
| Specificity of the project technology | −0.016 | (n.s.) | −0.159 | −2.326 ($p < 0.01$) |
| Cultural distance | −0.152 | −2.565 ($p < 0.01$) | −0.093 | (n.s.) |
| Technological discontinuity | 0.033 | (n.s.) | −0.161 | −2.355 ($p < 0.01$) |

*Note*: $\chi^2 = 34.366$ (d.f. = 10; $p < 0.01$); GFI = 0.954; AGFI = 0.871; RMR = 0.085; RMSEA = 0.111.

extant literature in TCE and RDT, the NPD literature, and the TI market literature. Moreover, these findings help provide new insights into specific drivers of supply organization for managers.

In relation to the degree of **supplier involvement**, the findings indicate that modularity and strategic importance of the project increase the degree of supplier involvement in the NPD process in TI markets, while specificity of the project technology and technological discontinuity reduce the degree of supplier involvement. Theoretically, our results in relation to specificity of the project technology and technological discontinuity were consistent with the TCE and RDT precepts. These findings, extending the work of Swan and Allred (2003) on TI markets and specified governance structures, demonstrate that firms solicit supplier involvement to the degree that it minimizes transaction risks and external dependence. These findings provide unique insights into the drivers of supplier involvement. For example, increased global competition has encouraged telecommunications companies to engage in greater NPD process offshore in order to maintain competitive advantage. Our findings suggest that the effective organization, in line with theoretical tenets, would be to decrease the degree of supplier involvement as technological discontinuity in the market increases.

The findings also suggest that not all normative aspects of TCE and RDT are in evidence as firms offshore NPD in TI markets. Specifically, contrary to our theorized relationships, we find that increased modularity stimulates greater supplier involvement. One explanation for this is the perceived need by the firm to work more closely with NPD suppliers to ensure the compatibility of their modular systems. Similarly, the results indicate that firms choose greater levels of supplier involvement for strategically important projects. While contrary to TCE and RDT (which suggest increased involvement would amplify the risk of leakage and increase dependence, breeding opportunism), close relationships with offshore outsourcing partners may provide protection from these increased risks through social control. For example, Heide and John (1992) argue, under TCE, for the establishment of norms, such as information sharing, in relationships. One could argue that as supplier involvement is increased in strategically important projects, relationships develop fostering the generation of relational norms such as information sharing, thereby providing protective mechanism within the relationship. Taken together, these contrary theoretical findings are understandable within the context of TCE and RDT extensions (e.g., Heide & John, 1992) and Williamson's (1991) comments regarding TCE's adaptation in fast moving markets. However, a question that remains is whether the results of this study, that are contradictory to the theoretical precepts of TCE and RDT, provide firms increased or decreased financial returns.

## 7. Conclusion

While this study provides a number of new insights into offshore outsourcing of NPD processes in technology intensive markets, its implications are tempered by its limitations. For instance, although this study explored two forms of channel governance decisions, its findings are limited by its context and measurement. For example, only technology intensive markets were examined. While technology intensive markets are one type of fast moving markets, they are not the only type and therefore exploration of other fast moving markets should be investigated. Moreover, one could argue that industry issues could play a significant role across markets (e.g., telecommunications versus pharmaceutical). Further, in markets with dynamic consumer tastes, a different set of conditions that could influence firm governance structuring.

Second, although this study explored two types of channel governance decisions, these two are not the only forms of governance. In this study, the decision was made to adhere to an arms-length transaction context so that offshore outsourcing issues could be investigated. However, under TCE, one could argue that vertical integration as a governance option needs to also be explored (Williamson, 1975). This is particularly important in TI markets where competitive advantage is often embedded within the specified technology. Future research should explore alternative governance forms for organizing NPD process relations in TI markets. In particular, examination of plural governance forms (cf., Heide, 2003) could shed additional light on the organization of firm boundaries in fast changing markets.

Third, a narrow perspective (i.e., NPD) was taken in relation to offshore outsourcing. The domain of offshore outsourcing is much broader and clearly warrants investigation. For example, offshore outsourcing of NPD denotes upward migration issues within the value chain. The influence of offshore outsourcing on other activities at the same level of the value chain as well as other levels of the value chain, would increase our understanding of this important topic.

Finally, a limitation of this study derives from its employment of secondary data. As with all secondary data, behavioral elements are gleaned through output variables. Therefore, additional research which engages decision makers directly could provide further insights into the decision calculus in this or other contexts. Still, through our use of secondary data, we have been able to avoid limitations inherent in primary data collected through attitudinal scales and individual key informants.

In conclusion, the aim of this study was to address the research question: "How do buyers organize their offshore outsourcing NPD relationships?" Through the employment of transaction cost economics and resource dependency theory, we were able to gain a better understanding of the factors driving two key organizing decisions (i.e., supply concentration and degree of supplier involvement). By demonstrating that new insights into NPD offshore sourcing can be gained by employing TCE and RDT in technology intensive markets, we believe that this research can serve as a foundation for managerial action as well as academic advancement.

## References

Anderson, E. (1985). The salesperson as outside agent or employee: A transaction cost analysis.. *Marketing Science, 4*(Summer): 234–254.

Appleyard, M. M. (2003). The influence of knowledge accumulation on buyer–supplier codevelopment projects. *Journal of Product Innovation Management, 20*(5): 356–373.
Brouthers, K. D. (2002). Institutional, cultural and transaction cost influences on entry mode choice and performance. *Journal of International Business Studies, 33*(2): 203–221.
Brush, G. J., & Rexha, N. (2007). Factors influencing supplier share allocation in overseas Chinese context. *Journal of International Marketing, 15*(4): 119–154.
Burkhardt, M. E., & Brass, D. J. (1990). Changing patterns of patterns of change: The effects of a change in technology on social network structure and power. *Administrative Science Quarterly, 35*(1): 104–127.
Buvik, A., & John, G. (2000). When does vertical coordination improve industrial purchasing relationships? *Journal of Marketing, 64*(4): 52–64.
Carson, S. J. (2007). When to give up control of outsourced new product development. *Journal of Marketing, 71*(1): 49–66.
Chen, H., & Chen, T. (2003). Governance structures in strategic alliances: Transaction cost versus resource-based perspective. *Journal of World Business, 38*(1): 1–14.
Das, T. K., & Teng, B. (2000). A resource-based theory of strategic alliances. *Journal of Management, 26*(1): 31–61.
Dong, B., Zou, S., & Taylor, C. R. (2008). Factors that influence multinational corporations' control of their operations in foreign markets: An empirical investigation. *Journal of International Marketing, 16*(1): 98–119.
Dutta, S., & Weiss, A. M. (1997). The relationship between a firm's level of technological innovativeness and its pattern of partnership agreements. *Management Science, 43*(3): 343–356.
Ganesan, S. (1994). Determinants of long-term orientation in buyer–seller relationships. *Journal of Marketing, 58*(2): 1–19.
Garud, R., & Kumaraswamy, A. (1993). Changing competitive dynamics in network industries: An exploration of Sun Microsystems' open systems strategy. *Strategic Management Journal, 14*(5): 351–369.
Gatignon, H., & Xuereb, J. M. (1997). Strategic orientation of the firm new product performance. *Journal of Marketing Research, 34*(1): 77–90.
Ghosh, M., & John, G. (2005). Strategic fit in industrial alliances: An empirical test of governance value analysis. *Journal of Marketing Research, 42*(3): 346–357.
Heide, J. B. (1994). Interorganizational governance in marketing channels. *Journal of Marketing, 58*(1): 71–85.
Heide, J. B. (2003). Plural governance in industrial purchasing. *Journal of Marketing, 67*(4): 18–29.
Heide, J. B., & John, G. (1988). The role of dependence balancing in safeguarding transactions in conventional channels. *Journal of Marketing, 52*(1): 20–25.
Heide, J. B., & John, G. (1990). Alliances in industrial purchasing: The determinants of joint action in buyer–supplier relationships. *Journal of Marketing Research, 27*(1): 24–36.
Heide, J. B., & John, G. (1992). Do norms matter in marketing relationships? *Journal of Marketing, 56*(2): 32–44.
Heide, J. B., & Weiss, A. M. (1995). Vendor consideration and switching behavior for buyers in high-technology markets. *Journal of Marketing, 59*(3): 30–43.
Hofstede, G. (1980). Culture and organizations. *International Studies of Management & Organization, 10*(4): 15–41.
Howells, J., James, A., & Malik, K. (2003). The sourcing of technological knowledge: Distributed innovation processes and dynamic change. *R & D Management, 33*(4): 395–414.
John, G., Weiss, A. M., & Dutta, S. (1999). Marketing in technology-intensive markets: Toward a conceptual framework. *Journal of Marketing, 63*(Special Issue): 78–92.
Kallunki, J.-P., Larimo, J., & Pynnonen, S. (2001). Value creation in foreign direct investments. *Management International Review, 41*(4): 357–376.
Kim, K., & Park, J.-H. (2002). The determinants of value creation for partner firms in the global alliance context. *Management International Review, 42*(4): 361–384.
Kleinschmidt, E. J., & Cooper, R. G. (1991). The impact of product innovativeness on performance. *Journal of Product Innovation Management, 8*(4): 240–251.
Kolbe, R. H., & Burnet, M. S. (1991). Content-analysis research: An examination of applications with directions for improving research reliability and objectivity. *Journal of Consumer Research, 18*(2): 243–250.
Kogut, B., & Kulatilaka, N. (1994). Operating flexibility, global manufacturing, and the option value of a multinational network. *Management Science, 40*(1): 123–139.
Kogut, B., & Singh, H. (1988). The effect of national culture on the choice of entry mode. *Journal of International Business Studies, 19*(3): 411–432.
Kotabe, M., & Murray, J. Y. (1990). Linking product and process innovations and modes of international sourcing in global competition: A case of foreign multinational firms. *Journal of International Business Studies, 21*(3): 383–408.
Krafft, M. (1999). An empirical investigation of antecedents of sales force control systems. *Journal of Marketing, 63*(3): 120–134.
Lehrer, M., & Asakawa, K. (2002). Offshore knowledge incubation: The "third path" for embedding R&D labs in foreign systems of innovation. *Journal of World Business, 37*(4): 297–306.
Matthews, J. A., & Cho, D. (1999). Combinative capabilities and organizational learning in latecomer firms: The case of the Korean semiconductor industry. *Journal of World Business, 34*(2): 139–156.
Merchant, H. (2003). Joint venture characteristics and shareholder value creation: The pervasive role of partner nationality. *Management International Review, 43*(1): 21–40.
Mikkola, J. H. (2003). Modularity, component outsourcing, and inter-firm learning. *R & D Management, 33*(4): 439–454.
Ojala, A., & Tyrvainen, P. (2007). Market entry and priority of small and medium-sized enterprises in the software industry: An empirical analysis of cultural distance, geographic distance and market size. *Journal of International Marketing, 15*(3): 123–149.
Rindfleisch, A., & Heide, J. B. (1997). Transaction cost analysis: past, present, and future applications. *Journal of Marketing, 61*(4): 30–54.
Sanchez, R. (1995). Strategic flexibility in product competition. *Strategic Management Journal, 16*(Special Issue): 135–159.
Sanchez, R. (1999). Modular architectures in the marketing process. *Journal of Marketing, 63*(Special Issue): 92–111.
Schilling, M. A. (2000). Toward a general modular systems theory and its application to interfirm product modularity. *The Academy of Management Review, 25*(2): 312–334.
Schilling, M. A., & Steensma, H. K. (2001). The use of modular organizational forms: An industry-level analysis. *Academy of Management Journal, 44*(6): 1149–1168.
Sharp, D. J., & Slater, S. B. (1997). Project escalation and sunk costs: A test of the international generalizability of agency and prospect theories. *Journal of International Business Studies, 28*(1): 101–121.
Shenkar, O. (2001). Cultural distance revisited: Towards a more rigorous conceptualization and measurement of cultural differences. *Journal of International Business Studies, 32*(3): 519–536.
Sousa, C. M. P., & Bradley, F. (2006). Cultural distance and psychic distance: Two peas in a pod? *Journal of International Marketing, 14*(1): 49–70.
Stremersch, S., Allen, M. W., Benedict, G. C. D., & Ruud, F. T. (2003). Buying modular systems in technology-intensive markets. *Journal of Marketing Research, 40*(3): 335–350.
Stump, R. L., & Heide, J. B. (1996). Controlling supplier opportunism in industrial relationships. *Journal of Marketing Research, 33*(4): 431–441.
Swan, K. A., & Allred, B. B. (2003). A product and process model of the technology-sourcing decision. *Journal of Product Innovation Management, 20*(6): 485–496.
Tidd, J. (1995). Development of novel products through intraorganizational and interorganizational networks the case of home automation. *Journal of Product Innovation Management, 12*(4): 307–322.
Tihanyi, L., Griffith, D. A., & Russell, C. J. (2005). The effect of cultural distance on entry mode choice, international diversification, and MNE performance: A meta-analysis. *Journal of International Business Studies, 36*(3): 270–283.
Wagner, M. S., & Hoegl, M. (2006). Involving suppliers into product development: insights from R&D directors and project managers. *Industrial Marketing Management, 35*: 936–943.
Walker, G., & Weber, D. A. (1984). Transaction cost approach to make-or-buy decisions. *Administrative Science Quarterly, 29*(3): 373–391.
Wasti, S. N., & Liker, J. K. (1997). Risky business or competitive power: Supplier involvement in Japanese product design. *Journal of Product Innovation Management, 14*(5): 337–355.
Wathne, K. H., & Heide, J. B. (2000). Opportunism in interfirm relationships, forms, outcomes, and solutions. *Journal of Marketing, 64*(4): 36–51.
Weiss, A. M., & Heide, J. B. (1993). The nature of organizational search in high technology markets. *Journal of Marketing Research, 30*(2): 220–233.
Williamson, Oliver E. 1975 Markets and Hierarchies: Analysis and Antitrust Implications. New York: Free Press.
Williamson, O. E. (1981). The economics of organization: The transaction cost approach. *American Journal of Sociology, 87*(3): 548–577.
Williamson, O. E. (1985). *The economic institutions of capitalism*. New York: Free Press.
Williamson, O. E. (1991). Comparative economic organization: The analysis of discrete structural alternatives. *Administrative Science Quarterly, 36*(2): 269–296.
Yalcinkaya, G., Calantone, R. J., & Griffith, D. A. (2007). An examination of exploration and exploitation capabilities: Implications for product innovation and market performance. *Journal of International Marketing, 15*(4): 63–93.