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跨組織關係之水平整合與垂直反整合

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Abstract

This study aims to investigate the role of relational embeddedness in interfirm collaborations, specifically in horizontally integrative and vertically dis-integrative inter-organization relations (IORs). TCE seems failing to explain the phenomena of using general contract in high transaction cost-characterized resource exchange and combination beyond firm boundaries. Whereas OT scholars explain it by tendering alternative role of relational embeddedness, we conducted an empirical study in semiconductor sector to prove that relational embeddedness plays an supplemental rather than alternative role in lessening the transaction cost in interfirm collaboration.

Key words: alliance, embeddedness, governance, inter-organization relations

Introduction

Transaction cost theory (TCE) is most profound and powerful about explaining the choice of particular contracts over others to formalize interorganizational collaborations. The specific form of interorganizational collaborations used is closer to the market or hierarchy extreme, depending on the relative magnitude of the transaction cost; in other word, the greater the transaction cost, the more hierarchical the nature of the contract used (Hennart, 1986). However, contradiction is observed in practice. Several high transaction cost-involved exchanges referred to strategic resource exchange and combination are conducting via a lesser hierarchical mode, which is opposite to TCE's argument. For example, the contractual arrangements between SIP (silicon intellectual property) firms and IC design firms for SIP, know-how or design service exchange that features high level of cospecialization and serious concern of value appropriation are carried out in form of nonequity-involved arrangement and prevalent in the IC market in recent years. Does TCE fade out in explaining the market phenomena?

Organizational theorists give us an answer. Opposite to a number of empirical studies that have mainly focused on Williamson's comparative institutional approach, organizational theorists argue the concept that relational control (social control mechanism) plays the role that replaces hierarchy in governance concern. For example, Powell (1990) suggested that alliances and other such exchanges relationship don't necessarily fall on market and hierarchy continuum put forth by transaction cost economics, rather, constitute a distinct alternative form of governance that he calls the "network form". Gulati (1998) in his article in SMJ announces, "...we study the governance structure, it becomes imperative to begin considering some of the *alternative* dimensions along which we can examine such structure" (Gulati 1998: 304). In his another article coauthored with Nohria and Zaheer (2000), they

identify the substitute role of network governance as “more recently this literature (contracting and coordination cost) has been extended to examine how alliances, which can be a *substitute* for acquisition.” (Gulati, Nohria, and Zaheer, 2000: 209). Ouchi (1980) claimed “clan” opposed to market and authority. Network approach seems to have faith that social control mechanism can be an alternative governance to replace hierarchical control.

However, we doubt the explanation offered by OT scholars that would the relational governance de facto be a complementary role (or supplemental role) rather than alternative (or substitutive role) to hierarchical governance structure (equity control or mutual hostage)? Therefore, our purpose in this study is trying to prove that is TCE still stand still in explaining the practice of real world and rethink the role of relational embeddedness to be a supplemental role rather than alternative role as addressed by organizational scholars.

Information Cost and Interfirm Governance

Information problem lies in the situation under which ex ante searching difficulties, information asymmetry and external uncertainty deteriorate transactions. It is even worse when the strategic resources are in the form of intangible service or goods, and these strategic resources are made in an inimitable way. Thus the content and quality of the resources become questionable before use because physical assets per se cannot provide an interfirm resources exchange or integration with any sustainable value creation and, most of the time, intangible resources like tacitness embodied in team or individual and organizational routines are essential components of strategic resources (Reed and DeFillippi, 1990).

Further, such problems of **information asymmetry** caused by tacitness will give rise to exchange problem of moral hazard and adverse selection (Akerloff, 1970), and which in turn break exchange arrangements (Chi, 1994). Akerloff (1970) argues that, under the condition of

information asymmetry, the potential seller of resources will be motivated to bid for a price that is higher than buyer's assessment, and thereby non-equity based governance deteriorates. Inasmuch, incentives to shirk or cheat (Hennart, 1986) worsen the concern of moral hazard and adverse selection, and sequentially hamper the exchange toward negative atmosphere of transaction and then makes the searching and exchanging more difficult.

Another antecedent of information cost raises from **technology and knowledge uncertainty**. Technology/knowledge uncertainty refers to the propensity of unexpected changes in technology or knowledge development. A rapid technology cycle, knowledge related to know-how and relentless industrial standard competition may jeopardize exchange and combination of strategic resources characterized by technology/knowledge intensity, which are more likely to encounter uncertainty. Thus it forces firms to face the problem of small numbers when technology unfamiliarity or huge technology gaps are so high to exclude many potential partners.

After illustrating the above cases, the solution for transaction problems caused by information cost is suggested by Chi (1994) that structural remedies of apportionment of residual control and residual claimancy should be considered. Since information issue results from measurement difficulties both in searching, exchange and combination, the remedy resorts to apportionment of residual control (Chi, 1994) because it is better to specialize in monitoring as well as rely on a residual claimant status to reduce shirking and cheating. TCE argues that the higher the transaction cost involved in a transaction, the more possibility that it goes to the hierarchy mode (Williamson, 1985). Thus, the higher the measurement difficulties arise from information cost, the greater extent it should be ranged close to the condition that the two parties bear residuals with hierarchical control.

Hypothesis 1a: The greater the information cost in interfirm collaboration, the more likely the transaction mode of hierarchical governance structure is chosen to organize the interfirm collaboration.

Coordination Cost and Interfirm Governance

The complexity of coordination costs as an essential basis of effective resources exchange and combination has been a salient indicator for determining hierarchical control or other modes of contractual arrangement of interorganizational collaborations (Gulati and Singh, 1998; Gulati, 1993). The difficulties associated with decomposing tasks and specifying a precise way to access resources in an interfirm collaboration are best encapsulated by the level of communication and information exchange that characterize the complexity and uncertainty in coordination. Strategic resources are controlled by different owners of interfirm collaboration thus effective **communication** requires more in-depth and on-going activities thus to facilitate information exchange and adjustment process to put strategic resource into effective exchange and combination. Furthermore, the communication platform that makes measurement of performance ease and links rewards to performance is often associated with concern of completed transfer and successful integration when the coordination job is beyond the firm boundaries.

Information exchange difficulties consist of two ways. First, **interconnectedness** of complicated linkages of different sets of strategic resources requires closer integration about exchange implementation and routine redevelopment in the sequential or simultaneous resources exchange/combination process. Second, complex interdependent codifying system or operation procedure requires more participation in spot learning and personal coordination (Chi, 1994; Gulati and Singh, 1998). Given the resource-based transactional constraints, not only are partners vulnerable to shirking or cheating, but also one may find it difficult to

persuade other party to make any significant compromise (Gulati and Singh, 1998). An adaptation difficulty may arise in interfirm collaboration formed to exchange or combine strategic resources; here significant disagreements or conflicts on the allocation or deployment of valuable resources may arise. Even when there is agreement, it may cost a lot of time and efforts or it may be too late for time-to-design or time-to-market.

Second, exchange and combination of strategic resources, further, tends to create **interdependency** that makes exchange hard to conduct. Interdependence, referring to the condition that sets of resource is mutual dependent to each other for the needs of specific transactions or complex linkage within different assets of resources (Williamson, 1985) is another antecedent of coordination difficulty. Interdependency of resources that specialized to firm-specific or interfirm-specific need therefore has less value to other use if the problem cannot be overcome (Peteraf, 1993). Consequently, in the condition of limited use causing by interdependency may give rise to the problem of hold up that worsens the difficulty in coordination. Williamson (1985) classifies coordination failure in terms of cheating cost and hold up, and Chi (1994) suggests assignment of residual claimancy and residual control to limit the extent of coordination problems. Gulati and Singh (1998) identify several hierarchical elements that mean to simplify coordination in interfirm organizing: command structure, incentive system, standard operating system, dispute resolution procedures, and non-market price system. As a consequence they suggest a higher demand of hierarchical control for interfirm collaboration when the coordination management is highly required. Thus, we propose:

Hypothesis 1b: The greater the coordination cost in interfirm collaboration, the more likely the transaction mode of hierarchical governance structure is chosen to organize interfirm collaboration.

The Role Of Relational Embeddedness And Interfirm Governance

The Supplemental View. The hypotheses discussed below test the possible alternative role of relational embeddedness, the following hypotheses are designed to test whether the relational embeddedness plays the role as a supplemental moderator rather than alternative one in an attempt to capture the essence of reputation effect, information benefit, trust and identification of relational embeddedness.

First, reputation effect is important when information asymmetry and technology unfamiliarity are high because reputation offers an assessment of the uncertainty and a promise of better information of qualified partners. The doubt of partner has rough answers when relational embeddedness and reputation which was built on prior experience, such as similar training and education background in school or familiar team routine and dominant logic in workplace gears a useful direction of how one screen and filter others capability and training as benchmark of qualified partner. This referral is of course about vouching for the reliability of that partner firm (Rowley et al., 2000).

Second, relational embeddedness such as social affiliation has the information benefit (Burt, 1992; Sandefur and Laumann, 1998). Burt (1992) defines the structural hole as those two actors connected each other for information benefit by building of nonredundant linkage to divergent clusters (Burt, 1992) and examines the benefits of information in the form of access, information time, and information referrals. Benefit of information access can develop firm's capability of accessing to valuable information about qualified and reliable partner for the resources exchange/combination in lesser information effort or more efficient ways; benefit of information timing creates the effective sharing of critical information to meet the

tough requirement of time-to-market or reduce environmental uncertainty caused by technology violent and unfamiliarity; and benefit of referrals bridges the positive recommendation by third party to shorten the process of searching a qualified partner (Burt, 1992). Thus, structural hole works as a ‘depreciated instrument’ to lessen the difficulty in interfirm connection and refined information exchange.

Third, similar account has been made a sense of trustworthiness in lessening coordination cost. “A firm’s trust in its network partners is the belief that partner will, without the exercise of influence or control, strive for outcomes that are beneficial for all members” (Achrol, 1997:65). A firm’s sense of familiarity plays a prominent explanatory role in amplifying trustworthiness and diminishing the uncertainty. Prior cohesive weak ties between two firms provide channels through which each partner can learn about the competencies and reliability of the other. In the case of interfirm collaboration, trust offers sociological element of exchange to have more sense of trustworthiness in information exchange with high degree of confidential concern and make mutual exchange more efficient by treating them as reciprocity exchange. As to the difficulty in persuading the other to make any compromise, the mindset that the short-term sacrifice will balance in the long-term reciprocity also reduces or alleviates the bargaining and negotiation process (Whitley, 1992).

Fourth, it is not unreasonable to expect that firms are likely to ease the coordination cost if there exists identification of belonging to the same ‘we-group’. Shared understanding has merged from and is reinforced by common connections such as ties of school affiliation, colleague affiliation, and job-hopping paths among firms. All of which develop the identification of common ties and ease the requirement of search, negotiation, and bargain in cooperation for knowledge sharing or technology exchange. Identification of group in interfirm collaboration identified from common attributes (Granovetter, 1985; Yeo-chi King,

1991) such as intangible attributes (such as geographical sub-culture, identical education background, and historical narratives) and tangible attributes (such as unique social status, identical dressing, and specific life style) together identify group member (such as members of Hsin-Chu industrial park) from outsiders. Besides, identification appropriated from interpersonal relation to interfirm embeddedness has its social mechanism to enhance concern for collective interests and identical goals pursuit (Coleman, 1988), thus, decreases the chance that the opportunity for exchange will be recognized and filtered without much formal coordinating and conflict compromise. Thereby, it lessens the positive relationship between coordination cost and hierarchy governance.

The substitute role. As Gulati describes the relational embeddedness is alternative to hierarchy control (Gulati, Nohria, and Zaheer, 2000). Scholars of network approach seem to have faith that social control mechanism can be an alternative governance to replace hierarchical control. For example, Dyer and Singh identify that informal self-enforcing mechanisms (trust) are more likely to generate relational rents as effective control mechanism than formal safeguards do (1998: 671). Therefore, from the alternative perspective, network governance is a new governance that “*network governance involves a select, persistent, and structured set of autonymous firms engaged in creating products or services based on implicit and open-ended contracts to adapt to environmental contingencies and to coordinate and safeguard exchanges*” (Jones, Hesterly, and Borgatti, 1997:914) which is a newly developed concept opposite to market or hierarchy. In the context of interfirm collaboration, we argue that firms may be less likely to use hierarchical governance (e.g. equity-based contractual arrangement) because the traditional argument of imperative hierarchy may be replaced by inter-firm relational embeddedness in a substitute perspective and its lessening the positive relationship between coordination cost and hierarchy governance from the supplemented perspective. Thus, we infer the null and alternative hypotheses as following:

Null Hypothesis 2: The governance form of interfirm collaboration is less likely to be hierarchical governance when the relational embeddedness between two firms is high.

Alternative hypothesis 2a: The greater the relational embeddedness, the greater the lessening moderating effect on the relationship between information cost (transaction cost) and hierarchical governance.

Alternative Hypothesis 2b: The greater the relational embeddedness, the greater the lessening moderating effect on the relationship between coordination cost (transaction cost) and hierarchical governance.

Methodology

The dataset is build from both secondary firm-level data of all the 141 firms within the network of semiconductor industry in Hsin-Chu Industrial park in Taiwan, which was collected to develop relational matrix and another primary data from 298 postal questionnaires (response rate of 70% after three waves of follow-up mailing and make-up face-to-face interviews) about interfirm collaboration within the network during 1998-2002. The relationship between the dependent variables (the governance mode) and independent variables are monotonic ordinal ranking for all value of the independent variables. These conditions can be accomplished by using the **Ordered Probability Model** (using LIMDEP 7.0).

Dependent Variable

The dependent variable is therefore an indicator denoting the mode choice of an interfirm collaboration in each dyad. Modes are in ordered and their sample distribution shows as: (1)

Spot market transaction. (2). Non-equity contractual arrangement. (3). Low-equity involved arrangement (refer to the respondent). (4). High-equity involved arrangement (refer to the respondent).

Relational embeddedness

After we used the Ucinet 6.0 (Borgatti, Everett, and Freeman, 2002) to code the data into the 3rd party belonging in education-affiliation matrix (ties of same graduated school) and working experience-affiliation matrix (ties of the same prior working experience) and employee-employer matrix, we calculated the degree centrality for each firm in each sociomatrix. To simply the measure of independent variable, particularly in the interaction terms of network variables and transaction cost variables, we calculated the relational embeddedness by using confirmatory factor analysis (CFA) of the standardized centrality index of each firm and use the sum of centrality of firm A and firm B as paired relational embeddedness of firm A and B in Probit-logistic models.

TC Variables and control variables

The variables of transaction cost and control are developed from the primary data collected by e-mailed questionnaires and personal interviews. Questionnaire measures in this research mainly rely on 5-point Likert scales, ranging from “very low” to “very high”. A series of exploratory factor analysis (EFA) was employed for the multi-item constructs to further purify the measurement indicators. The transaction cost was performed on the 17 measurement items of information cost and coordination cost. After EFA (cutting value=0.5), the component matrix indicated that four factors were extracted, which were labeled as “information cost-1, information cost-2” and “coordination cost-1, coordination-2”. The internal reliability and validity reveals that the results of reliability and validity pass the threshold value and demonstrates adequate internal consistency and validity. Control

variables include the firm attributes of the two partners in respects of their finance, performance, age and size. The Industry factors include the dummy of vertical collaboration and 5-point scale of concern of within group.

Results

Table 1 presents the results of probit-logistic estimates using ordered dependent variable: governance ranging from spot market (2.68%), non-equity contractual arrangement (68,12%), low-equity arrangement (16.44), and high-equity arrangement (29.19%) by the respondent of the focal firms (n=298) who also identify its partner. Positive coefficient indicates a higher propensity to ally with respect to that variable by a greater hierarchical mode and negative coefficients indicate a higher propensity to enter a lesser hierarchical mode.

Transaction Cost Variables. The results are consistent with the hypothesized transaction costs effect (Hypothesis 1a and 1b)—alliance involving high transaction cost is more likely to adopt greater hierarchy governance than hierarchy mode. Model 1 suggests the positive significant influence of **Information cost**. The coordination cost is significant by **coordination cost-1** (switching and information exchange cost). Most of the factors show significant positive relation between coordination and hierarchical mode (except **coordination cost2**-conflict and adjustment) and support our hypothesis 1a and 1b. The estimates reported in model 2 provide no support for the direct effect of **relational embeddedness**. As we wish the effect of network structural variables—relational embeddedness—is not significant in the expected direction in model 1 when the network variables are adding into the transaction cost models. It suggests that relational embeddedness plays irrelevantly as alternative role to replace formal hierarchical control in determining the governance mode. Our null hypotheses 2 about relational embeddedness that can replace the role of hierarchical control in forms of equity investment are not supported. The moderating

effects of network embeddedness, to some extent, attenuate the relationship between transaction cost and governance mode. The results show that: The concern of high information cost (factor of **uncertainty**) leading to more hierarchical choice can be lessened

TABLE 1 PANEL ORDERED PROBIT-LOGIT MODEL WITH RANDOM EFFECT

	Model 1	Model 2	Model 1-1	Model 2-1
Constant	17.47*** (3.84)	19.47*** (4.64)	31.57* (17.62)	35.63 (25.71)
Vertical/horizon dummy	0.40 (0.52)	0.63 (0.57)	0.40 (1.23)	.865 (1.32)
Group	0.38 (0.31)	0.68 (0.39)	0.744 (0.74)	.15* (0.90)
Age of firm A	0.40 (0.53)	0.53 (0.60)	0.78 (0.15)	0.1070 (0.17)
Size of Firm A	-0.32* (0.16)	-0.30** (0.17)	-0.20 (0.33)	-0.18 (0.44)
ROE of firm A	-0.12 (0.19)	-0.29 (0.25)	-0.20 (0.51)	-0.52 (0.82)
Leverage of Firm A	0.211 (0.39)	0.24 (0.42)	0.28 (0.88)	0.33 (0.91)
D/E ratio of firm A	-0.82 (0.13)	0.85 (0.14)	-0.15 (0.28)	-0.11 (0.42)
Information cost 1	3.54** (0.79)	3.32** (0.85)	6.71* (3.76)	6.53* (5.07)
Information cost 2	0.95 (0.41)	1.85** (0.96)	12.63* (6.76)	14.20 (9.88)
Coordination 1	6.86** (1.28)	7.75** (1.59)	0.77 (0.83)	-0.83 (1.71)
Coordination cost2	0.40** (0.37)	-0.55 (0.80)	1.54 (1.13)	3.30 (2.93)
Relational embeddedness	-0.34 (0.12)	0.60 (0.28)	-0.48 (0.28)	0.11 (0.64)
Relation*Information-1		0.10 (0.16)		.11 (0.29)
Relation*Information 2		-0.12* (0.10)		-0.19 (0.58)
Relation*Coordination 1		-0.88* (0.23)		0.38 (0.41)
Relation*Coordination2		0.22 (0.20)		-0.25 (0.40)
Hit ratio /Sigma	87.91	83.22	2.67* (1.76)	2.68 (2.25)
sigma of random effect			-60.32	-56.47
Log likelihood function	-64.58	-60.35	-64.56	-64.56
Restricted log likelihood	-276.38	-276.38	8.46***	7.62**
Chi-squared	423.59***	432.05***		
df	14	16		

P<0.05 *** P<0.01 ** p<0.5 * Unbalanced panel has 122 individuals

by the support of relational embeddedness shown in model 2 indicates that the negative coefficient of **relation*information cost2** and **relation*coordination cost 1** show the lessening effect is partially support hypothesis 2a and 2b.

Discussion and Conclusion

Hence, we build an improved TC-based model incorporating the network-based view (Nahapiet and Ghoshal, 1999), which provides a central role of relational embeddedness, to investigate TCE's position in firm's activities beyond boundaries that involve exchange and combination of strategic resources for divergent goals. Thus, we show a more complete transaction cost theory of interorganizational governance that incorporates the supplemented character of social-based embeddedness and demonstrate how the transaction cost theory and network theory contribute toward a more balanced view in investigating the role of governance of interfirm collaborations.

The result in table 1 shows that TCE still has a powerful explanation on the determinant of governance of interfirm collaboration. Many analysis on the IORs adopt key concepts drawn this body of literature. This study brings prove that the nature of relational embeddedness matters in the interfirm collaboration decisions in playing as supplemental role rather than alternative (supplanted) role to attenuate the concern of TC influence. At first level, our study of the determinant of interfirm collaboration governance indicates that relational embeddedness can explain the formation and, in some way, choice among ordered hierarchical governance set. From a social-based complemented supporting perspective, the better way to find a qualified partner and adopt a lesser hierarchical governance is to find someone with personal linkage; thereafter, accumulation of embeddedness can be a lubricant to shorten the distance between two potential partner and reduce some of the on-going transaction cost.

A second step taken into assess the choice of an underlying governance sets is to use a statistical model which accounts for any biases that may result from repeated-firms bias. There are repeated appearances of these 141 firms in concerning of the 298 cases of governance that two firms form the every single interfirm collaboration. The statistical model applied here should incorporate the random effect. The panel probit-logistic model corrects bias resulting from intrinsic randomness and captures any unobserved factors that generate differences amongst observationally identical firms in their choice of governance. The estimates reported in model 1-1 provide some support for the existence of random effect. The effects of the transaction cost variables and relational embeddedness variables are clearly attenuated, both in magnitude and significance, once we correct for unobserved heterogeneity. What surprised us is that another model 2-1 with insignificant sigma (the standard deviation of random effect to test the unbalanced panel-random effect) shows the negligible of the random effect. It might be more appropriate to view individual specific constant terms as randomly distributed across-sectional units. In our case, a set of 122 individuals from 144 SC firms may well include the almost full set of firms for which it is reasonable to assume that the model is constant. The distribution of panel that ranged from 1 to 7 in their unbalanced panel size shows that the average distribution implies the trivial significance about panel concern.

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