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S. Tamer Cavusgil Roger J. Calantone Yushan Zhao

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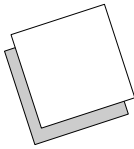
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Tacit knowledge transfer and firm innovation capability

S. Tamer Cavusgil

Professor of Marketing, Department of Marketing and Supply Chain Management, The Eli Broad Graduate School of Management, Michigan State University, East Lansing, Michigan, USA

Roger J. Calantone

Department of Marketing and Supply Chain Management, The Eli Broad Graduate School of Management, Michigan State University, East Lansing, Michigan, USA

Yushan Zhao

College of Business and Economics, University of Wisconsin, Whitewater, Wisconsin, USA

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Abstract *This study surveys a broad spectrum of US manufacturer and service firms to examine the effect of tacit knowledge transfer on firm innovation capability. The authors present a set of hypotheses concerning the relationships between inter-firm relationship strength and tacitness of knowledge transfer, extent of tacit knowledge transfer and innovation capability, and innovation capability and innovation performance based on the theory of knowledge. Moderating roles of firm collaborative experience and firm size on the relationship between inter-firm relationship strength and the extent of tacit knowledge transfer are considered. Empirical results generally support the predictions from the theory and managerial implications are included.*

Introduction

Innovations form the lifelines of organizations (Wind and Mahajan, 1997). However, innovations have become increasingly complex, costly, and risky due to changing customer preferences, extensive competitive pressure, and rapid and radical technological changes (Griffin, 1997). As a result, firms find it increasingly difficult to internalize innovations (Moorman and Rust, 1999). Acquiring knowledge and skills through collaboration has been considered an effective and efficient way of successful innovation (Adams *et al.*, 1998). This point of view is strengthened in several recent studies (Moorman and Rust, 1999; Madhavan and Grover, 1998; Li and Calantone, 1998; Han *et al.*, 1998; Chandrashekar *et al.*, 1999; Hurley and Hult, 1998; Cooper, 1992; Adams *et al.*, 1998).

In the real world, US multinational, 3M Corporation, is considered one of the most innovative companies in the world due to its effective knowledge management system (Brand, 1998). Similarly, Japan's Hitachi's effective knowledge creation and successful innovation are due in large part to the successful development of a long-term, high-trust supply relationship (Lincoln *et al.*, 1998). Xerox decided to launch a knowledge-sharing initiative called the "Transition Alliance" to deal effectively with innovations in hardware and software (Storck and Hill, 2000).

The importance of knowledge for firms is acknowledged in many studies. Knowledge is considered one of the important firm resources, which is

3M corporation



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Explicit knowledge

unique, inimitable, and valuable for firms (Day and Wensley, 1988; Collis, 1994; Peteraf, 1993; Barney, 1986a,b; Wernerfelt, 1984; Grant and Baden-Fuller, 1995; Grant, 1997). In interfirm relationship research, one of the purposes of inter-firm cooperation is to get knowledge from partner firms (Glazer, 1991). In the organizational learning research, firms are structured of learning, i.e. consistently getting knowledge from outside firms (Sinkula *et al.*, 1997). In the international studies, strategic alliances are a form of knowledge transfer that is more efficient than developing knowledge by firms themselves (Simonin, 1997; Poppo and Zenger, 1998).

Knowledge could be explicit or tacit (Nonaka, 1994). Explicit knowledge is based on universally accepted and objective criteria. It has the character of public goods. Explicit knowledge could be easily coded and transferred. Tacit knowledge is encoded knowledge and resides in the firm's system. Tacit knowledge is important but difficult to interpret and transfer (i.e. uncodified) from one firm to another. Owing to the difficulty in interpreting and transferring it, previous studies are mostly descriptive in nature. Detailed research on it is lacking. How to get tacit knowledge from other firms has been somewhat neglected in previous studies (Howells, 1996; Madhavan and Grover, 1998).

Another limitation in the previous research with tacit knowledge is the testing of the linkage of tacit knowledge with firm capability (Inkpen and Dinur, 1998). Many researchers admitted that tacit knowledge forms the foundation for building sustainable competitive advantage; however, the underlying relationship with other firm activities is not tested explicitly. All were attempts to improve the understanding of the role of tacit knowledge in firms. But these works lacked the specificity necessary for empirical research.

The objective of this paper is to examine how firms acquire tacit knowledge from partner firms and how the extent of inter-firm tacit knowledge transfer affects firm innovation capability. The relationships between interfirm relationship strength and the extent of tacitness of knowledge transfer, tacitness of knowledge and innovation capability, and innovation capability and innovation performance are considered specifically. We also explored the moderating effects of organizational collaborative experience and firm size on the relationship of relationship strength and extent of tacit knowledge transfer. We controlled variables of firm size such as annual sales and number of employees in other equations.

Empirical test

The major obstacle to conducting the empirical test is the creation of measures to test the extent of tacitness of firm knowledge transfer. We conducted instrument development on a large scale to get the appropriate scale. Several large firms generously provided us with limited access to their real innovation activities, giving us the opportunity to truly understand the role of tacit knowledge transfer on firm innovations. We subsequently collected data from the US firms to test the hypotheses. We included firms from a wide range of manufacturing and services industries in the sample frame.

The results show that tacit knowledge could be obtained from partner firms through their close and frequent interactions. Tacit knowledge transfer makes a significant contribution for firms to develop great innovation capability. Firms' collaborative experience also plays an important part in the tacit knowledge transfer. Firms with greater collaborative experience can

Competitive advantage

benefit more from this tacit knowledge transfer. The moderating role of firm size on that relationship was also explored.

In the next section, we examine the relevant literatures of tacit knowledge, interfirm relationship strength, and innovation. Based on this, we propose our research hypotheses concerning the relationships among the constructs. We then present our methodology for the study and report the results of our empirical test. We end our paper with discussions, implications, and future research directions.

Literature review

Organizational researchers have long been concerned with studying how firms can build and sustain competitive advantage (Day and Wensley, 1988; Day, 1994). Development of an effective and efficient knowledge management system has been considered a means to this end (Nonaka, 1994). Scholars have claimed that a firm is a body of knowledge and the importance of this intangible asset far exceeds that of other physical properties (Spender, 1996; Grant and Baden-Fuller, 1995; Grant, 1997; Nelson and Winter, 1982). Moreover, senior managers have begun to examine their human capital and their capabilities as sources of competitive advantage. In a study directed toward understanding the impact of organizational integration on new product development, Hoopes and Postrel (1999) found that the shared knowledge of firm members constitutes an important resource underlying product development capability. Firms that create and use knowledge rapidly and effectively are able to innovate faster and successfully (Lynn *et al.*, 1999). Dougherty (1992) found that knowledge creation is the key for organizational renewal. Teece (1998) reminded people that creating successful new products lies at the firm's fundamental core – firm intangible assets or knowledge. Madhavan and Grover (1998) confirm that tacit knowledge or embedded knowledge is important for firm knowledge creation as well as successful new product development.

Tacit and explicit knowledge

Explicit knowledge and tacit knowledge

The distinction between tacit and explicit knowledge is the key for understanding organizational knowledge (Nonaka and Takeuchi, 1995; Inkpen and Dinur, 1998). Polanyi (1962) defined tacit knowledge as the knowledge that is non-verbalizable, intuitive, and unarticulated. Tacit knowledge is learned through collaborative experience and is difficult to articulate, formalize, and communicate (Nonaka and Takeuchi, 1995; Polanyi, 1962, 1966). Tacit knowledge could be held by individuals or held collectively, in shared collaborative experiences and interpretations of events. Individual tacit knowledge can be found in an employee's schemes, skills, habits, and abstract knowledge (Lyles and Schwenk, 1992; Starbuck, 1992). The collective tacit knowledge typically resides in top management schemes, organizational consensus on past collaborative experiences, firm routines, firm culture, and professional culture (Lyles and Schwenk, 1992; Nelson and Winter, 1982; Nonaka and Takeuchi, 1995).

Spender (1996) suggested that tacit knowledge could be understood best as knowledge that has not yet been transformed into practice. It is knowledge that has been transformed into habit, and is highly context-specific and has a personal quality (Nonaka, 1994).

In contrast, explicit knowledge is codified and transferable in formal, systematic methods, such as in rules and procedures (Nonaka and Takeuchi, 1995). Individual explicit knowledge consists of knowledge and skills that

Absolute tacit knowledge

can be easily taught or written down, whereas collective explicit knowledge resides in standard operating procedures, documentation, information systems, and rules (Brown and Duguid, 1991; Lyles, 1988; Starbuck, 1992).

Winter (1987) developed the following terminology – complexity versus simplicity, not teachable versus teachable, and not observable versus observable – to distinguish different types of knowledge. Analogous to the tacit and explicit dichotomy, Zuboff (1988) distinguished between embodied, or action-centered, skills and intellectual skills. Action-centered skills are developed through actual performance (learning by doing). In contrast, intellectual skills combine abstraction, explicit reference, and procedural reasoning, which makes them easily representable as symbols and, therefore, easily transferable. Similar distinctions between explicit and largely tacit knowledge in organizations have been made by Scribner (1986), Bohn (1994), and Madhavan and Grover (1998).

It is rare to find absolute tacit knowledge or absolute explicit knowledge. In other words, as Inkpen and Dinur (1998) pointed out, the distinction between explicit and tacit knowledge should not be viewed as a dichotomy but as a spectrum with the two knowledge types as the poles at either end (also see Makhija and Ganesh (1997)). In order to facilitate operationalization, we accepted suggestions from the field research. We propose a degree of tacitness of the knowledge. So, the knowledge types must be classified on a continuum that ranges from explicit to tacit. The higher the degree of tacitness of firm knowledge, the harder it is to be transferred from one firm to another.

Relationship strength

Relationship strength is one character of interfirm relationships. It is central to the relationship research (Morgan and Hunt, 1994; Granovetter, 1973). We adopted the concept of “tie” from network study (Granovetter, 1973). Granovetter (1973) proposed that close interfirm relationships have three characteristics:

- (1) frequent interactions;
- (2) an extended history;
- (3) intimacy or mutual confiding (see also Kraatz (1998)).

Similarly, in the relationship marketing research, Morgan and Hunt (1994) emphasize that the nature of close relationship lies in its mutual trust, commitment, and high quality and frequent communications.

Relationships

In the close relationship, compared with weak relationship, both firms treat the relationship as valuable and important to each other (Moorman *et al.*, 1992). They have the desire that the relationship should endure indefinitely and are willing to work to maintain it. For example, when one party is in need of help, the other party would be readily available (Morgan and Hunt, 1994).

Mutual frequent information sharing in close relationship includes the formal as well as informal exchange of meaningful and timely information (Mohr and Nevin, 1990). It is specifically critical for close relationship because one party seeks a dialogue with the partner, not only concerning the partner's operations and strategies, but also with respect to feedback on its own operations and strategies. This kind of give-and-take requires open-mindedness and a non-defensive attitude. Information sharing has a substantive effect in which strategies and operations are modified and improved. The frequency and quality of information sharing signal the

importance of the relationship and the respect that the parties have for each other (Mohr *et al.*, 1996).

Innovation

Innovation is the base for organizational survival (Damanpour and Evan, 1984; Han *et al.*, 1998; Hurley and Hult, 1998). The findings uniformly indicate that firm innovation is the key for an organization's survival. Drucker (1954) was one of the first scholars to address the importance of innovation capability for organizations. He suggested that a firm has to be innovative to survive in the volatile environment. Innovation capabilities are critical to achieving a superior innovation performance. This is because markets are characterized by short product life cycle and a high rate of new product introduction. A firm with a great innovation capability will enjoy a high innovation performance.

High innovation capability

Specifically, a firm with high innovation capability employs a learning-by-doing effect, which makes it very difficult for competitors to buy this know-how in the market and also made it extremely difficult for firms to imitate. The difficulties of imitating this know-how are further exacerbated by the large tacit component of R&D. These characteristics of R&D capability enable a firm that has superior competence in R&D to succeed in innovation programs.

Research hypotheses

Our key argument is that a firm's survival depends mostly on firm innovation. Tacit knowledge is critical for a firm's innovation capability. A high degree of tacit knowledge could be obtained through close interactions with partner firms. Firms could benefit from the collaborative experience in the process of tacit knowledge transfer.

A close relationship between firms is necessary for knowledge transfer. It allows for prolonged cohabitation of managerial and technical personnel and facilitates the replication of organizational routines (Teece, 1981). A direct interface among the partner firms permits direct observation of operations and enables the gradual and experiential learning that is essential for successful transfer of tacit knowledge (Davies, 1977; Killing, 1983; Osborn and Baughn, 1990). For example, a supplier may get knowledge of inter-functional integration during its participation in a manufacturer's new product development. Because tacit knowledge cannot be easily specified, close partners may have opportunities to detect the knowledge needed. Besides, partnering relationships include a monitoring process. Monitoring is especially valuable where tacit knowledge is concerned, since such knowledge is not readily codified, and hence cannot be transmitted in the form of reports and balance statements.

In-depth communication

Strong ties are more likely to promote in-depth communication and to facilitate the exchange of detailed information between organizations (Kraatz, 1998). Close relationship enhances the opportunities for people in both firms to share feelings, emotions, collaborative experiences, and mental models through physical, face-to-face contacts. It is necessary to have a higher degree of tacit knowledge transfer (Nonaka, 1994). Through the frequent dialogue among the members of two firms, knowledge in one firm is converted into shared terms and concepts for the other firm. Thus, the tacit knowledge rooted in one firm is likely to be transformed into another firm's knowledge. Based on the above arguments, we propose:

Product performance

H1. The greater the relationship strength between two firms, the greater the extent of tacit knowledge transfer between the firms.

Our main premise of this study is that the greater the tacitness in the inter-firm knowledge transfer, the greater the firm's capability of innovation. The reasoning behind this premise is that tacit – as opposed to explicit-knowledge is more difficult to transfer and deploy across borders, and hence more likely to be unique, rare, and difficult for rivals to replicate. Acquiring high explicit (or low tacit) knowledge is unlikely to be as effective as acquiring high tacit knowledge through close relationship. This is because explicit knowledge about innovation is easily available to all competitors; tacit knowledge about innovation is not. Hence:

H2. The greater the extent of tacit knowledge transfer, the higher the firm innovation capability.

Firm innovation capability is the most important determinant of product performance (Cooper, 1984; Cooper and Kleinschmidt, 1987). Its contribution to product performance is uniformly supported by empirical studies (Cooper, 1984; Cooper and Kleinschmidt, 1987; Gatignon and Xuereb, 1997). Competitive advantage can have significant positive economic value for a firm (Barney, 1986a,b; Day, 1994). The contribution of innovation capability lies in its high value to buyers, its scarcity, and its imperfect sustainability (Barney, 1986a,b; Collis, 1994; Grant and Baden-Fuller, 1995). Therefore:

H3. The higher the firm innovation capability, the higher the firm innovation performance.

The relationship between relationship strength and the extent of tacit knowledge transfer is likely to be moderated by two important variables: collaborative experience and firm size. Simonin (1999) has argued that experience at collaborating is necessary to manage a diverse portfolio of collaborative ties and deal with emerging conflict in the relationship. As is empirically shown by Simonin (1997, 1999), collaborative experience is fundamental in building collaborative know-how, which, in turn, translates into greater collaborative benefits. For example, partner firms would protect their tacit knowledge instinctually. Experienced partners may resolve the conflict smoothly and get tacit knowledge to the greatest extent. Such collaborative experience also affects the capability of firms to recognize and understand the proper mechanisms of information gathering, interpretation, and diffusion. Familiarity with collaborative mechanisms and/or transfer processes facilitates the transfer of knowledge more effectively and efficiently.

Strategy literature

Firm size has long been viewed in the strategy literature as an important contingency variable (Hoskisson *et al.*, 1994) as well as a key impediment to organizational learning (Marquardt and Reynolds, 1994). In interfirm relationship literature, firm size has also been considered a differentiating factor in the capability of organizational learning (Glaister and Buckley, 1996), and a source of asymmetric bargaining power between partners (Khanna *et al.*, 1998). First, transfer of tacit knowledge needs complicated administrative, organizational, and monitoring support that tends to be only available to large firms. Second, in comparison with large firms, small firms usually do not have the resources or expertise to exploit tacit knowledge in its most sophisticated forms; rather, these small firms have a distinctive marketing style characterized by little or no adherence to formal structures and frameworks, and by heavy reliance on intuitive ideas, decisions, and

common sense. As such, firm size is expected to play a significant moderating role in the relationship between relationship strength and the extent of tacit knowledge transfer. We propose:

H4. The relationship between firm relationship strength and the extent of tacit knowledge transfer is stronger for firms with greater collaborative experience than firms with less collaborative experience.

H5. The relationship between firm relationship strength and the extent of tacit knowledge transfer is stronger for larger firms than for small firms.

Method

Sample and data collection

The final sample consists of 182 manufacture and service firms in the USA. A wide range of industries is included in the sample frame, including chemicals, machinery, electronics, instruments, computers and data processing, engineering and management services. Thus the sample covers the technical and administrative innovations.

A sample of 1,800 firms was drawn from the list. We identified the person in charge of the R&D function at the senior management level of each firm; that is, most of the executives were vice presidents of R&D. Questionnaires were sent out with a covering letter introducing the study. Responses were obtained from 182 out of 1,800 firms contacted – a 10 percent response rate.

Instrument and procedure

The questionnaire was developed and refined to assess the extent of tacit knowledge transfer on the basis of previous research, in-depth observation of firm innovation activities, and field interviews with managers. Investigators attended and recorded the process of the innovation projects of R&D teams during a three-month period in firms. In particular, we focused on how knowledge was obtained from partner firms and how it was applied to innovation projects.

Measures

We use multiple items to measure the following five constructs: innovation performance, innovation capability, the extent of tacit knowledge transfer, relationship strength and collaborative experience. The reliability of the construct is reported in Table I.

Innovation performance is measured by three items. They measure if the innovation project has succeeded in achieving its main objectives: financial and ROI. Innovation capability is measured by five items. Following Subramanian (1999), we use the frequency of innovations, order of market entry, simultaneous entry in multiple markets, the ability to penetrate new markets to tap the various facets of innovation capability.

Variables	Cronbach alpha
INNPERF (innovation performance)	0.71
INNCAP (innovation capability)	0.74
TACIT (the extent of tacit knowledge transfer)	0.77
RELSTR (relationship strength)	0.75
EXP (collaborative experience)	0.72

Table I. Cronbach alpha

Questionnaires

Innovation performance

Experience

The extent of tacit knowledge transfer is measured by four items. They are used to capture the complexity, codifiability, and observability of the information transferred.

Relationship strength is measured by three items. They are the frequency of interactions, confidence in each other, and the desirability of maintaining the relationship.

Collaborative experience is measured by four items. Three items represent the overall level of experience on informal cooperation, contractual agreements, and consortia. One item measures the overall collaborative experience.

Firm size is measured by annual sales volume and number of employees.

Data analysis

The hypotheses are tested in the following system of equations:

$$\text{INNPERF} = \alpha_1 + \beta_{11}\text{INNCAP} + \beta_{12}\text{SALES} + \beta_{13}\text{EMPLOY} + e_1 \quad (1)$$

$$\text{INNCAP} = \alpha_2 + \beta_{21}\text{TACIT} + e_2 \quad (2)$$

$$\text{TACIT} = \alpha_3 + \beta_{31}\text{RELSTR} + e_3 \quad (3)$$

$$\text{TACIT} = \alpha_4 + \beta_{41}\text{RELSTR} * D_1 + \beta_{42}\text{RELSTR} * D_2 + e_4 \quad (4)$$

where

INNPERF = Innovation performance;

INNCAP = Innovation capability;

TACIT = The extent of tacit knowledge transfer;

RELSTR = Relationship strength.

D_1 is a dummy variable of collaborative experience. The data are transformed as follows: the collaborative experience above the mean is defined as high collaborative experience and $D_1 = 1$. The collaborative experience below the mean is defined as low collaborative experience and $D_1 = 0$.

D_2 is a dummy variable of firm size. The transformation is similar to the above. For large firms, $D_2 = 1$; for small firms, $D_2 = 0$.

Impact of relationship strength

In equation (4), β_{41} is the difference between the low and high collaborative experience of firms concerning the impact of relationship strength on the extent of tacit knowledge transfer. If β_{41} is significant, it is evidence of the difference between the high and low collaborative experience firms. Similarly, β_{42} represents the difference between large and small firms.

As some variables are both dependent and independent variables in the system of equations (innovation capability and the extent of tacit knowledge transfer), we apply three-stage least square (3SLS) regression to conduct the analysis.

Results

The results of 3SLS analysis are summarized in Table II. It is found that relationship strength significantly and positively influences the extent of tacit knowledge transfer (coefficient = 0.14 and $p < 0.01$). The results support our

Variable	Parameter estimate	Standard error	p-value
<i>Model of innovation performance (dependent variable: innovation performance)</i>			
Intercept	-2.53	1.05	0.02
INNCAP (innovation capability)	1.81	0.31	0.00
SALES (annual sales)	0.26	0.24	0.27
EMPLOYEE (the number of employees)	0.31	0.16	0.84
<i>Model of innovation capability (dependent variable: innovation capability)</i>			
Intercept	1.31	0.31	0.00
TACIT (the extent of tacit knowledge)	0.79	0.12	0.00
<i>Model of tacitness of knowledge transfer (dependent variable: the extent of tacit knowledge transfer)</i>			
Intercept	2.01	0.19	0.00
RELSTR (relationship strength)	0.14	0.05	0.00
<i>Model of tacitness of knowledge transfer (dependent variable: interaction terms)</i>			
Intercept	2.42	0.06	0.00
RELSTR*D ₁ (Relationship strength)	0.05	0.01	0.00
RELSTR*D ₂	-0.001	-0.02	0.94
System Weighted R-Square: 0.2953			

Table II. Results of three-stage least square regression

prediction (*H1*) that interfirm relationship strength affects the extent of the tacit knowledge transfer.

The results support *H2*. The extent of tacit knowledge transfer positively affects firm innovation capability (coefficient = 0.79 and $p < 0.01$). The results of the model of innovation performance support *H3*. The innovation capability is influential as to firm innovation performance (coefficient = 1.81 and $p < 0.01$), consistent with the previous findings. The coefficients of the two control variables (annual sales and the number of employees) are not significant. Therefore, firm size does not have influence on the results.

Evidence

Examining the coefficient of the interaction term of experience with relationship strength, it is positive and significant (coefficient = 0.05 and $p < 0.01$). This is the evidence of the significant difference between high collaborative experience firms and low collaborative experience firms concerning the impact of firm relationship strength on the extent of tacit knowledge transfer. High collaborative experience firms are more effective in the transfer of high degree of tacit knowledge. *H4* is supported. In the interaction term of firm size and relationship strength, the coefficient is not significant. Firm size does not have any effect on the relationship between relationship strength and the extent of tacit knowledge transfer. *H5* is not supported.

Discussions and implications

The key objective of this study is to examine the role of tacit knowledge transfer on firm innovations. In general, we empirically provide some evidence that inter-firm relationship strength influences the extent of tacit knowledge transfer, and the tacit knowledge obtained from partner firms affects firm innovation capability, which in turn influences firm innovation performance.

Obtaining knowledge

Many researchers suggest that cooperating with suppliers and customers may enhance firm innovativeness. Our findings support that view and argue that knowledge transfer is one important part of interfirm cooperation. Getting tacit knowledge from partners is a valuable source for firms to develop sustained competitive advantage.

We also argue that developing a close relationship with other firms plays an important role in obtaining tacit knowledge from outside firms. We placed special a priori emphasis on the strength of the relationship. We argue that a close relationship provides firms with opportunities to access other firms' in-depth operation processes. They thus can imitate partners' programs, schemes, or cultures.

One of the characteristics of tacit knowledge is that it is not equally available for all competitors. Therefore, obtaining knowledge from outside firms is an efficient way of improving innovation capability. Owing to the pressure from market and technological changes, innovation becomes more costly and risky. Getting knowledge from partners and improving firm innovation capability could reduce innovation costs by using a first-time-right approach. A shorter development cycle and effective innovation could be achieved.

The degree of tacit knowledge transfer depends on the closeness of the two partners. Frequent interactions afford the two parties the ability to understand each other's needs and satisfy the needs accordingly. For example, the transfer of tacit knowledge is not likely to be complete first time. It needs the source firm's assistance at a later time. Based on the feedback from the recipient firm, the source firm could provide more detailed instructions on the nature of the knowledge and make it easier for the recipient firm to understand the knowledge. It has to be noted that the exchange of the information has to be frank and accurate. Open-mindedness is a necessity for the transfer of tacit knowledge. It enables the source firm to know the problems exactly and provide suggestions accordingly. If the source firm does not get accurate feedback, the remedy provided would not be proper. The transfer of tacit knowledge is unlikely to be successful.

Contribution

Our primary contribution lies in its specific argument and findings regarding the values of inter-firm relationships in the tacit knowledge transfer as well as the contribution of tacit knowledge from other firms to firm innovation capability. It is hoped that these specific arguments will prove useful in the development of the theory of knowledge. Most research on knowledge management has been limited to individual level or knowledge transfer within organizations. Our study aims at studying knowledge transfer among independent firms. The enlargement of the scope of research on knowledge management in this study will broaden the base of the theory of knowledge. As most previous research just deals with "what is not tacit knowledge," we tried to answer "what is tacit knowledge?" and empirically tested the tacit knowledge construct. We hope that this will spur the exploration of this difficult part of knowledge study.

This study has limitations. First, we study tacit knowledge transfer between partner firms. The data, however, are collected from one side of the relationship. Although we made efforts to reduce the bias from the response, dyadic data would be more appropriate. Second, this study is an attempt to empirically test the organizational knowledge transfer. The knowledge transfer process, however, is not static but dynamic. Longitudinal data should be collected to explore the dynamic nature of knowledge transfer.

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This summary has been provided to allow managers and executives a rapid appreciation of the content of this article. Those with a particular interest in the topic covered may then read the article in toto to take advantage of the more comprehensive description of the research undertaken and its results to get the full benefit of the material present

Executive summary and implications for managers and executives

Explicit and tacit knowledge

Innovation can help firms to build and sustain competitive advantage. Indeed, a firm's survival depends mostly on its ability to innovate. Innovation has become increasingly complex, costly and risky because of changing customer preferences, extensive competitive pressure, and rapid and radical technological change. Against this background, firms such as Hitachi and Xerox seek to collaborate with others in their innovation efforts.

Innovation depends on knowledge. Firms that create and use knowledge rapidly and effectively are able to innovate faster and more successfully than those that do not. Explicit knowledge can be easily coded and transferred. Tacit knowledge, in contrast, is more difficult to articulate, formalize, interpret and transfer from one firm to another. Cavusgil et al. examine how firms acquire tacit knowledge from partner firms and how the extent of inter-firm tacit knowledge transfer affects a firm's ability to innovate.

Close partnerships favour tacit knowledge transfer

The authors' research among 182 US manufacturing and service firms reveals that the stronger the relationship between two firms, the greater will be the extent of tacit knowledge transfer between them. Managers and technicians can get to know one another better and so communicate more effectively. Companies can observe one another's operations and match them more easily. Close partners generally have more opportunity to detect the knowledge that is needed, and work on filling the gaps.

Tacit knowledge transfer boosts innovation

The greater the extent of tacit knowledge transfer, the more likely the firm is to be able to innovate effectively. This is because tacit knowledge is more difficult to transfer and deploy across borders than explicit knowledge, and so more likely to be rare and difficult for rivals to replicate.

Firms that are most able to innovate effectively are most likely to make useful products that other companies cannot. Such products, of course, can command high prices in the marketplace.

Experienced firms benefit most

The authors also show that firms with considerable experience of collaboration are best able to manage a diverse portfolio of collaborative ties and deal with emerging conflict in the relationship. They are also more likely to be able to recognize and understand proper mechanisms of information gathering, interpretation and diffusion. Collaborative experience is fundamental to building collaborative know-how that, in turn, translates into greater collaborative benefits.

Size of firm does not affect tacit knowledge transfer

The transfer of tacit knowledge needs complicated administrative, organizational and monitoring support that tends to be available only to large firms. Moreover, small firms do not usually have the resources or expertise to exploit tacit knowledge in its most sophisticated forms. Rather,

small firms tend to have a distinctive marketing style characterized by little or no adherence to formal structures and frameworks, and by heavy reliance on intuitive ideas, decisions and common sense. One would therefore expect tacit knowledge to be more easily transferred between large than between small firms. Surprisingly, however, the research reveals no evidence for this.

(A précis of the article “Tacit knowledge transfer and firm innovation capability”. Supplied by Marketing Consultants for Emerald.)

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