



Portfolio of controls in outsourcing relationships for global new product development

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ABSTRACT

Due to increasing globalization and technological discontinuities, firms strive to develop new product capabilities and flexibilities by engaging in outsourcing activities and adopting modular systems. However, these strategies contain *risks* of opportunistic expropriation of tacit knowledge and *costs* related to monitoring sourcing partners who are geographically and culturally distant. This study examines the antecedents of control mechanisms through which firms manage the risks and costs associated with outsourcing relationships in global technology-intensive markets. Modularity in design is hypothesized as a moderator of model relationships because it can serve as a substitute for formal or informal controls in a “controls portfolio”.

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1. Introduction

Technological advances and increasing globalization characterize the current business milieu and have radically transformed the competitive landscape. Consequently, firms increasingly strive to develop new product development (NPD) capabilities and achieve strategic flexibility through outsourcing and adopting modular systems (Carson, 2007; Garud & Kumaraswamy, 1993; Schilling, 2000). The phenomenon of downstream buyers cooperating with upstream suppliers to introduce new products and/or components is prevalent across a spectrum of industries including consumer-electronics, textiles, automobiles, metals and pharmaceuticals¹ (Bettis, Bradley, & Hamel, 1992; Kotabe & Murray, 1990, 2004). Furthermore, the popular press has increasingly documented the prevailing use of outsourcing, and it appears that organizations are increasingly turning to globally sourcing their components and/or designs instead of spending millions of dollars to design and develop them internally. According to the Quarterly Index from outsourcing advisory firm TPI (15 February 2006 in The Economic Times), the value of major outsourcing contracts was \$75+ billion worldwide in 2005. In 2006, the major players in global sourcing deals include IBM Corp., Accenture Ltd., Electronic Data Systems Corp., Computer Sciences Corp. and HP Co. — all have signed contracts exceeding \$1 billion in value (12 July 2006 in The Wall Street Journal). Most importantly, such a rise in offshoring of new product development activities create the possibility of shifts in the global power structure and thus entail significant consequences for the world economy (Ernst, 2006).

Meanwhile, the study of interfirm relationships in technology-intensive (TI) markets has attracted significant research attention in the new product, marketing and management literatures (Dutta & Weiss, 1997; John, Weiss, & Dutta, 1999; Teece, 1988; Wuyts, Dutta, & Stremersch, 2004). In the extant literature, the term ‘high technology’ has typically been used to define markets characterized by rapid technological change (Bourgeois & Eisenhardt, 1988) and as John et al. (1999) suggest, “significant amounts of scientific and technical know-how” (p. 79). An understanding of TI markets requires a focus on the presence and transfer of know-how and the difficulties related to knowledge transactions (Glazer, 1991; Kogut & Zander, 1992; Teece, 1988). Rapid technological change and global competition create the risk of obsolescence of knowledge and capabilities, and thus such markets induce buyers to engage in sourcing activities and supplier relationships on a global scale (Harrigan, 1985; Kotabe & Murray, 1990; Swan & Allred, 2003; Weiss & Heide, 1993). Many successful companies depend on outsourcing to remain agile in coping with market dynamics as well as to expand their global operations. Outsourcing, primarily perceived and employed to reduce costs, recently has become a widespread and fundamental tool for competitive advantage. However, these supplier relationships also entail additional threats such as the potential leakage of tacit know-how and (over)reliance on suppliers’ resources and capabilities (Dutta & Weiss, 1997; Heide & Weiss, 1995; Kotabe & Murray, 2004). As documented in the business press, such risks can be mitigated by monitoring supplier operations during and assessment of supplier performance prior to and after the outsourcing transaction process (13 January 2005 in Legal IT).

Another important feature of TI markets is the increased utilization of modular product architectures as the basis for new product designs and development (Katz & Shapiro, 1994; Sanchez, 1995; Schilling, 2000; Stremersch, Allen, Benedict, & Ruud, 2003). Modularity is created by standardizing the interfaces between functional components and

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¹ According to the McKinsey Co. 2005 quarterly report, automotive components, fabricated metals, and pharmaceutical industries are among the manufacturing sectors that are increasing share in offshoring.

specifying greater reusability and commonality of components among product families (Staudenmayer, Tripsas, & Tucci, 2005; Sanchez & Mahoney, 1996; Wilson, Weiss, & John, 1990). The benefits include the ability to increase product variety offered, accelerate the speed-to-market and reduce the marketing and technological resources required to commercialize new products. More important, these systems provide a structure that coordinates the loosely coupled activities of component developers reducing switching costs, the risk of marketing and technology know-how leakage and the need for close monitoring of agents' behavior (Garud & Kumaraswamy, 1993; John et al., 1999; Prahalad & Bettis, 1986). Modular systems enable the coordination of a loosely coupled organizational structure linking geographically dispersed component developers (Kogut & Kulatilaka, 1994), thereby making outsourcing of research and development activities possible (Howells et al., 2003; Mikkola, 2003; Pisano, 1990). Thus, interfirm modularity not only brings operational advantages, but also enhances the firms' capability in managing their relationships.

Prior research on buyer behavior in global high-technology markets has focused on specific outcomes (make versus buy decisions) as opposed to buyers' underlying processes (Kotabe & Murray, 1990; Walker & Weber, 1984; Weiss & Heide, 1993). Hence, there is lack of research on the formal and informal controls the buyers exert on their suppliers in their outsourced new product projects to prevent risks, such as marketing and technological know-how leakage and diffusion to competitors. Buyers generally strive to minimize the likelihood of opportunistic expropriation of tacit technological knowledge, eliminate the difficulties related to monitoring their partners due to geographical or cultural distance, and avoid switching costs tied to their suppliers; these risks are especially high when many external linkages and dependencies exist (Pisano, 1990; Tidd, 1995). As cited in an article in *BusinessWorld*, 'if done right, outsourcing can be a powerful business tool' (January 13, 2005). Therefore, it is critical to understand how buyer firms manage their NPD outsourcing relationships in global TI markets. Relevant diverse streams of research include *agency*, *resource dependence* and *transaction cost theories* (Ouchi, 1979; Pfeffer & Salancik, 1978; Williamson, 1985; Eisenhardt, 1985; Rindfleisch & Heide, 1997).

This research particularly focuses on the unique opportunities, risks, and control portfolios associated with modular systems designs, which have also been suggested as a possible solution to the challenges associated with global sourcing by Kotabe and Murray (2004). Modularity enables the coordination of loosely coupled and flexible organizational structures linking geographically dispersed component developers via standardized interface specifications and feasible divisions of tasks in functional specification (Mikkola, 2003; Schilling, 2000; Wilson et al., 1990). Hence, through standardization and flexibility achieved, such interface management systems may allow firms to adopt different control portfolios in managing their NPD outsourcing activities and provide design-embedded control reducing monitoring costs and enforcement difficulties (Sanchez, 1999; Staudenmayer et al., 2005).

Overall, grounded in the new product, marketing, and management literatures, the primary contribution of this research is to provide a conceptual framework that explicates the antecedents of the control portfolios that buyers exert on their suppliers in global TI markets. The key questions can be summarized as:

- (1) In global technology-intensive markets, what are the portfolios of control mechanisms that buyers exert on their suppliers in outsourced new product projects (with modular architectures)?
- (2) What determines the particular combinations of controls utilized in these buyer-supplier relationships? That is, what are the antecedents of control portfolio utilization?
- (3) How does modularity impact the relationships between control mechanisms in control portfolios and their antecedents? Does modularity serve as a substitute for formal or informal controls?

The paper is organized as follows: first, different types of control mechanisms potentially employed in a buyer's portfolio are introduced. Then the theoretical framework of antecedents of controls in outsourcing relationships for global NPD is explained. Finally, the role of modularity in moderating the relationships of these antecedents with the buyer's portfolio of controls is examined.

2. Conceptual development: types of control mechanisms

Control is defined as behavioral, that is, 'attempting to ensure individuals or teams act in a manner that is consistent with achieving desired goals' (Anderson, 1985; Eisenhardt, 1985; Ouchi, 1979). Control mechanisms are broadly divided into formal versus informal (Jaworski, 1988; Jaworski & MacInnis, 1989). Formal controls rely on written mechanisms that influence behavior through performance evaluation and rewards. In contrast, informal control mechanisms (such as social norms, peer pressure, shared beliefs and experiences) utilize social strategies to reduce goal differences between the principal (i.e., buyer) and agent (i.e., supplier). Based on various criteria, these two broad categories of controls are also disaggregated into subcategories with distinguishing characteristics (Jaworski, Sathakopoulos, & Krishnan, 1993).

Two types of formal controls, i.e., outcome and behavior controls, differ based on the degree of supervision, the objectivity of the evaluation procedures, and the time window (Eisenhardt, 1985; Oliver & Anderson, 1994; Krafft, 1999). Outcome control is typified by the principal's (i.e., buyer) focus on the outputs of the NPD project. Buyers that employ such mechanisms evaluate their suppliers based on desired project goals or outcomes and reward them for meeting those goals (e.g., functional specifications, target implementation date, performance of the product or component). As an illustration, to control other companies' copying of their products and processes, Sharp assembles parts it orders from different suppliers evaluating them based on the performance of these parts (16 December 2003 in *The Wall Street Journal*). In behavior control, on the other hand, the buyers seek to influence the process, or the means of goal achievement. By explicitly prescribing rules and procedures and closely observing the suppliers' behaviors, buyers reward their suppliers based on the extent to which they follow stated procedures (e.g., development methodology, placing buyer personnel on supplier premises, or weekly progress reports) (Eisenhardt, 1985; Jaworski & MacInnis, 1989; Stump & Heide, 1996). For example, some companies like Xococo choose to send teams of audits to monitor the supplier's processes and development methods (16 December 2003 in *The Wall Street Journal*). Therefore, due to their emphasis on process behaviors over outcome results, behavior-oriented controls involve greater supervision and contact, more subjective evaluation methods, and tend to have a longer time perspective.

Informal controls have been categorized based on whether they are implemented by (or exert an influence on) a social group versus an individual. Clan control is implemented through mechanisms that minimize the differences between preferences (Eisenhardt, 1985) by transmitting common values, beliefs, and philosophy within the clan (Ouchi, 1979; Wathne & Heide, 2000). Examples include structuring the relationship so that it is strategic to both parties and socializing by executives through regular joint meetings. To protect their own reputation or the relationship with the buyer, the supplier may practice self control engaging in behavior consistent with the best interests of the buyer without formal controls. The supplier determines both the goals and the actions through which they should be achieved (as in self-regulated teams). For instance, in the NPD context, members of the supplier team may determine the specific process through which a new system is to be developed, or a specific timeline for new product or module delivery, and then monitor their own compliance with the self-prescribed behaviors and/or outcomes. Allegro Manufacturing, a provider of capital equipment systems

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