Dynamic Impacts of Country- and Firm-Level Interactions on Alliance Learning

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Abstract

This research highlights the importance of contextual factors, country- and firm-level interactions, on alliance learning. The findings reveal that successful alliance learning not only depends on the partner's openness to share knowledge but also relies on the firm's capacity to identify and absorb such knowledge. Institutional differences between the countries from where partner firms originate hinder the alliance learning by decreasing the firm's absorptive capacity and by enhancing knowledge ambiguity. However, frequent direct communication, and high levels of mutual trust and reciprocal commitment between alliance partners positively moderate the noxious effects of institutional differences on the alliance learning process.

Keywords: international strategic alliances, institutional differences, relationship quality, absorptive capacity, knowledge ambiguity

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Introduction

Due to the knowledge-based competition in the global economy, firms are compelled to make strategic decisions of either creating valuable knowledge by themselves or acquiring it from external partners. At the same time firms are concerned not to be exposed to the risk of knowledge leakage to their competitors. Such a cooperative puzzle is even more complex if the learning process, a firm is engaged in, is with firms across national boundaries. Although some attempts have been made by researchers to explain the confounding circumstances such as 'boundary paradox' (Quintas, Lefrere and Jones, 1997: 389) and 'causal ambiguity paradox' (King and Zeithaml, 2001: 76), the current understanding of how and why alliance learning fails has not been established.

Szulanski (1996) discovered that the causal ambiguity of the knowledge, the lack of absorptive capacity of the recipient, the lack of credibility of the source, and the arduousness of the relationship between the source and the recipient are the major impediments of inter-firm knowledge transfer. However, the seminal role played by contextual differences between firms has not been thoroughly studied. The failure to reflect on the co-evolution of the partner firms and their external contexts pose an improbable bias of presuming international strategic alliances to be closed entities. Additionally, the emergence of international strategic alliances reflects the attempts by firms to cope with discontinuities arising from a volatile interdependent and knowledge-intensive global economy (Ingram and Silverman, 2002); while the contextual concerns about alliance learning research has been underexplored.

This research therefore aims to explore the reasons why alliance learning would fail and how could partner firms mitigate such knowledge transfer and learning challenges during cooperation. Particularly, we expect to associate the contextual factors with cross-border knowledge transfer and learning processes and empirically examine how alliance learning is affected by country- and firm-level interactions between partner firms. By focusing on the contextual influences on alliance learning, this research is able to fill the research gap and offers the practical and feasible recommendations for better management on cross-border knowledge transfer and learning processes.

Theoretical Framework and Hypothesis

Alliance Learning and its Determinants

The concept of alliance learning process is critical because it reflects the specific learning orientation and practices that determine where the knowledge is learnt and what sort of learning action is taken by firms (Kim, 1998). Drawing motivation from the knowledge-based view (Grant, 2002) and the process-oriented view on knowledge transfer and acquisition (Kwan and

Cheung, 2006), this research proposes alliance learning as a parallel process with knowledge transfer within international strategic alliances. These parallel processes help partner firms acquire and apply cross-border knowledge to leverage their alliance management capabilities and best practices in global markets. Yet unlike knowledge transfer focusing on the two-way transferring process between a transferor and a recipient, learning is a complex and lengthy mechanism concerned with the subtle endeavor of only the recipient (Iyer, 2002). International knowledge acquisition as critically managing the cross-border knowledge to meet existing needs and to develop new opportunities (Quintas et al., 1997) is most apposite to epitomize the alliance learning outcome. The more knowledge acquired by a partner firm through the alliance learning process, the greater the benefits of capability development and enhancement would be for it (Reus, Ranft, Lamont and Adams, 2009).

However, it is argued that the success does not necessarily go to the firm that knows most, but rather to the firm that can make the best use of what it knows and knows what is strategically most important to itself (Bou-Llusar and Segarra-Cipres, 2006). Therefore, it is crucial for partner firms to recognize, absorb, and apply the transferred knowledge in international collaborations. The concept of knowledge is not easily defined. Much prior research has emphasized the differentiation among knowledge (authenticated information), information (the processed data), and data (raw numbers and facts) and proposed several perspectives to consider knowledge: a state of mind; an object; a process; a condition of having access to information; or a capability (e.g., Amidon, 2002; Huang and Yang, 2009). Instead of delving into the types and classification of knowledge acquired, this research focuses on the characteristics of cross-border knowledge perceived by the recipient firm during the alliance learning process, in that this directly reflects the transferor's behavior and actions towards knowledge transfer during cooperation. Indeed, learning is dependent on how easily that knowledge can be transported, interpreted and absorbed (Hamel, Doz and Prahalad, 1989), the nature of the knowledge thus posits as a critical determinant of the learning outcome. Due to the importance of knowledge-based resources to sustainable competitive advantage of the firm, intrinsic competition between alliance partners over these resources becomes an inevitable dilemma in cross-border knowledge transfer and learning processes (Muthusamy and White, 2005).

To offset such dilemma within alliances, the partner firms must decide what degree of their knowledge bases should remain within the private domains and how to ensure that those are securely protected so as to keep the long-term viability of the partnerships (Norman, 2002). The perceived opportunistic behavior of the alliance partner corresponds to the defensive and protective nature of the transferor's attitude towards knowledge transfer. From the recipient's standpoint, the acquisition of the transferred knowledge usually involves predicaments because

such knowledge is new and exploratory in nature, despite the acknowledged abstract or content of the knowledge. Even if knowledge transfer packages mainly comprise the codified documents and information, such as patents or product formulas, 'explicit knowledge must rely on being tacitly understood and applied' (Polanyi, 1966: 7).

If the knowledge is highly protected by the transferor, the recipient would not easily discover but rather observes it as causal ambiguous owing to the information asymmetry. Prior research has shown that articulable knowledge is more effortlessly transferable than less-articulable knowledge (Cummings and Teng, 2003). Thus the more causal ambiguity of the knowledge perceived by the firm, the more difficulties it would undergo in the learning process through international strategic alliances. Lippman and Rumelt (1982) pioneered the concept of causal ambiguity in business contexts in terms of reflecting the phenomena surrounding business actions and outcomes that make it difficult for competitors to emulate strategies. Likewise, Crossan and Inkpen (1995) associated causal ambiguity with inter-firm knowledge transfer and proposed the negative relationship between the two. Paralleling these arguments, knowledge ambiguity as an important impediment of alliance learning processes is thereby hypothesized in this research. Particularly, this research focuses on the cynical role played by causal ambiguity in the acquisition of new knowledge because it prevents firms from effectively and efficiently learning from their alliance partners (van Wijk, Jansen and Lyles, 2008).

Hypothesis 1: Causal ambiguity of the transferred knowledge negatively affects the firm's knowledge acquisition.

Whereas causal ambiguity is a useful barrier to imitation by rivals, Reed and DeFillippi (1990) observed that if it is too great to block managers' understandings of causal relationships or the existence of factor mobility, the firm might not be able to utilize competencies for sustainable competitive advantage. This implies that if the partner firm can mitigate such perception towards the transferred knowledge, the outcome of alliance learning would be enhanced. The extent to which a firm is able to 'recognize the value of new external knowledge, assimilate it, and apply it to commercial ends' (Cohen and Levinthal, 1990: 138) is dependent on its absorptive capacity. Increasing numbers of scholars have delved into the development of the absorptive capacity construct and recognized it as a critical contributor to a firm's long-term survival and success because it can reinforce, complement and refocus the firm's knowledge base (e.g., Lane, Koka and Pathak, 2006; Zahra and George, 2002).

Given the size and diversity of the absorptive capacity literature, Lane et al. (2006) criticized most prior research for treating absorptive capacity as a taken-for-granted construct without considering the underlying assumptions. In other words, there has been limited in-depth understanding of how absorptive capacity contributes to alliance learning or more

fundamentally, where absorptive capacity influences the alliance learning processes with respect to increasing cross-border knowledge acquisition. Essentially, alliance learning is guided by pre-existing knowledge (Andersen, 2008) and thus it is both a function of access to new knowledge and the capabilities for using and building on such knowledge (Inkpen, 1998) through strategic alliances. Unlike much prior research on alliance learning directed to evolving various terminologies/ morphologies to examine the analogous phenomenon (e.g., Kale and Singh, 2007; Nielsen and Nielsen, 2009), this research proposes absorptive capacity as a critical determinant of alliance learning in that it could reduce the noxious impact of causal ambiguity on international knowledge acquisition. This research deems absorptive capacity as a firm's ability to identify, transform and absorb the cross-border knowledge. With greater absorptive capacity of the firm, the more knowledge will be acquired through the alliance in that it is more capable of identifying the transferable knowledge, transforming the ambiguous knowledge into useful one as well as absorbing the knowledge for the cooperative purpose. Hence:

Hypothesis 2: Causal ambiguity of the transferred knowledge partially mediates the positive impact of the firm's absorptive capacity on its knowledge acquisition.

Contextual Factors: Institutional Differences

In order for knowledge to be learnt effectively and efficiently, Guzman and Wilson (2005) maintained that it must be congruent with the existing social context. However, it does not happen easily in conditions in which learning is taking place between firms, let alone in cases of international collaborations. In fact, increasing research has noted that knowledge transfer across national boundaries is particularly challenging from an organizational perspective given differences in time, and spatial and cultural distances posing significant barriers to such transfer (Salk and Lyles, 2007). For example, Cummings and Teng (2003) discovered that knowledge and norm distances are negatively associated with knowledge transfer in the case of international R&D collaborations. Though lacking empirical foundation, Bresman, Birkinshaw and Nobel (2010) attributed the problems engaged in knowledge transfer to the emergence of geographic and cultural distances between alliance partners.

Given the attempts made by these researchers positing the negative influences of contextual differences on cross-border knowledge transfer, however, there is limited understanding of how and why the alliance learning process is affected by such country-level interaction between partner firms. This is because most prior research has seen knowledge transfer and learning as single dependent variables associated with a range of possible antecedents (e.g., Sarala and Vaara, 2010; Simonin, 2004), ignoring the fact that these processes are contextual-embedded and evolved over time. Instead of being a one-time event, cross-border knowledge transfer and learning usually involve frequent and numerous interactions between

firms (Nonaka, 1994) and can be perceived as repeated games and change processes across national boundaries (Guzman and Wilson, 2005; Lee, Bennett and Oaks, 2000). In the case of alliance learning, such process can be more complicated because it encompasses different cultures and contexts which influence how partner firms process, interpret, and make sense and use of knowledge (Easterby-Smith, Lyles and Tsang, 2008).

By unfolding the underlying mechanisms of alliance learning and identifying its determinants in the previous section, this research is able to better explain how the country-level differences between partner firms affects the alliance learning process and its outcome. Particularly, this research applies the concept of institutional differences, the uncertainties derived from the heterogeneities of institutional frameworks between the countries from where the partner firms originate, to epitomize the country-level interaction between firms because such difference 'directly determine what arrows a firm has in its quiver as it struggles to formulate and implement strategy' (Ingram and Silverman, 2002: 20). Since Kostova (1996) coined the term 'institutional distance' and proposed it as the key determinant of transnational transfer of organizational practices within multinational enterprises, subsequent research has actively employed the concept to explore various phenomena in the international contexts and offered empirical evidence of the negative role played by institutional distance in any form of cross-border scenarios (e.g., Li and Ferreira, 2008; Yiu and Makino, 2002).

Accordingly, this research proposes institutional distance as a critical exogenous variable negatively influences the alliance learning process. Particularly, we expect divergent institutional differences to not only stimulate the ex-ante problems that resulted from the limited access to the knowledge base of the transferor but also lead to the ex-post difficulties in absorbing the transferred knowledge, and thus the recipient would experience causal ambiguity in the transferring process. Since Volberda, Foss and Lyles (2010) suggested that the emergence of absorptive capacity literature from the actions and interactions of organizational and inter-organizational antecedents remains unclear, we propose institutional differences as the critical contextual antecedents of absorptive capacity that limits the firm's ability to identify, transform, and absorb the transferred knowledge. Indeed, prior research has extensively acknowledged that alliance learning is never effortless: language barriers, information lag, regulatory inequality in intellectual property rights, and spatial and cultural differences could result in misinformation and conflicts and therefore impose real costs and puzzles on the partner firms (Buckley and Carter, 2004; Buckley, Glaister, Klijn and Tan, 2009).

Hypothesis 3: *Institutional differences between the countries from where the partner firms originate positively affects causal ambiguity of the transferred knowledge.*

Hypothesis 4: *Institutional differences between the countries from where the partner firms*

originate negatively affects the firm's absorptive capacity.

The Role of Relationship Quality

Since Huber (1991) proposed inter-organizational relationships as the channels through which firms transfer and acquire knowledge, substantial research has perceived knowledge transfer and learning as social and cognitive processes that are significantly affected by the inter-firm interaction. For instance, Larson (1992) argued that social aspects of exchanges are crucial in understanding the control and coordination of partnerships. Szulanski (1996) suggested that relationship quality, the degree of the inseparable relation between the transferor and the recipient, is positively associated with knowledge transfer. Drawing on the technology transfer research, Johnson (1999) considered relational capital, a firm's ability to interact positively with business community members, as a stimulator in technology management for wealth creation. In an empirical study on learning and knowledge protection within strategic alliances, Kale, Singh and Perlmutter (2000) found that mutual trust, respect, and friendship that reside at the individual level between alliance partners positively influence alliance learning. Recently, Liu, Ghauri and Sinkovics (2010) revealed that relational capital, which is defined as a relational rent generated in an exchange relationship that cannot be generated by either firm in isolation, has a positive effect on knowledge acquisition.

In spite of the various dimensions of relational/ network characteristics, previous research has generally agreed upon the positive role played by them in terms of facilitating resource and knowledge exchange across organizational and national boundaries. The significant effects of on-going dynamic social interactions on knowledge transfer and learning have been extensively discussed in the literature; notwithstanding, there is limited understanding of how relational underpinnings of alliance operations affect partner firms' behaviors and perceptions towards alliance learning processes. To better realize the impacts of dynamic firm-level interaction on alliance learning processes, this research maps out the underlying mechanisms of alliance learning and proposes that the impacts of institutional distance on the partner firm's absorptive capacity and ambiguous perception towards the transferred knowledge are critically moderated by the relationship quality, which can be characterized by the extent of partner interaction, mutual trust and reciprocal commitment between alliance partners (Kale et al., 2000; Liu et al., 2010).

According to Ring and Van de Ven (1994), firms would be more willing to take actions in communication or information exchanges if less risk is perceived with highly trusted partners. Indeed, Simonin (1999a, b) discovered that the experience of a firm with its alliance partner's knowledge is negatively associated with the corresponding level of causal ambiguity in the transferring process. As knowledge transfer is concerned with the process through which one

firm learns from the experience of another (Easterby-Smith et al., 2008), with more experience obtained from frequent communications, interactions, and reciprocities between alliance partners, fewer difficulties and misunderstandings of the recipient firm would occur while absorbing the transferred knowledge (Inkpen, 1998; Kachra and White, 2008). Succeeding the existing notion (Kale et al., 2000; Liu et al., 2010; Szulanski, 1996), this research argues that inter-firm interaction via relationship quality development and enhancement promotes the positive feelings of the partner firms and facilitates the processes of alliance learning. Specifically, if there is high quality of relationship between alliance partners, the less the inherent predicaments arising from divergent institutional frameworks between countries from where partners originate will impede alliance learning processes. Thus,

Hypothesis 5: Relationship quality between the partner firms negatively moderates the positive impact of institutional distance on causal ambiguity of the transferred knowledge.

Hypothesis 6: Relationship quality between the partner firms positively moderates the negative impact of institutional distance on the firm's absorptive capacity.

Research Methodology

Population, Sample and Data Collection

This research employed cross-sectional survey to collect the primary data from both web-based and mail questionnaires and the secondary data from The Global Information Technology Report 2010-2011 (Dutta and Mia, 2011). The target population was Taiwan-based international strategic alliances in the information and communication technology (ICT) industries, where the business environment is highly competitive, with complex and uncertain. This research focuses the analysis on Taiwanese ICT manufacturers that are relatively R&D-intensive across all firm sizes. This sample therefore provides an appropriate research context for the empirical investigation on alliance learning processes. Through a sequence of systemic sampling, this research finalizes an eligible sample set of 583 Taiwan-based ICT manufacturers having alliance learning activities, in particular the acquisition of new product development and international marketing knowledge and skills while partnering with their foreign partners.

As for the data collection procedure, we firstly used web-based questionnaires via emailing to the sampling firms with follow-ups every couple weeks from mid-June to the end of July 2010. We obtained 157 responses but withdrew 38 of them due to incomplete answers. To increase the response rate, we then employed mail questionnaires via posting to 38 respondents with invalid answers and to the rest of 464 non-respondents with one telephone follow-up from early August to mid-September 2010 and received 166 returned mails, but withdrew 14 of them

due to incomplete answers. The valid response rate combining web-based and mail questionnaires is 46.5% (271/583). Due to discrete phases of data collection involved in our research, non-response bias occurring when early and late respondents differ significantly (Dillman, Eltinge, Groves and Little, 2002) might become a concern. To assess the non-response bias, we compared the subjective estimates of the respondent firms' product categories, number of employees and the respondents' positions at the firms between web-based (early) and mail (late) questionnaires and found no significant differences between the two groups via independent-sample t-test in SPSS ($p > 0.05$). Consequently, non-response bias does not present a threat in our research.

Measurements

Apart from the measures of institutional differences, other measures of the constructs proposed in this research are designated to the items in the questionnaire and examined by 5-point Likert Scales, ranging from '1=strongly disagree/ very low' to '5=strongly agree/ very high' to allow for consistency in the response pattern. Building on the similar institutional distance measures developed in the prior literature (e.g., Chao and Kumar, 2010; Gaur and Lu, 2007), which were mainly taken from the secondary sources, this research adopted 7-item scale measures from The Global Information Technology Report 2010–2011 (Dutta and Mia, 2011) to reflect the essence of institutional distance. The selection of the appropriate measures is based on the relevance to the research scope of ICT industries in Taiwan. Because the nature of institutional differences cannot be directly assessed in the questionnaire items, we calculate the values for its measures by the following formula:

$$ID_{tf} = \sum_{i=1}^{n} [(I_t - I_f)^2 / V_I] / n$$

where ID_{tf} refers to the institutional difference between Taiwan (t) and the foreign country (f); I_t refers to the institutional difference indicator for Taiwan; I_f refers to the institutional difference indicator for the foreign country; V_I is the variance of indicator I; and n is the number of indicators. The formula design originated from Kogut and Singh's (1988) research on cultural distance and has been popularly applied by the subsequent research on the examination of cultural or institutional differences in international contexts (e.g., Gaur and Lu, 2007; Morosini, Shane and Singh, 1998).

Despite the practical recognition of the importance of knowledge ambiguity in inter-firm collaborations, there has been limited empirical research due to the difficulty in assessing the causal ambiguous perception of the firm (Simonin, 1999a, b). Instead of delving into taxonomy of knowledge characteristics and their underlying relationships, we measure knowledge ambiguity as an aggregate degree of internal stickiness (Szulanski, 1996) within alliances by

3-item Likert scales, i.e. the extent to which the partner firm has restricted your access to the knowledge, the extent to which the difficulty in acquiring the transferred knowledge, and the extent to which the unclear association between the cause and effect of the transferred knowledge (Nielsen and Nielsen, 2009; Szulanski, 2000).

Although single indicator of absorptive capacity has been largely applied by previous research (e.g., Youndt, Subramaniam and Snell, 2004; Tsai, 2001), it does not sufficiently capture the complex nature of absorptive capacity in the context of international strategic alliances. Stemming from Zahra and George's (2002) and Zhao and Anand's (2009) research, we define absorptive capacity as a firm's ability to identify, transform and absorb the transferred knowledge and assessed it by 3-item Likert-type scale measures, including the extent to which the firm is able identify the transferred knowledge, its knowledge infrastructure is effective to transform the knowledge, and its cooperative structure is open and flexible to absorb the knowledge.

Prior research has generally agreed upon the positive role played by relational factors, yet the applications of the construct across disciplines correspond to the divergent dentitions and measurements. For instance, in an empirical study on learning and protection of proprietary assets in strategic alliances, Kale et al. (2000: 218) defined relational capital as 'the level of mutual trust, respect and friendship that reside at the individual level between alliance partners, and developed 5 measures – close personal interaction, mutual respect, mutual trust, personal friendship and high reciprocity. Succeeding Kale et al.'s (ibid) research, Cousins, Handfield, Lawson and Petersen (2006) operationalized the construct into 3 elements, namely mutual trust, respect and interaction between firms in order to investigate the socialization processes of buyer-supplier relationships along with the manufacturing supply chain in the UK. Building on Szulanski's (1996) research, we epitomize relationship quality as firm-level interaction between alliance partners and develop 6-item Likert-type scale relating to the extents of partner interaction, mutual trust, and reciprocal commitment.

As Harrigan (1985) noted that a receiving mechanism of the firm is crucial for the acquisition of external knowledge, growing empirical research has endeavored to examine the antecedents of knowledge acquisition and originated various measures to represent the construct (e.g., Lane et al., 2001; Park, Giroud, Mirza and Whitelock, 2008). Nevertheless, prior research has generally considered cross-border knowledge acquisition as the extent of the knowledge acquired from the alliance partner and measured it by a specific set of knowledge pool related to the alliance operations (e.g., Liu et al., 2010; Tsang, Nguyen and Erramilli, 2004). Due to the nature of this research focusing on the acquisition of new product development and marketing-related knowledge and capabilities, knowledge acquisition as multi-dimensional

construct is measured by 3-item Likert-type scale: the extent to which has your firm acquired the new technological, marketing, and product development techniques/ expertise from the alliance partner.

Control Variables and Common Method Variance

This research adopted some dimensions of control variables, such as alliance duration (Simonin, 2004), country of origin of the alliance partner (Liu et al., 2010), and equity structure (Das, 2005), and examine if alliance learning outcomes are affected by these variables. We run a preliminary analysis of variance (ANOVA) via SPSS 18 (SPSS) and find no significant differences, thus disregarding the consideration of control variables in this research. We also applied Liang, Saraf, Hu and Xue's (2007) statistical approach in PLS path modeling to assess the common method bias in this research. The statistics demonstrate that the bias is not a problem in our research because the average substantively explained of the measures (0.61), which are collected from the same primary source (questionnaire), is significantly larger than the average method-based variance (0.03) and the ratio of substantive variance to method variance is about 20: 1.

Data Analysis Strategy

This research implemented structural equation modeling (SEM) techniques via SmartPLS 2.0 (SmartPLS) statistical program to investigate the causal relationships among the proposed theoretical constructs. SmartPLS is a variance-based multivariate statistical program that is particularly keen on 'soft modeling' (Wold, 1982) techniques and exhibits greater flexibility in dealing with various obstacles in situations where it is impossible to fit the hard assumptions of more conventional covariance-based statistical programs (Esposito Vinzi, Chin and Henseler, 2010), such as AMOS, EQS, and LISREL. As an advantage, the PLS method 'involves no assumptions about the population or scale of measurement' (Fornell and Bookstein, 1982: 443) and therefore can work without distribution assumption and easily handle continuous, dummy, and categorical non-normal data collected in this research. Also, it is capable of assessing interaction effects of the hypothesized moderator – relational capital and institutional distance because the assumption of interdependence/ exogeneity of the latent constructs is not required (Lohmoller, 1989).

Results

Measurement Model Assessment

We factor analyzed the measurement models via SmartPLS and the statistical results yield robust composite reliability and convergent validity for all developed measures, because they all

possess significant factor loadings (λ) related to their underlying constructs (t-values>1.96), the Dillon-Goldstein's rho values ranging from 0.71 to 0.93 (ρ_c>0.7), and the average variance extracted (AVE) values higher than the threshold value of 0.5 (Table 1). However, not only should each latent construct be strongly reflected by the assigned measures, but it should not have a stronger correlation with any other constructs in the theoretic model; otherwise, it would imply that the construct might not be conceptually distinctive from others by sharing the same types of measures. To evaluate such discriminant validity of each latent construct, an advocated approach of comparison between the square root of AVE and construct correlations was applied (Chin, 2010). A common criterion for assessing discriminant validity is that the shared variance between the latent constructs and the assigned measures should be greater than the variance shared with other constructs (Gotz, Liehr-Gobbers and Krafft, 2010). The statistical results compiled in Table 2 suggest that all constructs hold discriminant validity because their correlations with others do not present greater values than the square root of their own AVEs.

INSERT TABLE 1 & 2 ABOUT HERE

Structural Model Assessment

Because of the distribution-free assumption, the PLS modeling analysis does not allow a statistical test to examine the calibrated model's overall goodness of fit (Gotz et al., 2010); but it applies non-parametrical tests to evaluate the explanatory and predictive power of a structural model and provides compatible estimation results. To consolidate the findings, first of all, the bootstrapping other than the Sobel (Sobel, 1982) or empirical M (Holbert and Stephenson, 2003) test is used to assess the significance of mediating and moderating effects in the structural model. In addition to the criterion of path coefficient (β) via bootstrap algorithm in SamrtPLS, the effect size (f^2) concerning the changes of determination coefficients (R^2) and the predictive relevance (q^2) regarding the changes of cross-validated redundancy (Q^2) on an endogenous construct are also employed via PLS and blindfolding algorithms, respectively, to estimate the statistical validity of a specific mediator or moderator being added in or deleted from the structural model. At this stage, the model with better explanatory and predictive power when adding/ disregarding a mediator/ moderator is justified and succeeded for hypotheses testing.

<u>Mediation Analysis</u>

Due to the involvement of the multilevel mediation in the structural model, this research incorporated Shrout and Bolger's (2002) approach with bootstrapping method based on the resampling number of 5,000 (Hayes, 2009; Henseler, Ringle and Sinkovics, 2009) to examine the significance of mediating effects in this research. Excluding the moderator (i.e., relationship

quality), a baseline model containing the original order of the proposed relationships among the latent constructs (i.e., institutional distance, knowledge ambiguity, absorptive capacity, and knowledge acquisition) is initially bootstrapped to examine the significance of the path coefficients (β). The statistical results indicate that absorptive capacity is indeed a full mediator of institutional distance on knowledge acquisition because of the insignificant path coefficient of the direct path from institutional distance to knowledge acquisition in the alternative model ($\beta = -0.08$; t-value=1.53), whereas knowledge ambiguity is examined as a partial mediator of absorptive capacity on knowledge acquisition, in that the path coefficient between absorptive capacity and knowledge acquisition is significant in the alternative model ($\beta = 0.50$; t-value=7.71). The results provide the empirical evidence for the hypothesized model. To quantify the strength of mediation, we calculate the effect size and predictive relevance of the endogenous variables – knowledge ambiguity ($f^2=0.23$; $q^2=0.15$) and absorptive capacity ($f^2=0.38$; $q^2=0.24$) – and find both criteria are larger than the threshold value of 0, suggesting that the variance explained and predictive relevance of alliance learning processes with the linkages to knowledge acquisition perform better than they do without such linkages (Henseler et al., 2009).

<u>Moderation Analysis</u>

To avoid the technical restrictions of covariance-type statistical programs (i.e., AMOS, LISREL) on moderation analysis, this research adopted variance-based method (i.e., SmartPLS) to evaluate the significance of moderating effects in the research framework. In the first stage, a structural model without the moderating effects was run by PLS algorithm of SmartPLS to obtain the precise estimation of the latent constructs' scores. Based on Henseler and Fassott's (2010) suggestion, the estimation results of moderation analysis are feasible only if all constructs are constrained by single measures in the structural model. In the second stage, therefore, the moderator building up by the product of the constructs' scores in the previous stage was incorporated into the model for the purpose of moderation analysis. Meanwhile, the significance of path coefficients (β) in both models was examined by bootstrapping with 5,000 replacements in SmartPLS. Although Baron and Kenny (1986) argued that the moderation is supported if its path coefficient is significant regardless of the significance of the main effects in the causal relationship, Carte and Russell (2003) later criticised the argumentation for limited specifications as one of the nine common errors in pursuit of moderation.

Hence, apart from the estimation on the significance of path coefficients via bootstrap algorithm, other criteria such as effect size (f^2) and predictive relevance (q^2) concerning how much a unit change in a moderator influences the causal relationship between the initial and outcome variables (Chin, Marcolin and Newsted, 2003) via PLS and blindfolding algorithms,

respectively, were also employed to assess the explanatory and predictive power of the moderator affecting the proposed relationship. The statistical results disclose the significant moderating effects of relationship quality with moderate explanatory and predictive power on the causal relationships between institutional distance and the alliance learning process (β=0.12/–0.10; t-value=2.45/1.99; f^2=0.24/0.22; q^2=0.18/0.16). Specifically, the findings reveal that on the one hand one standard deviation increase in relationship quality not only positively affects the firm's absorptive capacity by 0.38 but also lessens the negative impact of institutional distance on its absorptive capacity from –0.22 to –0.10. On the other hand, one standard deviation increase in relationship quality negatively affects the firm's ambiguous perception towards the transferred knowledge by –0.25 and it also weakens the positive impact of institutional distance on knowledge ambiguity from 0.12 to 0.02, providing the empirical evidence of the presence of moderating effects in the proposed research framework.

<u>Model Fit</u>

Through a series of PLS path modeling techniques on model assessment, both measure- and construct-level validity and reliability are systematically examined; yet the research findings are not consolidated until an overall fit of both measurement and structural models is optimized. Accordingly, a global criterion of PLS goodness-of-fit (GoF) proposed by Tenenhaus, Esposito Vinza, Chatelin and Lauro (2005) was adopted to provide statistical evidence for model validation. As an operational solution for the methodological gap in the PLS path modeling literature, the criterion of PLS goodness-of-fit (GoF) has been increasingly applied by researchers to evaluate the overall model robustness at both measurement and structural levels (e.g., Esposito Vinzi et al., 2010; Tenenhaus and Hanafi, 2010), and is calculated as the geometric mean of the average community of the measures and the average variance explained (R^2) by the endogenous constructs. The normed values of PLS goodness-of-fit (GoF) after computation range between 0 and 1, whilst no threshold value has been advocated for interpretation in the prior research. When considering the cut-point value of average variance extracted as 0.50 (Fornell and Larcker, 1981) and the small, medium and large levels of determinant coefficient (R^2) as 0.19, 0.33, and 0.67, however, the values of PLS goodness-of-fit as 0.13, 0.23, and 0.47 become the appropriate representations of the hierarchical levels of the overall model fit indices. The calculation result of PLS goodness-of-fit criterion demonstrates that the research framework possesses strong validation of the overall model fit at both measurement and structural levels (GoF =0.42), which justifies the empirical stance on the proposed causal relationships among the theoretical constructs in this research.

Hypotheses Testing

The statistical results show that, first of all, the contextual factors arising from diverse

institutional frameworks between the countries from where the partner firms originate positively affects the firm's ambiguous perception towards the transferred knowledge (H3: β=0.12, t-value=2.40), whereas it negatively affects the firm's absorptive capacity to identify, transform and absorb the knowledge for alliance learning purposes (H4: β= –0.22, t-value=3.14). The findings also reveal that knowledge ambiguity is indeed a partial mediator of absorptive capacity on knowledge acquisition (H2: β= –0.18, t-value=2.98), which in turn, hinders the cross-border knowledge acquisition (H1: β= –0.26, t-value=7.93). Finally, our results also confirm the significant moderating role played by relationship quality during alliance learning processes because it weakens not only the negative impact of institutional differences on the firm's absorptive capacity (H6: β=0.12, t-value=2.45) but also the positive impact of that on its ambiguous perception towards the transferred knowledge (H5: β=0.10; t-value=1.99).

Discussion and Conclusion

Alliance learning is a complex phenomenon and in practice, successful learning is often not easy to achieve. Most prior research on alliance learning has focused on organization-level learning without considering the impacts of contextual differences between collaborating firms. Thus we have limited understanding of the potential challenges involved in knowledge transfer and learning processes across national boundaries. Why such contextual challenges occur and how to better manage them are the main research questions explored in this study. Building on the knowledge-based view (Barney et al., 2011; Grant, 2002), we firstly map out the underlying mechanisms of alliance learning processes by positing knowledge ambiguity, the firm's ambiguous perception towards the transferred knowledge, as the major impediment of cross-border knowledge acquisition, due to the intrinsic competition over knowledge-based resources between alliance partners. However, we further argue that the firm's absorptive capacity to recognize, transform and acquire the transferred knowledge could essentially reduce such noxious impact of knowledge ambiguity, which in turn, enhance the amount of the knowledge acquired through alliances. This indicates that alliance learning processes are essentially controllable and manageable by firms.

Moreover, stemming from Kostova's (1996) seminal work, we associate institutional differences between the countries from where alliance partners originate with alliance learning processes and propose it as critical country-level factor negatively influencing the firm's absorptive capacity whereas positively affecting its ambiguous perception towards the transferred knowledge. In other words, if there are divergent institutional frameworks between the alliance partners, the firm would not only experience difficulties in absorbing the transferred knowledge but also its absorptive capacity would be significantly restricted to acquire the knowledge, which subsequently, limiting the knowledge acquisition and resulting in the

cooperative failure. To mitigate such inherent challenges arising from the external environments, we suggest that the firm could develop and boost the relationship quality with its partner during cooperation. With higher quality of relationship between the alliance partners, the more negative impact of institutional distance on the firm's absorptive capacity as well as the more positive impact of that on its ambiguous perception towards the transferred knowledge would be significantly lessened. Thus the critical moderating role played by inter-firm interaction is noted in this research.

Drawing on a sample of 271 Taiwan-based international strategic alliances in the ICT industries, we empirically examine the dynamic impacts of contextual factors on the acquisition of cross-border knowledge and recommends strategies for overcoming the perceived challenges in the learning process. Our findings reveal that successful alliance learning not only depends on the partner's openness to share knowledge but also relies on the firm's capacity to identify, transform and absorb such knowledge. In the extent literature, institutional differences are considered to hinder the alliance learning process by decreasing the firm's absorptive capacity as well as by increasing the negative impact of knowledge ambiguity. Our research confirms that frequent direct communication, and high levels of mutual trust and reciprocal commitment can mitigate such country-level hindrances and can positively moderate the noxious effects of institutional differences on the alliance learning process. This research thus contributes to the existing alliance learning literature by highlighting the importance of contextual factors on learning in international strategic alliances.

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Table 1: Confirmatory Factor Analysis on the Measurement Models

Construct/ Measures	λ	T-value	α	ρ_c	AVE
Institutional Difference (ID) – adapted from Chao and Kumar (2010), Gaur and Lu (2007)			0.75	0.81	0.59
ID1: Judicial independence	0.65	5.17			
ID2: Laws relating to ICT	0.84	5.56			
ID3: Property rights	0.78	5.49			
ID4: Intellectual property protection	0.88	5.67			
ID5: Effectiveness of law making bodies	0.69	5.26			
ID6: Efficiency of legal framework in setting disputes	0.92	6.01			
ID7: Efficiency of legal framework in challenging regulations	0.80	5.53			
Relationship Quality(RQ) – adapted from Kale et al. (2000), Liu et al. (2010), Szulanski (1996)			0.84	0.93	0.66
RQ1: The extent to which the alliance is characterized by friendly and respectful interactions between the partners	0.62	2.23			
	0.95	3.74			
RQ2: The extent to which the alliance is involved frequent face-to-face communications and on-site visits between the partners	0.90	2.08			
RQ3: All alliance partners never cheat or mislead each other during cooperation	0.95	3.75			
RQ4: All alliance partners offer fair deals to each other during cooperation	0.97	4.22			
RQ5: All alliance partners make decisions based on mutual benefits	0.71	2.98			
RQ6: All alliance partners are highly committed to work with each other to solve problems					
Knowledge Ambiguity (KAM) – adapted from Simonin (1999a, b), Szulanski (1996)			0.65	0.71	0.57
KAM1: To what extent has the foreign partner restricted your firm's access to its knowledge base?	0.75	3.42			
KAM2: To what extent has your firm found the unclear linkages between causes and effects, inputs and	0.89	4.69			

	λ		α	ρ_c	AVE
outputs, and actions and outcomes related to the transferred knowledge from the foreign partner?					
KAM3: To what extent has your firm experienced difficulty in absorbing the transferred knowledge from the foreign partner?	0.88	4.55			
Absorptive Capacity (AC) – adapted from Zahra and George (2002), Zhao and Anand (2009)			0.67	0.72	0.66
AC1: The extent to which your firm has open and flexible structure towards learning	0.91	14.23			
AC2: The extent to which your firm has effective knowledge infrastructure in receiving the transferred knowledge	0.88	13.64			
AC3: The extent to which your firm is willing to exploit the acquired knowledge into the cooperative context	0.70	7.09			
Knowledge Acquisition (KA) – adapted from Tsang et al. (2004)			0.88	0.93	0.94
To what extent does your firm acquire the following knowledge from the alliance partner?					
KA1: New technological expertise	0.87	32.81			
KA2: New product development expertise	0.75	26.16			
KA3: New marketing expertise	0.82	30.43			

Note: λ = factor loading; α = Cronbach's alpha; ρ_c = Dillon-Goldstein's rho; AVE = average variance extracted

Table 2: Descriptive Statistics, Latent Construct Correlations and Discriminant Validity

Construct	Mean	S.D.	ID	RQ	KAM	AC	KAC
Institutional Distance (ID) §	1.65	1.02	**0.77**				
Relationship Quality (RQ)	4.02	0.69	-0.11	**0.81**			
Knowledge Ambiguity (K AM)	2.25	0.66	0.25	-0.23	**0.75**		
Absorptive Capacity (AC)	3.96	0.60	-0.07	0.39	-0.34	**0.81**	
Knowledge Acquisition (KAC)	3.72	0.56	-0.06	0.34	-0.13	0.56	**0.97**

Note: § = different scales are used from survey items; Diagonal terms (in bold) are square root of the average variance extracted. Off-diagonal terms are the correlation of latent constructs.