Hostage and Knowledge Transfer in Offshore Product Outsourcing

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Abstract

Both relation-specific assets and intensive knowledge transfer are widely observed in offshore product outsourcing, i.e. original equipment manufacturing (OEM). While conventional wisdom suggests that either of the two alone will lead to market failure, surprisingly, in practice, OEM relationships are quite stable over time and many have lasted for decades. To explain this puzzle this study suggests that the co-existence of asset specificity and knowledge transfer actually stabilizes, rather than destabilizes, the contractual OEM relationships. More precisely, due to the hostage effects of relation-specific investments made by contract manufacturers to mitigate knowledge leakage hazards, OEM buyers are more willing to share proprietary knowledge with the contract manufacturers. Meanwhile, the free knowledge acquisition during collaboration in turn would compensate the contract manufacturers for their vulnerability arising from the invested specific assets. Empirical data collected from 110 cross-border OEM relationships in electronic and information technology products basically support these arguments.

Key words: Contract manufacturer; outsourcing; asset specificity; knowledge transfer

Introduction

Cross-border contract manufacturing is a contractual arrangement where multinational enterprises (MNCs), often located in developed economies, subcontract production to offshore manufacturers, mostly in less developed countries (Hobday, 1995). One typical arrangement is called original equipment manufacture (OEM), in that buyers transfer all design and production know-how to offshore contract manufacturers (the suppliers) , buy back the output in which the transferred knowledge is embedded, and resell the final product to consumers under their own brand names (Chen, 2005; Kotabe, Mol and Ketkar, 2008).

OEM is marked by intensive but free transfer of knowledge from buyers to contract manufacturers. In outsourcing iPod from Asia, for instance, Apple shares market knowledge, design know-how, operation systems, and management skills with its contract manufacturers, in order to control production costs and assure product quality and brand image (Linden, Kraemer and Dedrick, 2007). Such knowledge transfer is not risk-free, however. To begin with, Apple must face the danger of fostering competition, as its learned contract manufacturers may leverage their manufacturing experience to introduce its own brand or copy-cats in the final products market (Markides and Berg, 1988; Hamel, Doz, and Prahalad, 1989; Quinn, 2000; Einhorn, 2007). Another risk is the knowledge spillovers and leakage to a third party that outsource products from the same contract manufacturers (Kang et al., 2009).

Meanwhile, in business practice, cross-border contract manufacturing is also characterized by a high level of unilateral relation-specific investments sunk by contract manufacturers to win the order (Kang et al., 2009). Such investments include dedicated manufacturing plants, customer-specific sales teams, computer systems, managerial processes, and so on. The largest notebook PC manufacturer Quanta, for instance, dedicated assembly lines to the specifications and configurations Dell's products and they cannot be easily modified to make computers designed by others (Tanzer, 2001). Quanta even created a Dell Department where all personnel and managerial processes were molded to serve only the needs of the MNC buyer, Dell.

Both the two above-mentioned salient features, knowledge transfer and asset specificity, have been the foci of international business studies for years. To explain the very nature of MNCs, scholars maintained that imperfections in international markets motivate firms to bring exchange into the firm's governance structure (Buckley and Casson, 1976; Dunning 1981). As an intermediate goods, knowledge is inherently tacit and therefore hard to transfer across firms, which in turn leads technology developers to internalize knowledge exploitation abroad through foreign direct investment (Hennart, 1982; Rugman and Verbeke, 2003). In contrast, asset specificity limits the power of the market in sanctioning inter-firm relationship, which then drives up transaction costs and results in vertical integration (Williamson, 1985, 1996). In other words, either technology transfer or asset specificity alone can destabilize contract manufacturing relationships. It is thus theoretically predictable that the two together will increase the possibility for partners to choose hierarchy over market to govern the contract manufacturing relationships. Surprisingly enough, in practice, OEM relationships are quite stable over time and many have lasted for decades. This is the puzzle that the study aims to solve.

We argue that relation-specific assets serve as hostages to facilitate technology transfer in cross-border contract manufacturing relationships (Williamson, 1983). On the one hand, contract manufacturers can use specific assets to signal to MNC buyers their commitments to establish a long-term cooperative relationship, because they will fail to fully recover their sunk investments if the relationship ends prematurely. The presence of specific assets, on the other hand, allows MNC buyers to inflict severe penalties on those contract manufacturers who abuse the transferred knowledge. As such, the co-existence of asset specificity and knowledge transfer sustains, rather than destabilizes, cross-border contract manufacturing relationships over time.

The paper is organized as follows. In the next section, we draw on Internalization Theory (IT) and Transaction Costs Economics (TCE) to develop a set of hypotheses to predict the antecedents and consequences of asset specificity in the context of knowledge transfer from MNC buyers to offshore contract manufacturers. The hypotheses are tested on a sample of 110 cross-border contract manufacturing relationships in electronics and information-technology products. We discuss the findings before concluding the paper.

Conceptual Framework

TCE advocates suggest that transaction-specific assets, i.e. asset specificity, create contractual hazards and frictions (Williamson, 1985, 1996). Whenever specific investments are present in a transaction, a proper safeguard (ownership control, for instance) should be in place for the investing firm to prevent its assets from being expropriated by its counterparts (Anderson and Gatignon, 1986). Specific assets are those assets that have little value in alternative uses and cannot be easily re-deployed to other business settings. Thus, those specific assets induce a lock-in risk for the investing firm and the transaction costs increase due to small-numbers bargaining. Within the context of cross-border contract manufacturing relationships, offshore contract manufacturers have to invest specialized assets if they are to win orders. The investments, including dedicated equipment, cross-function teams, computer software, etc., are useful in facilitating transactions between partners scattered in geographically dispersed locations. However, contract manufacturers that make the investment of buyer-specific assets limit the number of OEM buyers they can serve. Further, given the competitive global market, contract manufacturers have no guarantee for repeated orders from buyers. As such, in cases where the buyers terminate the contract prematurely, the contract manufacturers will fail to fully recover their specific assets. Along the logic of TCE, potential hold-up hazards arising from asset specificity would force the investing contract manufacturers to consider vertical integration, setting up their own R&D operations for instance, to constrain the opportunism that may result.

Focusing on intermediate product such as knowledge, Internalization Theory argues that knowledge is easier to transfer within the firm than across markets. The firm has a cost advantage in transferring the knowledge within its ownership as opposed to within a market context because knowledge cannot be handily transferred across organization boundary. Possible costs and hazards in contractual knowledge transfer include valuation of the technology, knowledge withholding, costs of technical supports, the knowledge abuse of recipients and so on (Buckley and Casson, 1976; Rugman and Verbeke, 2001; Bettis, Bradley and Hamel, 1992; Einhorn, 2007). In such cases, it becomes desirable for knowledge providers to internalize the possible knowledge exploitation abroad through foreign direct investment so that hazards arising from knowledge transfer could be mitigated by hierarchical orders (Buckley and Casson, 1976; Hennart, 1982; Rugman, 1981; Teece, 1986; Chen, 2005). Scholars also contended that, when combining two distinct types of know-how, hierarchies are to be chosen over markets because they permit efficiency in the integration of knowledge (Kogut and Zander, 1992; Grant, 1996).

Both the above-mentioned theories are rooted in organizational economics and, generally speaking, adopt a cost-minimization and efficiency-seeking approach to explain the “make or buy” decision (i.e. foreign direct investment or licensing). However, TCE focuses on the traits of the transaction, asset specificity in particular, and their effects on transaction costs whereas IT emphasizes the hazards arising from knowledge transfer through market. More specifically, Internalization Theory suggests that knowledge alone fails the market, regardless of the extent to which the asset committed to the transaction is customized. Ready examples occur in cross-border contract manufacture relationships. A learned contract manufacturer may leverage learned manufacturing experience to introduce its own brand and compete directly against its knowledge providers (buyers) in the final products market (Hamel, Doz and Prahalad, 1989; Quinn, 2000; Kang et al., 2009). As a result, intensive knowledge transfer through market, i.e. licensing, tends to be problematic (Dunning, 1981; Hennart, 1982).

Putting together, it is straightforward to predict that the existence of both asset specificity and knowledge transfer in a relationship will favor the organization form to govern the relationship. Intriguingly, we suggest that, the concurrence of the two will stabilize, rather than shake, the cross-border manufacturing relationship. As noted, OEM buyers will give necessary technology along with product specification to contract manufacturers to ensure product quality and protect their brand. However, the possible knowledge abuse by contract manufacturers is still very much the buyers' concerns (Quinn, 2000), not to mention the internalization advantage arising from market imperfection of knowledge transfer. On the other hand, contract manufacturers in emerging countries often lack the knowledge to apply manufacturing and product design technologies (Luo and Peng, 1999). The specific investments to the buyers signal commitment and post a hostage in the relationship (Williamson, 1983; Chen and Hennart, 2004). The specific assets mitigate the knowledge exploitation hazards and, as a result, facilitate knowledge transfer between buyers and contract manufacturers. Without the credible commitment signaled by contract manufacturers, OEM buyers would be reluctant to share proprietary knowledge with them. Similarly, without the anticipated knowledge gain, contract manufacturers would also be hesitant to risk investing specific assets for the relationship. Therefore, it is the concurrence of the two, asset specificity and knowledge transfer, makes the OEM contract sustain. This is why the relationships, given the intensity of knowledge transfer and the presence of specific assets, tend to be quite stable over time.

Hypotheses Development

Along with the above-discussed logic, we propose that investments in relation-specific assets enhance the smooth of knowledge transfer from OEM buyers to contract manufacturers. Specifically, we suggest that the investments contribute to the competencies of the investing contract manufacturers due to knowledge acquisition through joint projects. Further, given that specific investments facilitate inter-firm knowledge transfer, we argue that both the absorptive capacity of contract manufacturers and the degree of tacitness of knowledge to be transferred are positively associated with the likelihood of the investments in specific assets.

Asset specificity and joint actions

Previous research suggests that the presence of relation-specific assets signals the exchange relationship moves from arms-length market transaction to relational exchange that favors a long-term orientation (e.g. Dwyer, Schurr, and Oh, 1987; Celly et. al., 1999). Meanwhile, in long-term relationships, joint action between partners is deemed as key aspect of closeness and interdependence (Heide and John, 1988, 1990). Indeed, to meet an increasingly sophisticated demand, contract manufacturers in developing countries need to work closely with MNC buyers to improve their manufacturing and managerial processes (Hobday, 1995; Ernst, 2000).

We define joint action as the scale and scope of joint activities between OEM partners. Examples of joint actions include joint new product/component design, cost-reduction endeavors, global logistics arrangement, etc. In cross-border contract manufacturing arrangements, to facilitate communications and coordination between partners, specific assets, such as buyer-specific computer software and dedicated cross-functional personnel, are necessary conditions to make joint projects possible (Hamel, Doz, and Prahalad, 1989; Quinn, 2000). For instance, modular product architecture has to be established as the basis for developing new product jointly (Sanchez, 1999).

In addition, as noted earlier, buyers' concerns over possible hazards of knowledge abuse are a hindrance in the learning process for contract manufacturers. the postage of specific assets by contract manufacturers enables the buyers enjoying more control over the investing contract manufacturers because, once the manufacturers violates the contract, the buyers terminate the contract and the penalty of non-salvaged assets will occur (Williamson, 1983). Thus, such investments signal a pledge to the buyers and, as a result, attenuate their worries about possible opportunistic behavior such as knowledge leakage to a third party. Hence, the buyers' willingness to achieve closeness manifested by joint projects in relationships will be strengthened by the specific investments (Bensaou and Anderson, 1999; Celly et. al, 1999). In other words, specific investments mitigate both physical and psychological hindrance in knowledge transfer and thus result in more joint projects between buyers and contract manufacturers. We thus suggest

H1: The intensity of specific assets invested by contract manufacturers has a positive relationship with their joint actions with buyers.

Joint action and competence improvement

Recent literature deemed learning as a major purpose in forming alliances (e.g. Hamel, 1991; Nobeoka et al., 2002). Facing global competition, contract manufacturers need to learn and upgrade their own competencies to meet demands for complex manufacturing processes and engineering required by famous brands. Prior research has evidenced the process of learning and innovation of Asian contract manufacturers under OEM arrangement through accumulated experience and joint problem-solving (Hobday, 1995; Cyhn, 2000). As such, the interactive nature of knowledge transfer within alliance is critical.

Nevertheless, it is worth noting that, without opportunities to work closely with resource-abundant buyers, interactive learning can not take place. Problem shooting together with buyers on a regular basis provides a learning mechanism and generates incremental improvement ranging from production process to new component design (Cyhn, 2000). As discussed, OEM buyers are willing to give necessary knowledge to contract manufacturers, in terms of design, quality control, and meeting technical specifications etc., to benefit from low cost yet high quality production. In practice, most contract manufacturers started offering their manufacturing services by working to buyers' specification. For instance, Samsung Electronics started as a microwave oven contract manufacturer with GE and eventually took over the design of microwave ovens from GE. Hon-Hai Precision Industrial Co.[1], the major contract manufacturer for iPod, established one subsidiary near its OEM buyer, Intel. Its engineers stationed at Intel headquarters in Santa Clara, USA all year round to co-develop connectors compatible with Intel's newest product specification (BusinessWeek, 2005a).

[1] Hon-Hai is also known as Foxconn Co. It ranks as the largest electronic contract manufacturer.

Through joint projects, branded buyers may share information of production planning, inventory, and market forecasting with their contract manufacturers to enable them to better deal with demand fluctuations. Over time, the contract manufacturers could accumulate not only manufacturing skills but also the trend of foreign market demand, key specifications of future product innovations, and more important, the buyer's managerial capabilities as well as culture (Nelson and Winter, 1982; Vonderembse and Tracey, 1999; Yam et al., 2003). Such firm-specific knowledge is of particular importance as it is unique, valuable, and inimitable and contributes to firms' competencies (Barney, 1991).As a result, contract manufacturers could enhance their competencies through a gradual process of experiential learning in joint projects which facilitate information sharing, sophisticated communication and interactive learning. Thus, we expect a positive effect of joint action on the competence improvement of contract manufacturers.

H2: Joint action has a positive relationship with the improvement in contract manufacturers' competency.

Absorptive capacity and asset specificity

Prior research suggests that not all knowledge recipients are equally adept at learning (Hamel, 1991). Generally speaking, firms with overlapped technology, related experiences, and established interaction routines would possess high absorptive capacity (Cohen and Levinthal, 1990; Shenkar and Li, 2000). We define absorptive capacity as a function of the extent to which partners have developed interaction routines that maximize the frequency and intensity of socio-technical interactions (Cohen and Levinthal, 1990; Dyer and Singh, 1998). Firms with high absorptive capacity would "soak up" more and learn better whenever given the chance to work with their counterparts.

Under OEM arrangement, contract manufactures are anonymous and their buyers will give necessary knowledge for free to them to ensure product quality. Given the willing-to-teach buyers, however, it also takes smart-to-learn contract manufacturers to make the knowledge transfer effective. While given the same learning opportunities, other things being equal, those who possess capacity in absorbing incoming knowledge will reap a better learning benefit. Therefore, the rewards of knowledge transfer would be bigger for contract manufacturers possessing high absorptive capacity than otherwise.

We argue that the investment of specific assets to OEM relationships is a strategic decision. When it comes to the investment decision, contract manufacturers would evaluate the return on investment in terms of knowledge acquisition and make a rational decision. Generally speaking, contract manufacturers have an incentive to invest more relation-specific assets to induce knowledge providers, buyers, to share more information/ technology with them. However, knowing its own capability of absorbing incoming knowledge, a capable learner has a lot incentive to make the investment of specific assets to the relationships. Thus, the anticipated knowledge rewards for the investing contract manufacturers compensate their vulnerability stemmed from the specific investments (Cyhn, 2000; Nelson and Winter, 1982). We therefore expect a positive effect of absorptive capacity on the likelihood of investing specific assets.

H3: Absorptive capacity of contract manufacturers has a positive relationship with their investments in specific assets.

Knowledge tacitness and asset specificity

The extent to which the information and knowledge can be codified varies (Nonaka, 1994; Simonin, 2000). In fact, one major reason why market fails for knowledge transfer between firms is the inherent tacit nature of much knowledge (Madhok, 1997; Zander and Kogut, 1995). By definition, tacit knowledge is the knowledge more difficult to articulate, formalize, and communicate (Nonaka, 1994). For instance, documented production technologies, blueprints and manuals for instance, are less tacit than those "soft" behavioral technologies such as marketing knowledge (Simonin, 2000). Meanwhile, design capability and organization routines tend to be sticky to transfer as well (Cyhn, 2000; Wu and Hsu, 2001).

Knowledge embedded in routines is sticky due to its contex-knowledge linkage (Zander and Kogut, 1995; Simonin, 2000). Unless knowledge recipients have a chance to imitate through frequent interactions, communication, and templates, the sticky knowledge may fail to transfer across organization boundaries (Szulanski, 1996, 2002). The stickiness, as a result, imposes the need for ongoing and close interaction and communication that can be feasible only with the buyers' consent (Nelson and Winter, 1982; Oxley and Sampson, 2004).

Again, to gain the consent of buyers to work closely together, the hostage-like investment of specific assets could alleviate the buyers' concerns over possible knowledge-abusing behavior. As such, contract manufacturers committing relation-specific investments will have a better chance to obtain buyers' consent to get access to proprietary knowledge through various activities. In addition, to enable information flow across organization boundary, certain working routines and IT infrastructures compatible with counterparts has to be established to make the two independent organizations virtually integrated (Magretta, 1998). It is thus sensible for contract manufacturers to invest more specific assets when the knowledge to be transferred is perceived as more tacit. We therefore expect a positive effect of knowledge tacitness and the likelihood of investing relation-specific assets.

H4: The level of tacitness of knowledge acquired by contract manufacturers has a positive relationship with their investments in specific assets.

Methods

The Sample

We examine the investment of specific assets and knowledge transfer in OEM relationships in a setting of Taiwanese contract manufacturers. We choose electronics and IT-related contract manufacturers in Taiwan as subject firms for our empirical study for a couple of reasons. After years of manufacturing products under buyers' brands, Taiwan has become a hidden center of global economy and dominates certain product categories (Business Week, 2005b). According to Far Eastern Economic Review (2004), Taiwanese companies already make three-quarters of the world's notebook computers, more than 80% of all motherboards, plus a growing share of flat-screen displays and other technology tools. The electronics industry landscape, therefore, provides a rich context for examining the contract manufacturers' viewpoints in international subcontracting relationships. Moreover, due to highly intensive competition in the end product markets, increasing pressure to fulfill time-to-market promises requires the contract manufacturers to maintain efficient and effective collaborations based on specific investment and capabilities. Various anecdotal examples in Taiwan have made our research inquiry sufficiently relevant (Ernst, 2000).

The data were collected through a questionnaire mailed to 286 Taiwanese electronics manufacturers that offer large-scale manufacturing services to their foreign industrial buyers. We compiled the sampling frame from two different sources: *Directory of Major Companies of*

Information Industry in Taiwan, published by the Institute of Information Industry (III), and a supplier list compiled by International Sourcing Center (ISC) of the Taiwan External Trade Development Council. As OEM business is different from transactions between exporters and importers, which may be some one-shot deals, we cross-checked the two lists to identify eligible firms. Only contract manufacturers in IT-related industry were selected. We again consulted with experts in the III before mailing the questionnaires to ensure the correctness of the list. For instance, a firm of good export record with foreign distributors rather than OEM buyers would be deleted from our sampling list.

It is worth noting that the efforts to obtain survey data from the suppliers' side entail considerable time and energy, especially without the consent or support from buyers. Our pre-study interviews revealed that contract manufacturers are often subject to specific contract clauses that impose strict confidentiality on buyers' identity. Despite such difficulty, we mailed out multiple waves of questionnaires and traced them with follow-up calls. Each informant was asked to complete the questionnaire with reference to a self-selected foreign buyer that is of significant importance to his/her firm. Follow-up phone calls were made deliberately to make certain that even if multiple questionnaires were collected from the same firm, they indeed reflected supplying scenarios corresponding to different foreign buyers. As a result, 119 completed questionnaires were returned (i.e., 41.6% response rate). Nine were eliminated due to substantial missing data on key construct items, resulting in 110 usable questionnaires for subsequent analysis. The response rate is much higher than those found in previous research using survey data to examine inter-organizational relationships (e.g., Young-Ybarra and Wiersema, 1999).

The profile of respondent firms is sufficiently diverse in terms of product type and firm size. Regarding product types, 23.3% of the sample firms focuses on peripherals such as CD-ROM and scanner, 19.3% desktop and notebook PC, 15.2% network/multimedia card and motherboard, 15.2% semiconductors, and 10.4% components like connectors, LCD and PC case. In addition, the sample is composed of companies with annual sales turnover ranging from US $6 million to US $5 billion. The number of employees ranges from 69 to 35,000, with an average of 3,202. Of the respondents in this study, 21% are top executives, and 67% are division directors. Further analysis of the characteristics of sample firms, using criteria like sales volume, number of employees, and product types revealed no significant differences between the responding and non-responding firms.

Instruments and Measures

Most measurement items in the questionnaire are based on 7-point Likert scales, ranging from 1= “strongly disagree” to 7= “strongly agree.” Some of the items were reverse-coded wherever appropriate.

Asset Specificity Asset specificity was divided into two sub-constructs: “tangibles” and “intangibles.” *Tangible specificity* refers to the degree that concrete or physical investments such as dedicated equipment, computer hardware/software, online data exchange and communication interfaces are deployed specifically for the foreign buyers. These investments may build up the infrastructure of a virtual (or disintegrated) organization. *Intangible specificity*, on the other hand, delineates the extent suppliers assign cross-functional teams, adapt managerial processes, and facilitate data integration and human-machine interaction specifically for the buyers.

Joint Action In this study, joint action refers to the scale and scope of functional activities, ranging from product design, and logistic arrangement, to personnel training, performed jointly between partners. We generated multi-item scales of joint action based on previous related research (Zaheer, McEvily and Perrone, 1999; Heide and John, 1990) and field interviews with some electronics contract manufacturers in Taiwan (alpha = 0.814, AVE = 0.577).

Competence Improvement Competence improvement captures the degree to which capabilities of contract manufacturers have improved in production, product development, market responsiveness, and general managerial skills. It was measured by six items, and the composite reliability is satisfactory (alpha = 0.912, AVE = 0.695).

Absorptive Capacity & Knowledge Tacitness As to absorptive capacity and knowledge tacitness, these two latent variables were measured by four and three items respectively with satisfactory composite reliability (alpha = 0.762 and 0.809, AVE = 0.584 and 0.725, respectively).

Table 1 shows all the detailed measurement items, standardized factor loadings, and composite reliability of the five constructs.

[Table 1 about here]

The Model

In a confirmatory factor analysis (CFA) framework, we first run a "null model" in which all latent constructs are deprived of any possible inter-relationships, and the epistemic relationships between each latent construct and its corresponding measures are examined. This procedure provides reliability indices like Cronbach's α, as summed up in Table 1. Then we adopt the LISREL approach to estimate the hypothesized causal relationships.

Results

Table 1 reveals that all standardized factor loadings, significant at the 1% level, range from 0.5653 to 0.9215. Thus, these measures demonstrate adequate convergent validity. Meanwhile, all multi-item composite reliabilities (Cronbach's α) fall in a range from 0.699 to 0.912, indicating acceptable internal consistency among measure items. Correlations and descriptive statistics of latent constructs are reported in Table 2.

[Table 2 about here]

As to the structural model itself, Table 3 shows the parameter estimates and goodness-of-fit indicators of the structural path model. Although the overall Chi-square value of our proposed model does not suggest a good fit (χ^2 = 293.84, d.f. =166, p = 0.000), it should not be treated as a test statistic to reject a model unless used in model comparisons. The goodness-of-fit index (GFI = 0.7895) and the adjusted goodness-of-fit index (AGFI = 0.7338) suggest a borer-line fit, but the comparative fit index (CFI = 0.9364) seems to be acceptable. A further robustness check of the results using indices related to residual analysis, such as RMSEA = 0.082 RMR = 0.081 and NFI = 0.8665, also show no strong indication of a poorly fitted model (Bentler and Chou, 1987).

[Table 3 about here]

As the fit between the hypothesized model and the observed data is found acceptable, individual path coefficients can be then interpreted. Table 3 reveals that all estimates are significant at the $p<0.05$ level. Specifically, we find a positive and significant impact of asset specificity on joint action (β_{21} =0.9878, t=5.01), implying that the investment of specific assets by contract manufacturers is effective in inducing broader scope of collaboration with buyers. Hypothesis 1 is thus supported. Further, the projects performed jointly between contract manufacturers and their buyers contribute to competence enhancement of contract manufacturers. Joint action is positively and significantly associated with higher level of competence improvement (β_{32} =0.6791, t=5.11), which strongly supports Hypothesis 2. As to the two determinants of asset specificity, namely absorptive capacity and knowledge tacitness, the results are in the expected direction and the hypothesized effects are significant. The hypothesized positive impact of absorptive capacity on asset specificity is significant, consistent with the predicted direction (γ_{11}=0.7174, t=4.28). Hypothesis 3 is supported. It reveals that the better a contract manufacturer can absorb incoming knowledge, the more likely it will invest in a manner idiosyncratic to an OEM buyer. In addition, consistent with our theoretical prediction, the tacitness of knowledge to be transferred appears to induce contract manufacturers to invest specific assets to the relationships. The effect of knowledge tacitness on asset specificity is positive and significant (γ_{12}=0.2156, t=2.07), and Hypothesis 4 is also supported. Thus, both absorptive capacity and knowledge tacitness are confirmed as significant factors explaining the investment of specific assets in offshore product outsourcing relationships. However, of the two, absorptive capacity has a stronger impact on the investment than knowledge tacitness does.

Discussion and Conclusion

The primary aim of the present study was to answer the puzzle why OEM relationships could stay in contractual forms for years, given the possible contractual hazards of high stakes of relation-specific assets and intensive knowledge transfer in the relationships. Indeed, OEM has existed for decades. For instance, Mattel started using Taiwanese contract manufacturers to product Barbie dolls in late 1970s, while Liz Claiborne began product outsourcing overseas in 1976 (Chazen, 1996). However, to facilitate transaction and ensure product quality, it is not uncommon to observe in practice that OEM suppliers are requested to invest relation-specific assets whereas OEM buyers transfer necessary technology and managerial knowledge to suppliers for free. Conventional wisdom predicts that either of the two, asset specificity or knowledge transfer, alone fails the market. Interestingly, this study found that the concurrence of the two will sustain, rather than shake, the contractual OEM relationships. The findings extend our understanding to International Business theories and boundaries of the firm.

Instead of taking a cost-minimization approach, this study conceptualized relation-specific assets as a hostage and suggested that the pledge of specific assets will support knowledge transfer between OEM buyers and contract manufacturers. Our results support the hostage effect of relation-specific assets. While prior research emphasizes the negative side of asset specificity such as increased transaction costs and emphasizes the importance of proper safeguard mechanism, our study takes a positive approach. Although some research has suggested the value-creation side of asset specificity (e.g. Celly et. al, 1999; Madhok, 1997; Williamson, 1983), nevertheless, our study maybe the first to theoretically and empirically link asset specificity with inter-partner learning within the context of cross-border contract manufacturing relationship. By data collected from 110 cross-border OEM relationships in electronic and information technology products, we empirically validated that such investment significantly contributes to knowledge transfer manifested by closer interaction through joint action.

Departing from prior research that deems joint action as an indicator of interdependence (Heide and John, 1988), this study suggests that joint action play a role as a learning platform for contract manufacturers. Over time, the contract manufacturers could acquire not only production skills/technology but also the trend of foreign market demand, and more important, the buyer's managerial capabilities as well (Nelson and Winter, 1982; Vonderembse and Tracey, 1999; Yam et al., 2003). Statistical analysis of our data confirmed this point as the path coefficient between joint action and competence improvement is significantly positive and of magnitude. The finding is consistent with viewpoints of recent researches that joint problem-solving arrangements and R&D co-practice facilitates the transfer of complex and tacit knowledge between partners (McEvily and Marcus, 2005; Frost and Zhou, 2005). Further, our results suggest the mediating role of join action in the linkage between asset specificity and learning.

We also argue that the pledge of specific assets is a strategic decision for contract manufacturers rather than a mere compliance to OEM buyers. With an aim to induce more learning opportunities, contract manufacturers will make the investment decision based on two factors: how good they are at absorbing incoming knowledge and how tacit the knowledge to be acquired is. The empirical results reveal that both positively and significantly influence the investment of specific assets. However, the investing contract manufacturers are more mindful of their absorptive capability than the knowledge tacitness. This may find explanation from the fierce competition between offshore contract manufacturers in recent years. Meeting increasing competition from low-wage areas such as China and Vietnam, to avoid cutting-throat competition and tap into high-end markets, it is critical for contract manufacturers to learn from resource-abundant OEM buyers to remain updated with respect to cutting-edge product and process development (Cyhn, 2000; Wu and Hsu, 2001). Ready example is High Tech Computer (HTC) in Taiwan. It used to produce phones anonymously for customers like T-mobile and AT&T yet now works with major MNCs such as Google and Microsoft's Windows Mobile platform is centered around HTC's smart phones (Einhorn, 2007; Sun, 2007). Putting the statistical results and anecdotal examples together, it is imperative for contract manufacturers to work closely with leading branded customers to stay competitive. Thus, the improved competence of contract manufacturers is their compensation and value created from investing specific assets in OEM relationships.

The implication of this study is that committing relation-specific assets is a winning proposition for contract manufacturers in emerging markets to upgrade their competence. Many Asian MNCs, such as Samsung in Korea and Acer Taiwan, were first founded as offshore contract manufacturers offering production services for MNCs in developed countries (RCA, IBM etc.). A farsighted, pro-active contract manufacturer should take the investment decision as a strategic choice rather than mere a passive compliance with OEM buyers. Such investments signal commitment to maintain an enduring relationship as well as facilitate collaborative joint projects with the buyers, under which knowledge exchange and organizational learning will be realized. Thus, for contract manufacturers, the relationship management strategy can be shaped in such as way that joint action can be induced, common language and shared routines established, knowledge transferred and internalized, and finally the investing contract manufacturers' own competencies enhanced.

It is worth noting that previous research on OEM relationships overwhelmingly takes buyers' stance examining related outsourcing issues (e.g. Markides and Berg, 1988; Hamel, Doz, and Prahalad, 1989; Quinn, 2000). The perspectives of contract manufacturers are by and large neglected, not to mention that there is a disparity between the prevalence of OEM in practice and the lack of research work published in academic journals (Chen, 2005). This study thus fills the gap and contributes to the theory of OEM. Further, departing from the literature discussing mutual hostage or reciprocal investment of relation-specific assets (e.g. Williamson, 1996), this study conceptually and empirically illustrate how the concurrence of hostage and knowledge transfer sustains contractual relationships in cross-border OEM.

This study has certain limitations that can lead to directions for future research. Ideally, we want to have a bigger sample size. However, there is a paucity of data on cross-border contract manufacturing, and it is relatively difficult to collect data from the suppliers' side regarding buyer-supplier relationships, as compared to the buyers' side. As all subject firms are totally Taiwan-based and belong to the IT-electronic industry, the results could be more generalizable should data from other industries or other Asian countries can be included. In addition, we are assuming that learning is necessary in all OEM partnerships, which may not hold in practice. Finally, given the hostage effect, we are not sure whether contract manufacturers could keep upgrading their competence without provoking a "sense of being threatened" in the minds of their branded buyers (Bettis et. al., 1992; Markides and Berg, 1988). The simultaneous cooperative and competitive nature of OEM relationships is obvious. More conceptual and empirical work is needed in this area.

To conclude, the co-existence of asset specificity and knowledge transfer makes OEM a self-forcing contract, because both sides have something to lose if the relationship fails. The hostage effects of asset specificity induce closer interaction between OEM partners. As the buyers will be more willing to give contract manufacturers access to proprietary technology/knowledge after the specific assets are sunk, the investing contract manufacturers will benefit from close collaboration and improve their own competence. That’s why the concurrence of asset specificity and knowledge transfer stabilizes, rather than destabilizes, cross-border contract manufacturing relationships over time.

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Table 1: Item Reliability and Validity

Construct	Measurement Items	Factor loadings	Cronbach α and AVE
Absorptive Capacity	1. Your firm knows clearly that who knows what in the buyer's firm	0.6767	α = 0.762
	2. The technological background of your firm is close to that of the buyer	0.6968	AVE = 0.584
	3. You firm knows well what can be learned from the buyer	0.6678	
	4. Your firm has been good at absorbing ideas and skills of the buyer	0.6250	
Knowledge Tacitness	1. It takes a long time to pick up the managerial process of the buyer	0.6860	α = 0.809
	2. It is not easy to transform the buyer's new product idea into documentation	0.9215	AVE = 0.725
	3. It is difficult to orally explain the buyer's managerial concept	0.7044	
Asset Specificity [1]	1. Tangible Specificity [2]	0.6164	α = 0.736
	(1). Your firm has dedicated manufacturing/testing equipment for the buyer		AVE = 0.562
	(2). Your firm has invested computer hardware and software for the buyer		
	(3). Online data exchange between your firm and the buyer has been pretty smooth		
	(4). You firm has invested some compatible interfaces for the buyer		
	2. Intangible Specificity [2]	0.5653	α = 0.699
	(1). Your firm has dedicated a cross-functional team for the buyer		AVE = 0.526
	(2). The interaction between computer and people is typical when communicating with the buyer		
	(3). Your firm has invested in downstream data integration for the buyer		
	(4). Your firm has spent lots of time to adapt your managerial process to ensure the compatibility with the buyer		
Joint Action	1. Your firm designs new product jointly with the buyer	0.6433	α = 0.814
	2. Your firm studies the method of cost reduction jointly with the buyer	0.7501	AVE = 0.577
	3. Your firm arranges your delivery system jointly with the buyer	0.7117	
	4. Your firm has some personnel training jointly with the buyer	0.7187	
	5. Your firm makes long-term planning together with the buyer	0.5816	
Competence Improvement	1. After collaboration, the yield rate of your firm has been improved	0.8287	α = 0.912
	2. After collaboration, the production process of your firm has been improved	0.8689	AVE = 0.695
	3. After collaboration, the speed of product development of your firm has been improved	0.6766	
	4. After collaboration, the speed of delivery of your firm has been improved	0.7957	
	5. After collaboration, the market responsiveness and flexibility of your firm has been improved	0.7974	
	6. After collaboration, the managerial skills of your firm has been improved	0.8067	

Note: 1. "Asset specificity" is measured by two dimensions: tangible specificity and intangible specificity.

2. Tangible and intangible specificities are measured by four items respectively. For the purpose of data reduction, measurement items corresponding to each specificity concept are aggregated into composite scores.

3. AVE stands for average variance extracted.

Table 2: Correlations between Latent Constructs

Constructs	Mean	s. d.	1	2	3	4
1. Absorptive Capacity	4.038	0.562	1.0000			
2. Knowledge Tacitness	2.872	0.947	-0.0653	1.0000		
3. Asset Specificity	2.406	0.577	0.7034	0.1687	1.0000	
4. Joint Action	3.888	0.887	0.6948	0.1667	0.9878	1.0000
5.Competence Improvement	5.390	0.852	0.4718	0.1132	0.6708	0.6791

Note: Correlations above 0.1853 are significant at p<.05 (N=110).

Table 3: Empirical Results of Hypotheses Testing

	Hypothesis	Path coefficient	t-value
H1	Asset Specificity → Joint Action	0.9878	5.01
H2	Joint Action → Competence Improvement	0.6791	5.11
H3	Asorptive capacity → Asset Specificity	0.7174	4.28
H4	Knowledge Tacitness → Asset Specificity	0.2156	2.07

χ^2 =293.84 with d.f.= 166 (p=0.00)

Goodness of Fit Index (GFI)=0.7895

Adjusted Goodness of Fit Index (AGFI)=0.7338

Comparative Fit Index (CFI)=0.9364

Normed Fit Index (NFI)=0.8665

Non-Normed Fit Index (NNFI) = 0.9272

Root Mean Square Residual (RMR) = 0.08154

Root Mean Square Error of Approximation (RMSEA)=0.08295