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Fostering Collaborations: A Knowledge-Acquisition Strategy for Contract Manufacturers in OEM Relationships

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Abstract

Acquiring knowledge through collaborations with OEM buyers is critical for offshore contract manufacturers given its relative resource-deficiency. However, existing research on knowledge transfer within OEM alliances mainly addresses knowledge abuse hazards from the buyers' stance. We have limited understanding about how the contract manufacturers could alleviate the buyers' concerns so as to foster a wide array of joint projects. Adopting lenses of transaction cost economics and relational view, this study hypothesizes that buyer-specific tangible/ intangible/ site assets and relational capital will contribute to collaborations in international OEM relationships. The arguments by and large find empirical support in data collected from 110 dyadic relationships between OEM buyers and Taiwan contract manufacturers in information industries. Overall, this study sheds light on the mechanisms to enhance collaborations and entails a knowledge acquisition strategy for resource-poor contract manufacturers mostly from emerging markets.

Keywords: knowledge acquisition, OEM collaboration, asset specificity, relational capital

1. Introduction

Cross-border contract manufacturing is a contractual arrangement where multinational enterprises (MNEs), often located in developed economies, subcontract production to offshore manufacturers, mostly in emerging economies (Ernst, 2000; Hobday, 1998). One typical arrangement is called Original Equipment Manufacturing (OEM hereafter), in that MNE buyers (Apple Inc. for example) transfer all design and production know-how to offshore contract manufacturers (Foxconn for instance), buy back the output in which the transferred knowledge is embedded, and resell the final products to consumers under their own brand names (Chen, 2005; Ernst, 2000; Sunaoshi, Kotabe & Murray, 2005; Kang, Mahoney & Tan, 2009).

It is worth noting that, in most cases, the contract manufacturers are relatively small in size and, as latecomers, inferior to the foreign MNE buyers in terms of resource abundance and managerial capabilities (Kang et al., 2009; Mathews, 2002). In today's competitive global market, the contract manufacturers need to be competent not only in manufacturing but in managerial capability, cost targeting, or logistic services as well, if they are to win an order. Thus, getting access to proprietary know-how in the course of working for a given MNE buyer to stay competitive is important, if not critical, for the contract manufacturers.

Generally speaking, as the final products will bear the brand names of buyers, it is in the buyers' interest to give necessary product specifications and technology to the contract manufacturers to ensure product quality and brand image (Chen, 2005). In addition, interfirm collaborative projects, joint new product development (NPD) for instance, could be regarded as the platforms facilitating proprietary knowledge transfer from the buyers to the contract manufacturers. It is because, during the implementation of the projects, the participating contract manufacturers could receive information such as market trend, technology, and win the opportunities to solve product design problem together with the MNE buyers (Lu & Yang, 2004; Ritter & Walter, 2003).

On the other hand, much of OEM literature suggests the competence erosion risks, knowledge leakage to third party, and that a learned contract manufacturer may exploit for the benefits of its own brands the knowledge it acquires, including product design/ development and own-brand marketing (e.g. Arrunada & Vazquez, 2006; Jean, Sinkovics & Hiebaum, 2014; Kotabe, Mol & Ketkar, 2008). As such, the risks and possible future rivalry against some learned contract manufacturers would reduce the buyers' willingness to share knowledge. Given buyers' concerns, then, how can contract manufacturers mitigate the challenge to foster collaborations in international OEM relationships? This is the basic question we are going to address.

When addressing knowledge transfer issues in OEM alliances, existing studies mostly focus on safeguarding the possible hazards of knowledge leakage from buyers' perspectives (Arrunada & Vazquez, 2006; Kotabe et al., 2008). Although some have examined the *results* of knowledge transfer, such as the types of capability developed (Cyhn, 2000; Jean, Sinkovics, & Hiebaum, 2014), and knowledge spillover effects on contract manufacturers (Kang et al., 2009; Liu, Tsou & Chen, 2013), limited attention has been given to examine the *factors* contributing to collaborative projects which facilitates proprietary knowledge transfer in OEM alliances. This study aims to fill the gap and entail a knowledge acquisition strategy for resource-poor contract manufacturers mostly from emerging markets.

The objective of this study is to theoretically develop and empirically examine the motivators of a wide array of collaborative and boundary-spanning projects in international OEM relationships through a combined lens of economic (Williamson, 1985) and relational view (Dyer & Singh, 1998). In the following section, we discuss the concept of transaction cost economics and relational view to provide theoretical hypotheses for the study, followed by methodology, statistical analysis of data, discussions, managerial implications, and conclusions.

2. Literature Review and Hypotheses

The transactions cost economics (TCE), in general, focuses on the efficient governance structure of relationships in a static context to minimize transaction costs arising from traits of transactions. Among the transaction traits, relation-specific assets invested, or "asset specificity" in Williamson's terms, is regarded as a major source of friction between transaction parties (Williamson, 1985). This is because the high switching costs caused by the relation-specific investments will transform an ex-ante market type of bidding into an ex-post small number bargaining situation. Nevertheless, studies also suggest that the customized investments may facilitate smooth coordination between trading parties (Dyer & Singh, 1998), inducing closer partnership (Dyer, 1996), contributing to information sharing and stability in a relationship (Celly, Spekman & Kamauff, 1999), and so on. In brief, like two sides of the same coin, relation-specific investments create both transaction costs and value.

Emphasizing a firm's idiosyncratic linkage with others, the relational view argues that firms can build up their competitive advantage by carefully managing their relationships with suppliers, customers, and other resource providers (Dyer & Singh, 1998; Kohtamaki, Vesalainnen & Moller, 2013). The relation itself can provide a strategic source of efficiency and competitive edge if managed appropriately (Dyer & Singh, 1998; Zaheer, McEvily & Perrone, 1998). Recent research further indicated that relational capital, goodwill, and trust that exist among partner firms can facilitate learning and transferring know-how across the organization boundaries while simultaneously prevent inter-partner technological leakages (Kale, Singh & Perlmutter, 2000; Muthusamy & White, 2005).

Given that the economic governance and social control perspectives complement each other in inter-firm relationship management, we thus combine the two complementary perspectives to broaden our theoretical grounds in exploring the motivators of collaboration within the context of international OEM alliances.

2.1 Asset Specificity and Joint Action

Asset specificity is defined as the extent to which an asset can be redeployed to alternate uses without sacrificing its productive value. It can be in the form of dedicated manufacturing equipment, tailored production tooling, human asset deployment, and proximity of production site to customers (Williamson, 1985). TCE suggests that, due to their non-salvageable nature, the investing party of relation-specific assets may suffer from *ex-post* hold-up risks in the relationship unless proper safeguards are in place *ex-ant*e. On the other hand, the pledge of commitment through making buyer-specific investments, such as dedicated equipment, location, and IT interface, also signals credible commitment in relationships (Williamson, 1983).

This study adopts the term joint action from Heide and John (1990) to represent a wide array of collaborations, indicating the extent and scope to which OEM buyers and offshore contract manufacturers work together toward their common goals. Commonly observed joint actions in international OEM business include joint logistic arrangement, joint new product development, joint cost-reduction program, and so forth. With the increased extent and scope of joint projects taken, partners' organizational boundaries are penetrated and information exchanged. It is because that collaborations connect people from both parties and create communities of practice in which complex knowledge can be interpreted and leveraged (McEvily & Marcus, 2005; Muthusamy & White, 2005; Ryzhkova. & Pesamaa, 2015).

In practice, to facilitate the implementation of projects among dispersed partners, investments in information and communication technology (ICT) are necessary due to market pressure to shorten the time-to-market cycle (Hult, Ketchen, & Slater, 2004). Such investments together with cross-functional team and managerial process dedicated to the projects provide common platforms for firms in onsite and offshore locations to virtually design and develop new product together (Kotabe et al., 2008). Similarly, tangible production equipment and integrated computer systems invested specific to the foreign buyer could enhance efficiency in collaborations. Meanwhile, geographic proximity between partner firms, or site-specificity in Williamson's term, could facilitate frequent interactions and enable frequent people visits from both sides to resolve problems together. That is, the relation-specific assets invested could enhance the degree of inter-firm linkage and create value during collaborations by improving the coordination of complementary resources and international product modularity network (Subramani & Venkatraman, 2003). In addition to these practical contributions, Williamson (1983) suggests that the relation-specific investments also signal credible commitment. Their hostage effects could reduce the buyers' concerns over the knowledge abuse risks. It is thus reasonable to suggest that

H1a. ***Tangible specificity is positively associated with joint action in international OEM relationships.***

H1b. ***Intangible specificity is positively associated with joint action in international OEM relationships.***

H1c. ***Site specificity is positively associated with joint action in international OEM relationships.***

2.2 Relational Capital and Joint Action

Relational capital refers to mutual trust, respect, and friendship both at the individual and the firm level between partners (Kale et al., 2000; Kohtamaki, Vesalainnen & Moller, 2013). Prior research evidenced that mutual trust between partners can reduce opportunistic behavior, enhance knowledge transfer and "thick" information exchange in alliances (e.g. Dyer & Chu, 2000; Uzzi, 1997). Along the similar vein, Szulanski (1996) also argued that a laborious and distant relationship between partners is one of the major barriers to knowledge flow between partners. All the above, taken together, suggest a positive association between a trusting relationship and an effective knowledge transfer between partners.

As discussed above, inter-firm collaboration entails closer interactions and information sharing. The OEM buyers engaging in joint activities risk losing their own proprietary capabilities to the contract manufacturers. Thus, without trust-based relational capital, the fear of possible hazards of proprietary knowledge leakage may become a hindrance for firms to form joint projects with partners (Zaheer & Venkatraman, 1995; Dyer & Chu, 2000). The OEM buyers may decline the proposal of collaborations to withhold exchange of critical information or experience with their contract manufacturers. Nevertheless, with the trust felt in the relationships, the buyers' concerns could be alleviated. It is thus natural to suggest:

H2. Relational capital is positively associated with joint action in international OEM relationships.

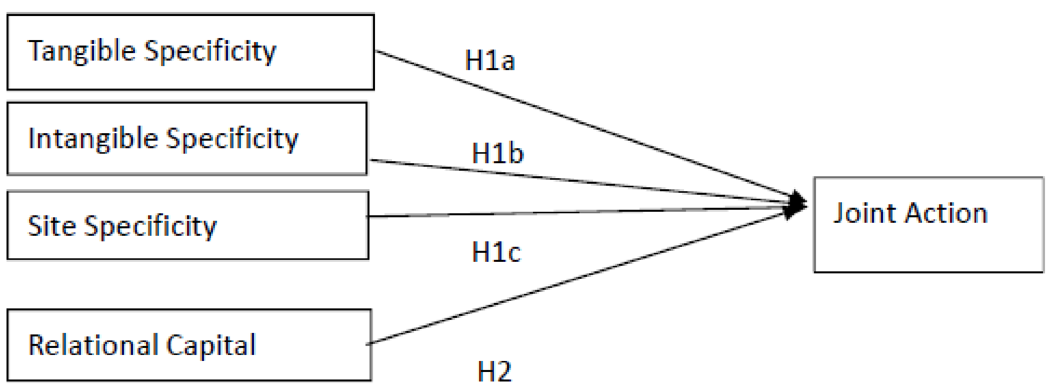

Figure 1. Research Model

3. Method

3.1 Research Setting

This study chose information technology and electronics industries in Taiwan as the target of empirical study for a couple of reasons. First, the industries are globalized and knowledge-intensive. During the past decades, the rising wave of strategic outsourcing is particularly obvious in globalized industries, not to mention that IT and electronic industries have experienced radical technological changes. The knowledge acquisition in OEM alliance is thus a compelling issue for contract manufacturers in the target industries. Second, Taiwanes contract manufacturers play an important role in the global value chain of the IT and electronic industries. The industry landscapes therefore provide a rich context for accessing international OEM relationships from the contract manufacturers' side and make our research inquiry sufficiently relevant.

3.2 Data and Sample

The data were collected through a survey questionnaire mailed to 286 Taiwanese electronic product manufacturers that offer production services to OEM buyers. There are two different sources of sampling frame: the Directory of Major Companies of Information Industry in Taiwan by the Institute of Information Industry (III), and a supplier list compiled by International Sourcing Center (ISC) of Taiwan External Trade Development Council. Each informant was asked to complete the questionnaire with reference to a self-selected foreign buyer of significant importance to his or her firm. Extensive follow-up phone calls were made. As a result, 119 completed questionnaires were returned. Nine questionnaires were then eliminated due to substantial missing data on key construct items, resulting in 110 cases for subsequent analyses.

The profile of 110 firms is diverse in terms of product type and firm sizes. 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 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.

3.3 Measures

Most of the questionnaire items in this research are based on 7-point Likert-type scales, ranging from 1= "strongly disagree" to 7= "strongly agree". Multi-item scales based on previous related research were generated and adapted following field interviews with marketing managers of five Taiwanese contract manufacturers, who served as the pilot sample for pre-testing purposes.

Dependent variable Joint action was measured by both manufacturing and managerial joint projects, adapted from Zaheer et al., (1998) and Heide & John (1990), namely (1) *joint new product design* (2) *joint cost reduction* (3) *joint personnel training* (4) *joint logistic arrangement*.

Independent variables A broad concept of asset specificity was decomposed into three sub-constructs, namely *tangible specificity*, *intangible specificity*, and *site specificity*. The first and the third were borrowed from the concepts of dedicated specificity and site specificity suggested by Williamson (1985). Tangible specificity refers to the degree to which the manufacturing equipment is dedicated to or tailored for the relationship; intangible specificity is defined as the degree to which the on-line data exchange, IT interface, and routine process integration are customized to the OEM relationship; whereas site specificity refers to the extent of the proximity of warehouse site to the buyers, which helps speed up order fulfillment and delivery. As to relational capital, three measurement items drawn from Kale et al. (2000) and Zaheer et al. (1998) capture the degree of reciprocity, trustworthiness, and friendship with all levels of the buyer.

Control variables Two control variables were incorporated as they have been recognized as having an influence on joint action: size and duration (the length of relationship). Size was using the logarithm of annual sales of the respondent supplier as a proxy. Larger suppliers generally have the resources to make investments and thus gain opportunities to work closely with their buyers. The length of relationship was operationalized as the logarithm of the number of months the respondent firm has associated with the buyer. It was included as a control variable because it is quite likely that the longer the partners of the alliance associate with each other, the greater the chances that, over time, a broad scope of joint projects exist between them (Subramani & Venkatraman, 2003).

3.4 Analysis

The measurement validation process began with calculating item-to-total correlations to identify items that do not pertain to the designated construct. Table 1 shows that the constructs exhibit satisfactory levels of reliability as indicated by composite reliabilities (Cronbach alpha) ranging from 0.794 to 0.805. The convergent validity of the measurement scales was examinedvthrough the confirmatory factor analysis (CFA). As to item validity, the standardized factor loadings ranges from 0.53 to 0.93. As suggested by Bollen (1989), the factor loadings, which are all bigger than 0.5, can be interpreted as validity coefficients reflecting the degree to which the observed variables adequately measure the underlying construct. Table 1 shows all the detailed items, standardized factor loadings, composite reliability and AVE of the constructs. Descriptive statistics and correlations of constructs can be found in Table 2.

Table 1. Reliability and validity of measures

Construct	Measurement Items	Factor loadings	Composite alpha	AVE
Tangible specificity	1. Dedicated production and testing equipment 2. Dedicated IT hardware 3. Dedicated people	0.62 0.93 0.77	0.794	0.614
Intangible specificity	1. Routines and processes especially adapted for the buyer 2. IT compatibility	0.53 1.08	0.729	0.611
Site specificity	The degree of geographic proximity of warehouse to the OEM buyer' location	--	Single item	Single item
Relational Capital	1. Friendship with all levels of the OEM buyer's staff 2. Reciprocity between partners 3. Trustworthiness felt in the relationship	0.65 0.76 0.88	0.802	0.592
Joint action	1. design new product jointly with the OEM buyer 2. joint cost reduction project the OEM buyer 3. delivery system arranged jointly with the OEM buyer 4. joint personnel training project with the OEM buyer	0.68 0.87 0.64 0.68	0.805	0.523

Table 2. Correlations and descriptive statistics

Variables	Mean	S. D.	1	2	3	4	5	6
1. Joint action	3.888	0.887						
2. Relational capital	4.004	0.475	0.449**					
3. Tangible specificity	4.527	1.349	0.475**	0.188*				
4. Intangible specificity	4.627	1.536	0.464**	0.146	0.427**			
5. Site specificity	5.900	1.226	0.326**	0.190*	0.446**	0.479**		
6. Firm size	5.691	1.459	0.130	0.162	0.218*	0.077	0.141	
7. Duration	64.218	59.458	0.144	0.253**	0.161	0.181	0.237*	0.079

Because all data are self-reported and collected through the same questionnaire during the same period, there was a possibility of a common method variance. Thus we conducted Harman's single-factor test to test the presence of common method effect (Podsakoff & Organ, 1986). Through a principal component factor analysis, no single factor was found by using unrotated factor loading. However, the first extracted principal component, with 54.136% of total variance explained, may cause the presence of general factor. To solve this problem, the confirmatory factor analysis was used to examine whether all variables loaded on one factor fit the data well. The results showed that the single-factor model did not fit the data well ($\chi 2$ 35.193, p=.000; GFI=0.896; CFI= .835; TLI= .670; SRMR= .304; RMSEA = .235). While the results of these analyses do not preclude the possibility of common method variance, they do suggest that common method variance is not of great concern and thus is unlikely to confound the interpretations of results.

This research used a hierarchical regression model to evaluate the hypothesized relationships. In the first step, two control variables were entered. Then the three asset specificity variable were entered and relational capital the final step.

4. Results

Table 3 shows that, in the first step of the regression (Model 1), none of control variables are significant in predicting the existence of joint action. Model 2 tests the effects of the control variables together with relational capital on joint action. In Model 3, three sub-constructs of asset specificity and control variables were tested. Model 4 is the full model, incorporating all three decomposed asset specificity, relational capital, and control variables (R^2=0.430). These variables in full model increased explained variance by 37.5 % more than the explained variance we obtained in Model 1. Consistent with our theoretical prediction, the influence of relational capital on joint action is positive and significant in the Model 4 (β=0.365, $p<0.00$). As to asset specificity, not every sub-construct of asset specificity is statistically significant. Both tangible specificity and intangible specificity have a significant and positive impact on the joint action (β=0.290, $p<0.00$; β=0.297, $p<0.00$ respectively), whereas site specificity is a positive but insignificant predictor (β=-0.002, $p>0.10$).

To sum up, table 3 reports that both tangible and intangible specificity have a positive and significant impact on joint action while the effects of site specificity are positive but insignificant. H1a and H1b is thus supported, H1c is not. Meanwhile, the hypothetic link between relational capital and joint action is positively and significantly. H2 is supported.

Table 3. Hierarchical regression analysis (Dependent variable = Joint action)

Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4 (Full model)**
Tangible specificity	—	—	0.321** (3.342)	0.290*** (3.294)
Intangible specificity	—	—	0.297*** (3.369)	0.297*** (3.369)
Site specificity	—	—	0.025 (0.249)	-0.002 (-0.021)
Relational capital	—	0.432*** (4.770)	—	0.365*** (4.638)
Control variable				
Firm size	0.120 (1.255)	0.058 (0.657)	0.031 (0.371)	-0.011 (-0.143)
Duration	0.134 (1.409)	0.030 (0.334)	0.028 (0.329)	-0.048 (-0.611)
R^2	0.035	0.205	0.312	0.430
Adjusted R^2	0.017	0.183	0.278	0.397
R^2 change	0.035	0.171	0.107	0.118
F value	1.931	9.133***	9.413***	12.977***
Significance	0.150	0.000	0.000	0.000
Number of cases	110	110	110	110

Notes. * $p \leq .10$ ** $p<.05$ *** $p<.01$

5. Discussion & Conclusion

Conceptualizing joint action as a platform facilitating knowledge transfer, this study takes contract manufacturers as focal firms and examines the motivators of a wide array of collaborative, boundary-spanning projects in international OEM relationships. As noted earlier, the offshore contract manufacturers, typically located in emerging economies, are generally inferior to the branded OEM buyers in terms of resource abundance and managerial capabilities. Thus, to acquire knowledge owned by the buyers through collaborations is critical for the contract manufacturers, given the buyers' concerns over possible knowledge abuse and future rivalry problem.

The empirical results of this study are by and large consistent with theoretical predictions of TCE and relational view. Tangible and intangible buyer-specific assets, such as dedicated manufacturing equipment, tailored production tooling, people, managerial processes computer software system, among others, are effective investments conducive to joint action in international OEM relationships; whereas site specificity (i.e. proximity of production site to the buyer) is not a significant predictor. A plausible explanation is that the hindrance arising from geographic distance in partner interactions has been reduced by information communication technology and the importance of buyer-specific site has thus been declining (Kotabe et al., 2008). Meanwhile, relational capital is found positively and significantly associated with joint action. Our findings support the relational view that inter-organizational relation itself can provide a strategic source of efficiency and competitive edge if managed appropriately (Dyer & Singh, 1998; Zaheer et al., 1998; Kohtamaki et al., 2013).

This study contributes to the existing OEM literature in two ways. First, departing from extant research which suggests joint action as a safeguard or governance mechanism to monitor partners' behavior (e.g. Heide & John, 1990; Somaya, et al., 2010), this study conceptualizes joint action as a knowledge transfer platform which enables offshore contract manufacturers to interact frequently with, and acquire knowledge from, the resource-rich MNE buyers. Second, this study addresses the strategic aspects of buyer-specific investments and empirically elaborates the effects of various asset specificities on joint action. It is true that, in practice, MNE buyers are dominant and tend to request contract manufacturers to invest chunky, customized assets to facilitate information exchange with respect to product design and manufacturing etc. Nevertheless, this study provides evidences that the buyer-specific investments also signal credible commitments and pave the way for a wide array of collaborative projects in international OEM relationships.

The current study contains certain limitations that can be improved in future research. First, this study had an implicit assumption that all firms want to learn, and future studies may want to examine the assumption. Further, like most large-sample survey research on alliances, we too obtained responses from just one of the alliance partners. However, since knowledge acquisition from partners is an issue more critical for contract manufacturers than for OEM buyers, it would be more relevant to examine the drivers of collaboration from the contract manufacturers' side. Finally, all subject firms are based in Taiwan, and our results could be more generalized if data from contract manufacturers in other countries have been included.

To conclude, for contract manufacturers, a straightforward way to acquire external knowledge through collaborations is to commit buyer-specific assets and cultivate trusting ties with the resource-abundant MNE buyers in international OEM relationships. The buyer-specific assets include physical production & test equipment, computer software, managerial process, dedicated cross-functional team, and managerial process etc. Nevertheless, given the potential conflicts between OEM buyers and ambitious learned contract manufacturers, the level of buyer-specific assets invested should be considered as a strategic choice to alleviate the buyers' concerns over knowledge abuse hazards to foster collaborations, rather than a mere compliance to the buyers' requests. However, without a trust-felt and reciprocal relationship, the buyer may decline the proposal of collaborations to withhold exchanges of critical information or experience with the contract manufacturers. Thus, with a purpose to broaden collaborative and boundary-spanning projects, contract manufacturers could examine the level of mutual trust cultivated in the relationship when making the buyer-specific investments. Overall, this study offers strategic insights on proactive knowledge acquisition in international OEM relationships for offshore contract manufacturers that are resource-poor relative to branded MNE buyers.

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