

**Hongxin Zhao/Yadong Luo**

## **Antecedents of Knowledge Sharing With Peer Subsidiaries in Other Countries: A Perspective from Subsidiary Managers in a Foreign Emerging Market**

### **Abstract**

- This study examines antecedent factors that influence organizational knowledge sharing between emerging market subsidiaries and their peer subsidiaries in other countries.
- We demonstrate that knowledge sharing itself is also an organizational variable, which requires proper configuration with both strategic properties (strategic interdependence, technological linkage, and entry mode) and infrastructural conditions (knowledge encapsulation, incentive system, and intranet system).

### **Key Results**

- Our analysis validates that inter-subsidiary sharing hinges on a subsidiary's strategic interdependence and technological linkage with peer subsidiaries as well as its intranet infrastructure, incentive system, and knowledge encapsulation.

### **Authors**

Professor Hongxin Zhao, Boeing Institute of International Business, John Cook School of Business, Saint Louis University, St. Louis, MO, USA.  
Professor Yadong Luo, The Emery M. Findlay Distinguished Chair in Graduate Business Studies, School of Business Administration, University of Miami, Coral Gables, FL, USA.

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A critical challenge for multiunit organizations is to leverage resources and knowledge developed by their diverse units that are dispersed in various locations (Nonaka 1994). In search of synergy and efficiency, organizations engage in cross-unit transfer and sharing of knowledge that reflects their distinctive competencies bolstering and sustaining a competitive advantage (Bartlett/Ghoshal 1989, Buckley/Carter 1999, Kogut/Zander 1992, Tsai/Ghoshal 1998). In a context of multinational enterprises (MNEs), intraorganizational sharing of distinctive knowledge is filled with more opportunities as well as more challenges in creating synergetic payoff, in contrast to domestic enterprises (Zander/Kogut 1995, Kostova 1999), necessitating a careful diagnosis of factors affecting the success of knowledge sharing (Gupta/Govindarajan 2000).

Accordingly, research on knowledge sharing within MNEs has been surging recently. Knowledge sharing in *technology* or product innovation aspects has been studied from the viewpoints of global value chain (Hedlund 1994, Hitt/Hoskisson/Ireland 1994), resource exploitation and exploration (Kogut/Zander 1992, Zander/Kogut 1995), and global integration (Ghoshal/Bartlett 1988, Gupta/Govindarajan 1991). According to this line of research, technological knowledge sharing within an MNE network enhances corporate-level value creation, addition, and revitalization. Meanwhile, several other studies addressed how intracorporate knowledge sharing is shaped by *external* environment conditions such as institutional deterrence, regulatory hindrance, environmental hostility, liability of foreignness, consumption behavior, and intellectual property rights protection (Eisenhardt/Behnam 1995, Glazer 1991, Granstrand/Håkanson/Sjolander 1993, Kostova 1999, Roth/Morrison 1990, Ruggles 1998). These endeavors mostly emphasize *parent* or corporate-level knowledge and articulate how knowledge sharing nourishes corporate success and network gains.

To further our understanding of intra-MNE knowledge sharing, this study seeks to address inter-unit sharing of *organizational* knowledge; examine what *inside*-organization factors account for this sharing; at foreign subsidiary level. Intra-MNE knowledge sharing can occur at three levels: (1) sharing between parents and subsidiaries; (2) sharing among subsidiaries (i.e., inter-unit sharing); (3) sharing among employees at a local subsidiary, and (4) sharing among the establishments of a same subsidiary in a given market. This study delimits its focus on sharing among peer subsidiaries, or inter-unit sharing, which has become increasingly important when parent firms dedicate more resources and authorities to subsidiary managers in response to escalated competition (Hargadon 1998, Prahalad/Hamel 1990, Tsai 2002). Second, in this study the MNE refers to diversified transnational corporations containing numerous subsidiaries in different host nations. Thus 'inter-unit' means the link between a focal subsidiary in one nation and peer subsidiaries in other nations. Third, we emphasize organizational knowledge, which is defined as knowledge about how to organize and manage offshore operations and investments. Compared to technological knowledge, or-

ganizational knowledge tends to be less observable but it is still less difficult for organizational knowledge to be transferred between subunits inside an organization (Nonaka/Takeuchi 1995). Organizational knowledge within a diversified yet coordinated corporation is formalized at some point so that it can be diffused easily within the organization (Appleyard 1996). This inside-network diffusion is “value-impregnated” (Kostova 1999, Szulanski 1996), which mitigates transaction costs overseas (Gupta/Govindarajan 1986). Lastly, we note that this study focuses on the antecedents that affect overall level, rather than differentiated structure, of a focal subsidiary’s sharing with the whole group of sister subsidiaries in other nations. With the emphasis on identifying these general antecedents, it seems beyond the study to scrutinize the structure of sharing – how a focal subsidiary differently shares knowledge with different peer subsidiaries and/or under different circumstances. This, however, is an important agenda for future research.

The above inquiry may have some implications for both theory and practice. Knowledge-based theory in a global context remains inadequately addressed (Buckley/Carter 1999) and a lacuna particularly abounds in exploring the process, antecedents, concurrent, and consequent factors of knowledge sharing within an MNE network (Birkinshaw/Morrison 1995, Ghoshal 1987). Our effort will shed some light on an antecedent view of knowledge sharing, which then may enrich the internalization perspective of MNE theories (Dunning 1995; Egelhoff 1982) as well as the community perspective of capability building and sharing (Ghoshal/Bartlett 1990, Hedlund 1994, Kogut/Zander 1992, Zander/Kogut 1995). If our propositions are validated, then we can argue that knowledge sharing itself is an organizational variable, which requires configuration with strategic needs and infrastructural conditions.

## Theory and Hypothesis

Global management studies increasingly recognize the imperatives of knowledge in global competition and view MNEs as efficient learning networks or as organizational vehicles to share knowledge across national borders (Conner/Prahalad 1996, Kogut/Zander 1996). Knowledge-based theory treats knowledge as a core competence or strategic asset that differentiates firms in a competitive market (Grant 1996, Prahalad/Hamel 1994, Spender 1996). According to this theory, an effective organization must excel at creating, acquiring and sharing knowledge throughout the corporate network (Gupta/Govindarajan 2000). Unlike transfer, which is a unilateral process moving from one unit to another, sharing connotes “experiencing together” and involves simultaneous multiple exchanges between a nodal subsidiary and the rest of MNE network (Zander/Kogut 1995). It mirrors

mutual learning between peer subsidiaries and indicates managerial innovation for upgrading a bundle of existing resources and capabilities (Grant 1996, Hedlund 1994). Economically, inter-unit sharing may reduce transaction costs that incur when knowledge must be "bought" from the outside, increase foreign investment returns from improved skills and peer collaborations, and reduce economic and financial risks that emerge if the firm has to depend on external sources for such resources (Porter 1986, Spender 1996).

Inter-unit sharing of organizational knowledge becomes an inseparable part of global knowledge management (Ghoshal/Bartlett 1990). The value-creation of organizational knowledge is less prone to external forces than to internal design, routinization, and exploitation (Conner/Prahalad 1996, Garvin 1993). Moreover, value-adding abilities of organizational knowledge are generally more enduring and sustainable than those of technological knowledge (except some know-how) that is affected by the life cycle of the industry or product (Nonaka 1994). Thus, addressing contingencies and consequences of this sharing at the subsidiary level becomes important.

Organizational knowledge contains declarative organizational knowledge as well as procedural organizational knowledge. Declarative knowledge is knowledge of explicit fact such as data and factual information while procedural knowledge is knowledge of *how* something occurs or is performed (Cohen 1991, Zack 1999). An example is bicycle riding. For a bicycle rider, traffic rules, road signs and functional parts (all are facts) are declarative. But knowing how to balance a bicycle is more procedural and tacit that may be learnt only through practice and difficult to explicitly codify. In the context of marketing, for instance, customer database, market analysis software, or pricing calculation formula may exemplify declarative knowledge while how to reach target consumers, how to increase market share in a particular host country, or how to differentiate products and services to suit a specific niche market are examples of procedural knowledge. In the context of dealing with host country governments, declarative knowledge may include, for instance, information on governmental policies, political power structure, regulatory organs, and officials' attitude toward MNEs. But procedural knowledge may involve how to get governmentally-regulated projects ratified, how to cultivate relationships with local authorities, or how to build the partnership with government institutions. Procedural knowledge is analogous to process and steps that can be learnt and compiled through interpreting declarative knowledge (Anderson 1982). It is a script and organized knowledge that describes an appropriate sequence of events or activities to fit a particular situation. In contrast declarative knowledge is represented explicitly and symbolically and should be independent of the methods used to perform inferences on it (Davenport/Prusak 1998).

For MNE subsidiaries, declarative organizational knowledge is notably reflected in explicit facts on functional practices such as pricing, hiring, marketing,

customer service, organizational structure, business policy, and performance evaluations. Procedural knowledge is generally reflected in problem solving expertise such as how to interpret and predict regulatory changes, how to deal with local governments, how to reduce foreign exchange risks, how to cope with local cultures, and how to improve local adaptations. For subsidiaries seeking organizational knowledge from peers in different locations, both declarative organizational knowledge and procedural organizational knowledge are important. Without declarative knowledge that provides conditions and facts of expertise or practice, procedural knowledge sharing will become blind duplication. Without procedural knowledge that provides specific solutions, declarative knowledge sharing will be an idle effort.

Knowledge sharing can be examined with respect to level, frequency, or content (Huber 1991, Robinson 1995). This study emphasizes the frequency for both theoretical and empirical reasons. Theoretically, frequency is an appropriate indicator of subsidiary effort for intra-network learning. Repeated exchanges allow a subunit to actually acquire and utilize organizational knowledge that is often hard to be fully assimilated through one-time transfer (Zack 1999). Moreover, frequent sharing allows human assets to develop from learning-by-doing and enhances organizational capacities through continued interactions (Nelson/Winter 1982). Because market conditions change in foreign markets and new products and services are constantly developed, knowledge may quickly become obsolete (Pearce 1992, Ruggles 1998). Frequency is imperative to upgrading organizational knowledge. Empirically, frequency seems to be an appropriate measure in cross-industry surveys. It is sometimes difficult for respondents to scale the "level" (e.g., no standard to define how high is 'high'). Content of organizational knowledge is also a difficult factor to be standardized or grouped across different industries. Our current dataset only enables us to examine this frequency and is not ready to diagnose the level or content of knowledge sharing. Future research may explore alternative composite measures that can capture level, content and quality of knowledge sharing.

Although knowledge sharing research has received great attention, few studies have explicated how knowledge sharing should be properly aligned with strategic needs and organizational conditions (Spender 1996, Boisot 2002). Many MNEs have become so complex that their knowledge is fragmented, difficult to locate and share, and therefore redundant, inconsistent or not used at all (Zack 1999). As one effort to fill this gap, this study emphasizes how to configure a subsidiary's peer-sharing of organizational knowledge with its strategic as well as infrastructural context. We argue that this sharing is not a spontaneous nor exogenous event. Rather it is a deliberate yet variable action, requiring architecturally coupling with strategic and infrastructural contexts. We define the strategic context as strategic links and needs, which are further revealed in strategic interdependence, technological linkage, and entry strategy. These strategic vari-

ables reflect how a nodal subsidiary is strategically linked with peer subsidiaries in various countries and, accordingly, the extent to which this subsidiary strategically needs knowledge sharing. We define the infrastructural context as conditions of organizational infrastructure in which knowledge sharing is proceeded. Three conditions are set forth: knowledge encapsulation, incentive system, and intranet infrastructure. These infrastructural variables reflect how effectively a nodal subsidiary's institutional mechanisms acquire, share, and absorb knowledge from other corporate members.

## **Strategic Context**

The potential for synergistic benefits from resource sharing varies across strategic context (Gupta/ Govindarajan 1986). This context is composed of strategic factors that determine the strategic link between corporate members (Nohria/ Ghoshal 1994). As elaborated below, strategic interdependence, technological linkage, and entry strategy are illustrations of this link. Inter-unit sharing of organizational knowledge is contingent on these strategic context variables because they determine a nodal subsidiary's strategic needs for knowledge sharing. Subsidiaries maintaining differing levels of strategic or technological linkage with peer subunits or using differing entry modes in foreign markets are likely to vary in their needs for organizational knowledge sharing. Subsidiaries with varying needs for this sharing are expected to maintain different frequencies or intensities of knowledge sharing.

### *Strategic Interdependence*

Strategic interdependence concerns the extent to which work processes that have strategic implications are interrelated so that changes in the state of one element affect changes in the others (Robinson 1995). The choice of international strategy largely depends on the degree of interrelationship among subsidiaries (Porter 1986). The rationale behind the influences of strategic interdependence on knowledge sharing can be traced to the distinct strategic roles of subsidiaries echoed in the literature of global strategy. Different subsidiaries are assigned different strategic roles (Bartlett/Ghoshal 1986, Hedlund 1994, Luo 1999, Jarillo/ Martinez 1990, White/Poynter 1984). Because MNEs differ in pursuing different strategies ranging from multi-domestic to global and transnational strategies (Bartlett/Ghoshal 1989), each subsidiary plays a specific role/task that fits into the overall corporate strategy (Taggart 1998). The strategic linkages of a subsidiary can be characterized by the degree or magnitude of the interdependent relationships between a given subsidiary and other subsidiaries. Operationally self-

sufficient and strategically independent subsidiaries are miniature replicas of the parent (Luo 1999, Pearce 1992). The linkage between them and the rest of corporate group will be weak. It is likely that they are not compelled to explore and exploit global learning because the need for sharing and transferring locally-accumulated knowledge is low. Whereas, a subsidiary tied closely to the global web of corporate activities exhibits a high degree of interdependence in the global web of value-chain (Gupta/Govindarajan 1986). The tight linkage of these subsidiaries with other subunits is epitomized in the frequent flows of resources and intermediate products such as parts and components in the productive integration between a subsidiary and the rest of the corporate members. This recurrent exchange that creates high degrees of interdependencies and reciprocal lines of communication calls for a high level of coordination among corporate entities (Roth/Morrison 1990). Therefore, it is likely that subsidiaries with a higher degree of strategic interdependence will more actively share organizational knowledge with peer subsidiaries. We thus propose:

*Hypothesis (H1).* For a nodal subsidiary, the frequency of sharing (a) declarative organizational knowledge and (b) procedural organizational knowledge with peer corporate members will be positively associated with the degree of its strategic interdependence with these members.

### *Entry Strategy*

According to transaction cost economics, a fully controlled entry mode such as a wholly-owned subsidiary is used to internalize the transfer of knowledge and proprietary assets due to the market imperfections (Hennart 1989, Williamson 1985). The literature of intra-MNE knowledge sharing has not yet clearly elucidated whether wholly-owned subsidiaries and joint ventures, the two primary equity-based entry modes with varying governance structures and control mechanisms, equally facilitate inter-unit sharing of declarative and procedural organizational knowledge. We argue that declarative knowledge sharing may be stronger in wholly-owned subsidiaries while procedural knowledge sharing may be stronger in joint ventures. In wholly-owned subsidiaries, business processes are tightly integrated and synchronized with parent corporations, and their organizational structure tends to be more centralized by the parent managers. Under this structure, parent managers monitor subsidiary operations and management by using bureaucratic-based and information-based control tools such as manuals, blueprints, and information systems (Zollo/Singh, 1998). These tools explicitly specify the rules and procedures that subsidiaries should follow. This suggests that sharing of declarative, rather than procedural, organizational knowledge with peer corporate members is likely to be more evident for wholly-owned subsidiaries.

In joint ventures, two or more cross-national and cross-organizational partners tend to have a large non-duplicative knowledge pool that complements the existing knowledge stock of the corporate network (Gupta/Govindarajan 1991, Inkpen/Dinur 1998). When one party acquires useful knowledge or practices from the other party, it is expected to share this with peer corporate members. As Doz (1996) and Inkpen and Dinur (1998) advocate, the joint venture is a vehicle to learn and gain a partner firm's knowledge, experience, or practices, which satisfies what the firm needs and complements what the firm has. In particular, this vehicle is established to acquire a partner's procedural or problem-solving knowledge that will then be shared and used by peer members within a globally coordinated MNE network (Almeida 1996, Appleyard 1996). Joint ventures involving one or sometime multiple partners with diverse cultural backgrounds, business practices, and philosophies naturally offer a fertile learning 'field of interaction' (Nonaka 1994, p. 19). Therefore, a joint venture party tends to share acquired know-how and information with its parent firms and peer subsidiaries which may in turn 'filter' the data and recombine them with their own knowledge to leverage in other markets (Khanna/Gulati/Nohria 1998). We thus expect:

*Hypothesis (H2).* (a) Declarative organizational knowledge will be more frequently shared in wholly-owned subsidiaries and (b) procedural organizational knowledge will be more frequently shared in joint venture subsidiaries.

### *Technological Linkage*

Sharing organizational knowledge is inextricable from technological linkage of a subsidiary with other corporate members. Technological linkage concerns the extent to which a nodal subsidiary's innovation and production is reliant upon technological knowledge or assistance offered by other subsidiaries. While strategic interdependence is largely shaped by subsidiary roles assigned by parent firms, technological linkage is mainly determined by operational needs of the nodal subsidiary itself. Technological tasks and new product development in a given subsidiary can hardly be accomplished sufficiently without borrowing the technology and know-how that originated in other corporate members (Granstrand/Håkanson/Sjolander 1993). Acquisition and supply of technology necessitates significant sharing of follow-up organizational guidance and practice to ensure that the technology is adequately exploited. Many elements of organizational knowledge are about organizing firm production, operation, and management activities such that productivity is improved (Nonaka/Takeuchi 1995). When a subsidiary closely linked with corporate group's technology, it will demand more procedural organizational knowledge from peer firms about how to integrate the



transferred technology with the firm's own value-adding process and how to organize aftermath operations and management to maximize technology-derived gains (Caraca/Simoes 1995). Aftermath procedural knowledge such as information control, data management, and workforce motivation enhances managerial innovation, which links technology to firm performance (Dixon 2000, Spender 1996). Following the above reasoning, we therefore hypothesize:

*Hypothesis (H3).* For a nodal subsidiary, the frequency of sharing procedural organizational knowledge with peer corporate members will be positively associated with the degree of technology linkage on these members.

### Infrastructure Context

When knowledge is seen as a dynamic process, a proper infrastructure that facilitates knowledge sharing becomes critical (Ruggles 1998). In addition to the social settings in the form of social ties (Hansen 1999) and social interactions (Tsai/Ghoshal 1998, Weiss 1998) that facilitate knowledge exchange within firms and between firms, firms need to create an organizational infrastructure to nurture and unleash knowledge exploitation. Companies that build a strong knowledge-sharing infrastructure can quickly transform new knowledge into productive results, thus gaining a new competitive edge (Prahalad/Hamel 1990). Extant research generally agrees that an intranet system, rewarding system, and knowledge encapsulation system are critical components of firm-level infrastructure that affects knowledge flow and sharing within a diversified yet integrated MNE (Ghoshal/Bartlett 1988, Goold/Campbell/Alexander 1994, Kostova 1999, Roth/Morrison, 1990). Superior conditions in these infrastructures bolster a firm's ability to share and absorb new knowledge. Without an intranet infrastructure, a subsidiary cannot promptly access and smoothly share peer member knowledge. And, without an incentive infrastructure, a subsidiary cannot create a learning culture and maintain a learning environment within the firm. Without an encapsulation system, a subsidiary cannot transform shared knowledge into productive results and sustained values.

#### *Knowledge Encapsulation*

Knowledge encapsulation is a routinized process of encoding, storing, and converting knowledge into a retrievable and sharable form. It is interrelated to yet different from tacit knowledge. Transferring or sharing tacit knowledge always requires knowledge encapsulation. Nevertheless, tacit knowledge connotes the nature or type of knowledge concerning the explicitness, and is hard to articu-

late. Knowledge encapsulation refers to a mechanical procedure to store and document knowledge and information for subsequent use and exchange. Organizations that institutionalize systematic practice of documenting lay a readily-available base for sharing knowledge. Encapsulating makes knowledge possible and easier to disseminate rapidly and widely within the organization.

An important goal of a learning organization is to capture knowledge by converting tacit knowledge to explicit knowledge so that it can be more easily shared (Inkpen/Dimur 1998). This system is critical to organizational knowledge sharing because many elements of declarative or procedural organizational knowledge are implicit and tacit (Ruggles 1998). Firms need an internalized system to convert tacit organizational knowledge into explicit knowledge (Nonaka 1994). Encapsulation involves a systematic and structural documentation of information to develop a repository for collective insights contained within policies, procedures, routines, and rules that can be retrieved when needed (Day 1994, p. 44). Encoding, refining, storing, and retrieving help transform implicit organizational knowledge into explicit, shareable information that links upstream repository creation to downstream knowledge distribution and sharing. Because knowledge is inherently created by and resides in individuals in various locations (Nonaka/Takeuchi 1995), retaining created knowledge through the cultivation of organizational memory is fundamental to companies that intend to establish, grow, and nurture learning organizations. The organizational memory perspective suggests that the collective activities of organizations to process, use and store information lead to the creation of organizational memory in the form of shared beliefs, values, norms, and behaviors (Levitt/March 1988, Walsh/Ungson 1991). Thus, preserving organizational memory via rules, procedures, files, and professional practices accumulates knowledge. In particular, organizational knowledge, practice, and experience can be preserved and retrieved from organization memory even when key organizational members leave (Huber 1991, Walsh/Ungson 1991).

Codifying and documenting may capture only part of tacit knowledge because of the context-dependent and unstandardized nature of tacit knowledge (Dixon 2000). Nevertheless, because tacit knowledge is of high viscosity (Davenport/Prusak 1998), firms can rationalize, routinize, and synthesize this type of knowledge. Encapsulated knowledge then becomes the repertoire to be shared among organizational units (Meindl/Stubbart/Porac 1994). Within an MNE network, also known as a "knowledge-sharing community" (Kogut/Zander 1992, Zander/Kogut 1995), organizational knowledge sharing is expected to heighten when knowledge encapsulation infrastructure is advanced. Although parent firms are mainly responsible for building and structuring this infrastructure, subsidiaries are primary users and direct beneficiaries of this system. To the extent that if a knowledge sharing system within an MNE community is productive and beneficial, a nodal subsidiary will be willing to make the efforts in knowledge

encapsulation. This suggests that the degree of knowledge encapsulated at a nodal subsidiary enhances organizational knowledge shareability, and the frequency of knowledge sharing. We therefore suggest:

*Hypothesis (H4).* For a nodal subsidiary, the frequency of sharing (a) procedural organizational knowledge and (b) declarative organizational knowledge with peer corporate members will be positively associated with the degree of knowledge encapsulated by this subsidiary

### *Intranet System*

As MNEs increasingly rely on information technology to transfer knowledge within geographically dispersed businesses, the intranet constitutes an important part of the knowledge sharing infrastructure within an organization. From the information process view, an intranet system becomes a base mechanism for intraorganizational exchanges (Ciborra/Jelassi 1994). As an information platform, the intranet system connects intra-corporate users scattered across nations. As a centerpiece of information technology hardware it also boosts interactive learning and sharing (Bernard 1996). The system determines how promptly local managers can gain information, guidance, and experience from the rest of the MNE network. It thus affects information costs for offshore activities as well as payoffs resulting from appropriate decisions about local operations. As the intranet serves as an information platform, the intranet infrastructure provides a seamless pipeline for the flow of declarative and procedural knowledge. Without this infrastructure, an MNE network will be short a supporting system for knowledge repository, distribution, refinement, and sharing (Alavi/Leidner 1999, Cohen 1991, Zack 1999). A well-established and functional intranet system also renders flexibility such that multiple contexts of use can simultaneously occur. More specifically, dissemination of declarative, factual knowledge within a stable community can be accomplished through access to a central electronic repository. Interactive modules in an intranet system such as emails, discussion databases, and video conferencing stimulate intraorganizational sharing of information and knowledge. In any event, the development and use of an intranet system facilitates intra-MNE knowledge sharing. We hence hypothesize:

*Hypothesis (H5).* For a nodal subsidiary, the frequency of sharing (a) procedural organizational knowledge and (b) declarative organizational knowledge with peer corporate members will be positively associated with the development and use of an intranet system.

### *Incentive System*

Organizational knowledge sharing is promoted in an internal context in which individuals or groups are recognized and rewarded for sharing their ideas and expertise with other members within the organization (Garvin 1993). People tend to enjoy frequent feedback and recognition for their work (Argyris 1991). Individual employees may be reluctant to share their knowledge within the firm if their learning efforts are not recognized and rewarded. Thus, the existence of incentives is important because a knowledge generator may be hesitant to share his or her knowledge if not being adequately rewarded and recognized. Previous research indicates firms face challenges to motivate self-interested employees to share valuable knowledge with others (Wood/Gray 1991). The unwillingness to share both procedural and declarative knowledge is attributed to the lack of incentive that prevents recipients from seeking knowledge (Goold/Campbell/Alexander 1994). A recent survey also reveals that human inertia is the single biggest barrier to knowledge sharing (Wah 1999). This suggests that organizational commitment to rewarding and recognizing knowledge sharing within a network is likely associated with frequent occurrence of knowledge sharing at the subsidiary level. Local employees are likely to treat knowledge sharing as unnecessary or secondary to their jobs if no incentives are explicitly given for contributions to the accumulation, learning, and sharing of information and knowledge. Executives can encourage exchange of ideas such as best practices and international experience (declarative knowledge) and stimulate sharing of problem-solving techniques such as building relationships with business community and winning competitions with local rivals (procedural knowledge) by institutionalized reward and credit-taking mechanisms (Gupta/Govindaraj 2000, Levitt/March 1988, Kogut/Zander 1992). We thus postulate:

*Hypothesis (H6).* For a nodal subsidiary, the frequency of sharing (a) procedural organizational knowledge and (b) declarative organizational knowledge with peer corporate members will be positively associated with the development of its reward system for this sharing.

## **Methods**

### **Empirical Setting**

Given the facts that this study emphasizes subsidiary-level knowledge sharing and that emerging markets have become the prominent hosts of MNE subsidi-

aries, this study chose MNE subsidiaries operating in the largest foreign emerging market (China) as its empirical setting. Economic reforms have advanced China's integration with the world economy, maintained its strong external payments position, liberalized the markets for many goods and services, and intensified industrial competition. China's per capita income has more than quadrupled since 1981 and real growth in GDP has averaged nine percent per year. For a country whose population exceeds that of Sub-Sahara Africa and Latin America combined, this has been a remarkable development. Market-based transactions now dominate the Chinese economy, with over 90 percent of retail prices and 80 percent of production and agricultural prices being determined by the market. China has also been absorbing enormous amounts of foreign investments over the past two decades, with an accumulated amount of US\$ 349 billion by the end of 2000. More than US\$ 100 million foreign capital is now being invested daily in China. From a research perspective, MNE subsidiaries in a dynamic Chinese environment offer a rich setting for a test of determinants and importance of organizational knowledge sharing. Foreign subsidiaries depend, for defensive or offensive reasons, on organizational knowledge from peer members to solidify their competitive position there. Compared with other emerging economies, as in Eastern Europe and the former Soviet republics, MNE operations in China are much more sophisticated in both scale and scope, allowing for examination of a diverse range of issues.

## Data and Sample

To verify our hypotheses, this study used archival and survey data. Archival information was used to measure some antecedent and control variables while the multi-source survey information was used to measure concurrent and consequent variables and the rest of the antecedent variables. We used foreign subsidiaries located in Shanghai as the sample population. The sample of 602 foreign subsidiaries was chosen from the database of the Shanghai Foreign Investment Commission and the Foreign Investment Association, based on the following selection criteria, after consulting with several scholars in this area and with local officials in charge of foreign investment approval. First, we limited our sample to foreign subsidiaries from North America, Japan and Western Europe. This focus also serves the purpose of examining the differences between Japanese firms and Western firms in knowledge sharing as suggested by Hedlund and Nonaka (1993). Second, we restricted our sample to manufacturing subsidiaries in industries that depend more on knowledge sharing with peer subsidiaries (e.g., electronic/electrical, automobile, machinery, telecommunication, pharmaceuticals, instruments). Service subsidiaries in China are relatively few and have a different knowledge sharing behavior.

To mitigate possible threats arising from single rater-related common method variance, we split questionnaire items and sent them to different informants of each sample firm. Subsidiary CEOs are primary informants who responded to the most survey questions, while senior marketing, financial, and information technology managers filled in sales, financial, and intranet information (in separate parts). Subsidiary CEOs are appropriate respondents because they are the brokers of knowledge sharing within an MNE network (Snow/Thomas 1993, McGee/Thomas 1986). Our cover letter explained our research purpose, defined major concepts and terms, specified the importance of accurate estimates, and addressed response confidentiality. To mitigate possible measurement errors and maximize content validity, the questionnaire was developed through an iterative process of drafting, pilot-testing and redrafting as suggested by DeVellis (1991). After the first draft, the pilot questionnaires were pre-tested through field interviews of six executives of subsidiaries. The feedback from this pilot test was then incorporated into redrafting the final questionnaire. The survey was administered in collaboration with the Sun Glorial School of Management of The Eastern China University, which provided graduate assistants in conducting mailing and tracking. To ensure accurate translation and achieve conceptual equivalence (Iyengar 1983), the survey was originally developed in English and then translated into Chinese by a bilingual professor in management and cross-checked by two local Chinese who are bilingual and work for MNEs in China. We then mailed a bilingual questionnaire with the English version on front of the pages and the translated Chinese on the back pages. After follow-up reminders, 136 questionnaires were returned out of 602 samples. After omitting those missing important information, we were left with 121 usable questionnaires, yielding an approximately 20 percent effective response rate.

Based on the database of the Shanghai Foreign Investment Commission and the Foreign Investment Association, we checked the nonresponse bias. From this database we were able to compare some subsidiary attributes between responding and non-responding firms identified by a code number we initially stamped on each questionnaire. The mean differences between respondents and non-respondents with respect to the number of employees, length of operations, and sales were tested using an unpaired *t*-test. No systematic differences were found between the responded and the nonresponded from this test. In order to check the representativeness of the sample, the mean of the project size of the sample firms was compared with national FDI population in the same industry sector, using information obtained from the *China Statistical Yearbook*. The national average is \$1.73 million as compared to the sample average of \$1.81 million. The *t*-test results were insignificant, suggesting no bias from the population in terms of investment size.

## Variable Measurement

Variables, measurements, and internal consistency for multi-item constructs are presented in Table 1. Wherever possible, we either borrowed the instruments used in prior studies or adapted instruments based on theoretical reasoning to measure these constructs in the context of China. Frequency of declarative knowledge sharing was measured on a 5-point scale where medium (scale =3) was defined as once per month. The average obtained from our pre-survey field studies was 2.7. The Cronbach's alpha for declarative organizational knowledge was 0.77 suggesting satisfactory internal consistency of this construct and appropriateness of sub-items behind. We varied the frequency of procedural knowledge sharing by asking how rare/often, since we had found in our pre-survey interviews some respondents expressed difficulties in indicating the above frequency for this type of knowledge sharing. For procedural organizational knowledge, Cronbach's alpha was 0.83 and communality estimates were above 0.63, thus validating the reliability and item-dimensionality of this variable.

To further check common method variance associated with the link between proposed antecedents and knowledge sharing, we conducted a global factor analysis (Appendix I). As shown in this appendix, neither all variables were loaded in a single factor nor did any single factor dominantly accounted for the majority of the variance, suggesting that serious common method variance threats were not present (Podsakoff/Organ, 1986). Using archival data to measure entry mode strategy (a proposed antecedent) and most control variables also helped reduce such threats. Appendix I also displays that various sub-items were properly loaded in proposed factors (variables).

## Results

Table 2 presents mean, standard deviation, and Pearson correlation matrix for all variables in this study. We checked multicollinearity in the regression models by examining the variance inflation factors (VIF) for each independent variable. The VIF values in our models ranged from 1.0 to 8.0, suggesting that multicollinearity does not pose a concern. To verify the hypotheses (*Hypothesis 1–Hypothesis 6*) and see how much additional variance was explained by strategic and infrastructure variables, we conducted a hierarchical regression analysis (Table 3). As the results in Table 3 show, the coefficients for strategic interdependence and technology dependence are positive and significant in relation to both declarative and procedural knowledge sharing ( $p < 0.05$  or lower). This suggests that high levels of strategic integration and technology dependence lead to fre-

**Table 1.** Description of Measurements and Sources

Variable, Source & Reference	Communality/Alpha
<i>Declarative knowledge</i> (Egelhoff 1982, 1991, Gupta/Govindarajan 1986) (How often do you engage in the exchange of the following factual information (i.e. data, related documents, etc.) using phone, fax, email and other means with peer subsidiaries and headquarters?) Scale: 1 = 6 months; 2 = quarterly; 3 = monthly; 4 = biweekly; 5 = weekly	Cronbach $\alpha = 0.77$
on price changes	0.675
on local hiring	0.633
on marketing data	0.747
on product/service adaptation	0.747
on performance evaluation	0.533
Source: subsidiary CEOs	
<i>Procedural Knowledge</i> (How often do you engage in exchange of your expertise and know-how (i.e. procedures, advice, tips, etc.) in the following areas using phone, fax, email and other means with peer subsidiaries and headquarters?) Scale: 1 = very rare; 2 = rare; 3 = medium; 4 = often; 5 = very often	Cronbach $\alpha = 0.83$
resolving business process/practice issues (e.g. exchange control/remittance)	0.689
fostering a relationships with local government	0.743
understanding the local government policies	0.794
coping with cultural/social issues	0.823
interpreting changes in political/legal issues and events	0.633
Source: subsidiary CEOs	
<i>Strategic Interdependence</i> (Kobrin 1991, Barlett/Goshal 1987, Egelhoff 1988) (Use the following scale to indicate the degree of interdependence between your subsidiary and the rest of the corporate units). Scale: 5-point: 1 = extremely low to 5 = extremely high	Cronbach $\alpha = 0.73$
Integration of purchasing with peer subsidiaries	0.813
Integration of manufacturing process with peer subsidiaries	0.734
Integration of marketing activities with peer subsidiaries	0.770
Overall interdependence with peer subsidiaries	0.660
Source: subsidiary CEOs	
<i>Technology linkage</i> (Lyles & Salk 1996) (Use the following scale to indicate the degree of technological acquisition from and supply of your subsidiary with the rest of the corporate units). Scale: 5-point: 1 = extremely low to 5 = extremely high	Cronbach $\alpha = 0.74$
product-related technology from peer subsidiaries	0.749
process-related technology from peer subsidiaries	0.684
manufacturing support by peer subsidiaries	0.630
Source: subsidiary CEOs	
<i>Entry Strategy</i> 1 = wholly-owned; 0 = otherwise (joint venture) Source: local archive	
<i>Knowledge Encapsulation</i> (Kogut/Zander 1992, 1993, Hansen 1999) (Use the scale to evaluate how well your subsidiary systematically and routinely stores the knowledge and information) Scale: 1 = not documented; 2 = not well documented; 3 = somewhat documented; 4 = documented but no systematic; 5 = very well documented	Cronbach $\alpha = 0.80$



**Table 1.** Description of Measurements and Sources (Continuation)

Variable, Source & Reference	Communality/Alpha
from the network is encoded, stored and converted	0.735
transmitted to the network is encoded, stored and converted	0.589
All business practices/information/know-how are routinely documented	0.661
<i>Source: subsidiary CEOs</i>	
<i>Incentive System (Slater 1973, Pucik 1991, Gupta/Govindarajan 2000)</i>	
A. Is there a formal system or practice in your company that recognizes and rewards employees for sharing ideas and information with others? (1 if yes; 0 otherwise)	
B. Is there a formal system or practice in your company that publicizes or praises openly employee's efforts of helping each other to resolve problems? (1 if yes, 0 otherwise)	
<i>Source: Subsidiary CEOs</i>	
<i>Intranet systems (Ciborra/Patriotta 1996, Tsoukas 1996, Romm et al. 1996)</i>	
Cronbach $\alpha = 0.82$	
(Use the given scale to evaluate the following items about the utility of the intranet system)	
Scale (5-point: 1 = extremely low to 5 = extremely high)	
your employees' accessibility to the company intranet	0.832
use of intranet by employees to exchange (post & brainstorm) ideas and problems	0.709
use of intranet for transmitting routine information with other corporate members	0.669
<i>Source: IT managers</i>	
<i>Covariates (source: R&amp;D from survey and all others from local archive)</i>	
Capital Intensity: invested capital over number of employees	
R&D: last 3-year average of R&D spending to sales	
Age: number of years operating in China	
Industry: 1 = electronics/telecommunication; 0 = other	
Country of Origin: 1 = Western firms; 0 = Japanese firms	

\* Local archive refers to the database compiled by the Shanghai Foreign Investment Commission and the Foreign Investment Association.

quent knowledge sharing. *Hypothesis 1* and *Hypothesis 3* are supported. For entry mode, *Hypothesis 2b* is supported but *Hypothesis 2a* is not. The coefficient of entry mode is positive and significant for declarative knowledge ( $p < 0.05$ ) but is non-significant for procedural knowledge. This implies that the frequency of sharing declarative organizational knowledge is positively associated with the wholly-owned subsidiary mode. But sharing procedural organizational knowledge is not influenced by the entry mode choice. While this result implies that there is no difference between joint venture and wholly-owned modes in sharing procedural knowledge, it is also possible that there is an additional need for sharing declarative knowledge in joint ventures since the discourse in the context of joint ventures needs to be made more explicit and direct.

Turning to infrastructure context variables, we found that the coefficients of both knowledge encapsulation and intranet systems are positive and significant for both declarative and procedural knowledge ( $p < 0.05$  or lower), indicating that enhanced encapsulation and intranet systems are positively related to knowl-

Table 2. Descriptive Statistics and Correlation Matrix

Variables	Mean	St.D.	1	2	3	4	5	6	7	8	9	10	11	12
1. Procedural knowledge	3.82	1.03												
2. Declarative knowledge	4.54	1.24	0.11											
3. Strategic interdependence	3.89	1.76	0.31**	0.20										
4. Technological linkage	4.33	2.36	0.16	0.24**	0.14									
5. Entry strategy	0.39	0.48	0.13	0.18	0.13	0.12								
6. Incentive system	0.67	0.78	0.36**	0.25*	0.09	0.09	0.10							
7. Intranet system	3.72	1.02	0.24*	0.34**	0.16	0.13	0.06	0.13						
8. Encapsulation	4.03	0.75	0.46**	0.21*	0.07	0.05	0.17	0.05	0.19					
9. Capital Intensity	8.39	14.76	0.14	0.11	0.35	0.17	0.25*	0.04	0.15	0.10				
10. R&D	4.07	0.99	0.12	0.19	0.22*	0.37**	0.22*	0.12	0.13	0.19	0.21*			
11. Country-of-origin	0.42	0.47	0.25*	0.12	0.16	0.20	0.16	0.10	0.05	0.06	0.11	0.17		
12. Industry	0.44	0.49	0.12	0.09	0.20	0.32**	0.08	0.07	0.16	0.17	0.14	0.22*	0.28**	
13. Age	6.40	3.62	0.06	0.11	0.13	0.04	0.16	0.07	0.10	0.18	0.21*	0.13	0.10	0.04

\* p < 0.05; \*\*p < 0.01.



**Table 3.** Antecedents of Organizational Knowledge Sharing: Hierarchical Regression Analysis

	Declarative Knowledge			Procedural Knowledge		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<i>Strategic Context</i>						
Strategic Interdependence	0.42**	0.45**	0.32**	0.32**	0.45**	0.26*
Technology Linkage	0.37**	0.30**	0.30**	0.24*	0.26*	0.43**
Entry mode (wholly-owned)	0.29*	0.24*	0.28*	0.14	0.12	0.19
<i>Infrastructure Context</i>						
Knowledge Encapsulation		0.27**	0.21*		0.30**	0.29**
Incentive System		0.20	0.14		0.29**	0.23*
Intranet System		0.23*	0.26*		0.25*	0.27*
<i>Control Variables</i>						
Country-of-origin (Western)			0.23*			-0.22*
Capital Intensity			0.25*			0.11
R&D			0.12			0.15
Age			0.18			0.14
Industry			0.17			0.09
Adjusted R <sup>2</sup>	0.22	0.47	0.56	0.19	0.34	0.41
Adjusted $\Delta R^2$		0.25	0.09		0.15	0.07
$\Delta F$		6.25**	3.66***		5.25**	4.58**

The values in the columns are standardized coefficients with \*\*  $p < 0.01$ ; \*  $p < 0.05$

edge sharing between a nodal subsidiary and the rest of the MNE network. This evidence corroborates *Hypothesis 4* and *Hypothesis 5*. However, we want to caution that this finding only suggests a positive relationship between knowledge encapsulation or intranet system and knowledge sharing, and cannot demonstrate real causality between them due to our data limitation (reverse causality is possible here since frequent knowledge sharing may heighten intranet communication, for instance). As for incentive systems, the results are mixed. This finding lends support to *Hypothesis 6a* but not *Hypothesis 6b*. This variable is found to be nonsignificant in relation to declarative knowledge sharing but to exert a significantly positive effect on procedural knowledge sharing. This mixed finding may be changed if the absorptive capacity factor is also considered in the model, since providing incentives to employees for sharing knowledge within the business entity may also help increase the overall absorptive capacity of the firm.

Among the control variables, the coefficients of Age and Industry show no significant impacts on either types of knowledge sharing. Capital intensity (\$ investment per employee) is positively associated with declarative knowledge sharing only, suggesting that subsidiaries that committed larger amount of capital are more inclined to share declarative knowledge more frequently. The variable of country-of-origin turned out to be significantly associated with both declarative and procedural knowledge sharing but in opposite directions. It is worth noting that the result of *t*-test between the Western and Japanese firms confirms this

finding. The Western and Japanese subsidiaries differed significantly in both declarative knowledge sharing ( $t = 2.395, p < 0.05$ ) and procedural knowledge sharing ( $t = -2.26, p < 0.05$ ). The positive coefficient of country-of-origin suggests that Western subsidiaries as compared to Japanese subsidiaries are more likely to frequently share declarative knowledge (factual and explicit knowledge) with their parents and peer subsidiaries, whereas the Japanese subsidiaries are more inclined to engage in exchange of procedural knowledge.

## Discussion and Conclusion

This study addresses the antecedents of inter-unit sharing of organizational knowledge in the context of foreign subsidiaries. It emphasizes how intracorporate dynamics affect a subsidiary's sharing of organizational knowledge with the rest of the MNE network. Based on knowledge-based theory, this study identifies two sets of organizational antecedents that influence a nodal subsidiary's knowledge sharing: strategic context (strategic interdependence, technological linkage, and entry mode) and infrastructure context (knowledge encapsulation, incentive system, and intranet system). Overall, our analysis confirms that these antecedents shape organizational knowledge sharing at the subsidiary level. Compared to technological knowledge sharing, organizational knowledge sharing has been inadequately assessed in the literature. Strategic context variables explain how a nodal subsidiary is strategically linked to the MNE network (parent and peer subsidiaries). They define the extent to which this subsidiary depends on the internalized network to neutralize external threats in a foreign country or leverage network resources for more returns in a new territory. Infrastructure context variables explain how a focal subsidiary is organizationally prepared for transferring, acquiring, converting, and exploiting knowledge exchanged with the MNE network. They define the extent to which this subsidiary institutionalizes knowledge sharing mechanisms to nourish a learning environment in the form of sharing.

This study distinguishes between declarative organizational knowledge sharing and procedural organizational knowledge sharing. Our analysis demonstrates that with the exception of incentive system all the strategic and infrastructural variables we proposed were significantly associated with declarative knowledge sharing and that all these variables except entry mode impact procedural knowledge sharing. We also find that MNEs from different regions are not isomorphic in sharing declarative or procedural knowledge. For instance, subsidiaries of Western MNEs tend to emphasize declarative knowledge sharing whereas those of Japanese MNEs focus on procedural knowledge exchanges. Capital intensive

subsidiaries also present more frequent sharing of declarative, but not procedural, organizational knowledge. These results suggest that declarative knowledge and procedural knowledge are distinct such that not every organization should mimic the same behavior when sharing these two types of knowledge; and that not every antecedent we identified would function in the same way or with the same magnitude within the organization.

Our analysis may also have several implications on MNE research. First, our findings infer that intracorporate knowledge sharing could help curb indigenous resource dependence or overcome external challenges. From the resource dependence perspective, this sharing partly shifts dependence from local resources to network resources. Second, we demonstrate that knowledge sharing is contingent on the strategic context that links a nodal subsidiary with the MNE network. An individual subsidiary's strategic interdependence and technology linkages with the parent firm and peer members are part of a global integration design that should be configured with knowledge deployment design. MNE capabilities need to be allocated such that knowledge sharing stimulations are aligned with the level of strategic integration between a nodal subsidiary and the MNE system. Finally, the organizational or administrative infrastructure in which a nodal subsidiary organizes its economic activities serves as a fundamental condition under which its knowledge sharing proceeds. Complementary to the view that an MNE is a globally coordinated social community which can serve as an efficient channel for knowledge flows (Ghoshal/Bartlett 1988, Kostova 1999), we document the importance of organizational infrastructure in fostering knowledge flow within this community. Knowledge sharing will not arise from vacuum but relies on incentive, intranet, and encapsulation systems that are embedded in organizational routines. Since a superior infrastructure nurtures knowledge sharing, MNEs should help globally dispersed subsidiaries to develop or advance this infrastructure so that both parent firms and overseas subunits will benefit from knowledge flows and exchanges.

Several limitations should be addressed by future research. First, this study examined knowledge sharing only at the subsidiary level. We do not know the antecedents as well as consequences of intra-MNE knowledge sharing at the corporate level. Future research should investigate how parent-level characteristics or strategic attributes may determine the level or pattern of knowledge sharing. For MNEs using a regional headquarters structure, an insightful appraisal of how knowledge sharing occurs within a focal region as well as across regions is also warranted. Second, our research design focused on the frequency of sharing and did not articulate the structure and process of sharing. Despite its complexity, the structure and process of intracorporate sharing is an important research question because it tells where structural holes or centers of excellence are in providing value-added knowledge to a nodal subsidiary. Examining how a nodal subsidiary is strategically interrelated to such holes or centers and what aspects

of organizational knowledge from these centers are particularly useful should be strongly encouraged. Third, this study did not further differentiate organizational knowledge based on functions (market vs. product) or setting embeddedness (local vs. global). One may propose that knowledge sharing for a specific subsidiary may vary between market and product knowledge or between local and global knowledge. Finding these insights can advance the content-based research of knowledge sharing. Fourth, our study did not include social factors in the research design. Future studies may integrate social demographic factors such as tenure of subsidiary executives in the research to empirically isolate the influences of socialization aspect of sharing. Integrating individual and firm level factors could provide more insights to the understanding of knowledge sharing. Fifth, since knowledge is conceived as a key inimitable capability by which firms sustain competitive advantage, the relationship between knowledge sharing and the subsidiary performance should be examined in future studies in conjunction with the analysis of fit between information-process capacity and information-process requirements (Egelhoff 1982). Sixth, our dataset is cross-sectional rather than longitudinal, thus raising difficulty in identifying causality between some antecedents (e.g., knowledge encapsulation and intranet system) and knowledge sharing. Using longitudinal information to further check this causality is warranted. Finally, this study used sample firms from a single foreign country to test our hypotheses. To redress this limitation, future studies may empirically verify related propositions based on a larger sample from multiple countries and using archival or secondary data to operationalize objective measures.

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**Appendix 1.** Global Factor Analysis of Survey Items

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
<i>Declarative knowledge</i>						
prices changes	0.845					
human resource	0.828					
marketing	0.754					
product development	0.738					
performance evaluation	0.684					
% of variance	14.59					
eigenvalue	2.91					
<i>Procedural knowledge</i>						
resolve business process/practice issues		0.838				
foster a relationships with local government		0.818				
understand the local government policies		0.745				
interpret and coping with cultural/social issues		0.667				
interpret changes in political/legal issues and events		0.559				
% of variance:		14.11				
eigenvalue:		2.82				
<i>Strategic interdependence</i>						
purchasing			0.852			
manufacturing process			0.731			
marketing activities up			0.666			
Overall integrated			0.625			
% of variance:			12.69			
eigenvalue:			2.55			
<i>Intranet systems</i>						
The degree of your emplyee's accessibility to intranet				0.857		
The extensiveness of using intranet in transferring information				0.760		
The extensive use of intranet in posting/brainstroming ideas				0.708		
% variance:				11.61		
eigenvalue:				2.42		
<i>Technology linkage</i>						
dependence on product-related technology					0.863	
dependence on process-related technology					0.637	
dependence on manufacturing support					0.688	
% variance:					10.59	
eigenvalue:					2.10	
<i>Knowledge Encapsulation</i>						
knowledge received is encoded, stored and converted						0.768
knowledge transmitted is encoded, stored and converted						0.666
business practices/know-how are routinely documented						0.569
% of variance:						9.34
eigenvalue:						1.89

## References

- Alavi M./Leidner, D. E., Knowledge Management Systems: Issues, Challenges and Benefits, *Communication Association, Information Systems*, 1, 7, 1999, pp. 1–37.
- Almeida P., Knowledge Sourcing by Foreign Multinationals: Patent Citation Analysis in the U.S. Semiconductor industry, *Strategic Management Journal*, 17, 1996, pp. 155–165.
- Anderson, J. R., Acquisition of Cognitive Skill, *Psychological Review*, 89, 1982, pp. 369–460.
- Appleyard M. M., How Does Knowledge Flow? Interfirm Patterns in the Semiconductor Industry, *Strategic Management Journal*, 17, 1996, pp. 137–154.
- Argyris C., Teaching Smart People How to Learn, *Harvard Business Review*, May–June 1991, pp. 99–109.
- Bartlett C. A./Ghoshal, S., *Managing Across Borders: The Transnational Solution*, Boston, MA: Harvard Business School Press 1989.
- Bartlett C. A./Ghoshal, S., Tap Your Subsidiaries for Global Reach, *Harvard Business Review*, 1986, pp. 87–94.
- Bartlett C. A./Ghoshal, S., Managing Across Borders: New Organizational Responses, *Sloan Management Review*, Fall 1987, pp. 45–53.
- Bernard, R., *The Corporate Intranet*, New York: John & Wiley & Sons 1996
- Birkinshaw, J./Morrison, A. J., Configurations of Strategy and Structure in Subsidiaries of Multinational Corporations, *Journal of International Business Studies*, 26, 1995, pp. 729–754.
- Boisot, M., The Creation and Sharing Knowledge, in Choo, C. W./Bontis, N. (eds.), *The Strategic Management of Intellectual Capital and Organizational Knowledge*, Oxford: Oxford University Press 2002, pp. 65–78.
- Buckley P. J./Carter, M. J., Managing Cross-Boarder Complementary Knowledge, *International Studies of Management & Organization*, 29, 1999, pp. 80–104.
- Caraca, J. M. G./Simões, V. C., The New Economy and Its Implications for International Organizations, in Schiattarella, R. (ed.), *New Challenges for European and International Business*, Proceedings of the EIBA Conference, Urbino 1995, pp. 257–282.
- Ciborra, C./Patriotta, G., Groupware and Teamwork in New Product Development: The Case of a Consumer Goods Multinational, in Ciborra, C. (ed.), *Groupware and teamwork*, New York: John Wiley 1996, pp. 121–144.
- Ciborra, C./Jelassi, T., *Strategic Information Systems: A European Perspective*, New York: John Wiley 1994.
- Cohen, M. D., Individual Learning and Organizational Routine: Emerging Connections, *Organization Science*, 2, 1991, pp. 135–139.
- Conner, K. R./Prahalad, C. K., A Resource-Based Theory of the Firm: Knowledge versus Opportunism, *Organization Science*, 7, 1996, pp. 477–501.
- Davenport, T. H./Prusak, J., *Working Knowledge: How Organizations Manage What They Know*, Boston, MA: Harvard Business School Press 1998.
- Day, G. S., The Capabilities of Market-Driven Organizations, *Journal of Marketing*, 58, 1994, pp. 37–52.
- DeVallis, R. F., *Scale Development: Theory and Applications*, London: Sage 1991.
- Dixon, N. M., *Common Knowledge: How Companies Thrive by Sharing What They Know*, Boston, MA: Harvard Business Press 2000.
- Doz, Y. L., The Evolution of Cooperation in Strategic Alliances: Initial Conditions or Learning Processes?, *Strategic Management Journal*, 17, 1996, pp. 55–83.
- Dunning, J., *Multinational Enterprises and the Global Economy*, New York: Addison-Wesley 1995.
- Egelhoff, W. G., Strategy and Structure in Multinational Corporations: An Information-Processing Approach, *Administrative Science Quarterly*, 27, 1982, pp. 435–458.
- Egelhoff, W. G., Strategy and Structure in Multinational Corporations: A Revision of the Stopford and Wells Model, *Strategic Management Journal*, 9, 1988, pp. 1–14.
- Egelhoff, W. G., Information-Processing Theory and the Multinational Enterprise, *Journal of International Business Studies*, Third Quarter, 1991, pp. 341–368.
- Eisenhardt, K. M./Behnam, N. T., Accelerating Adaptive Processes: Product Innovation in the Global Computer Industry, *Administrative Science Quarterly*, 40, 1995, pp. 84–110.



- Garvin, D. A., Building a Learning Organization, *Harvard Business Review*, 71, 1983, pp. 78–91.
- Ghoshal, S., Global Strategy: An Organizing Framework, *Strategic Management Journal*, 8, 1987, pp. 425–440.
- Ghoshal, S./Bartlett, C. A., Creation, Adoption, and Diffusion of Innovations by Subsidiaries of Multinational Corporations, *Journal of International Business Studies*, 19, 1988, pp. 365–388.
- Ghoshal, S./Bartlett, C. A., The Multinational Corporation as an Interorganizational Network, *Academy of Management Review*, 15, 1990, pp. 603–625.
- Glazer R., Marketing in an Information Intensive Environment: Strategic Implications of Knowledge as an Asset, *Journal of Marketing*, 55, 1991, pp. 1–19.
- Goold, M./Campbell, A./Alexander, M., *Corporate-Level Strategy: Creating Value in Multibusiness Company*, New York: Wiley 1994.
- Granstrand, O./Håkanson, L./Sjolander, S., Internationalization of R&D: A Survey of Some Recent Research, *Research Policy*, 22, 1993, pp. 413–430.
- Grant, R. M., Toward a Knowledge-Based Theory of the Firm, *Strategic Management Journal*, 17, 1996, pp. 109–122.
- Gupta, A. K./Govindarajan, V., Knowledge Flows and the Structure of Control Within Multinational Corporations, *Academy of Management Review*, 16, 1991, pp. 768–792.
- Gupta, A. K./Govindarajan, V., Knowledge Management's Social Dimension: Lessons from Nucor Steel, *Sloan Management Review*, Fall 2000, pp. 71–80.
- Gupta, A. K./Govindarajan, V., Resource Sharing Among SBUs: Strategic Antecedents and Administrative Implications, *Academy of Management Journal*, 29, 1986, pp. 714–895.
- Hansen, M. T., The Search-Transfer Problem: The Role of Weak Ties in Sharing Knowledge Across Organization Subunits, *Administrative Science Quarterly*, 44, 1999, pp. 82–111.
- Hargadon, A. B., Firms as Knowledge Brokers: Lessons in Pursuing Continuous Innovation, *California Management Review*, 40, 1998, pp. 209–227.
- Hedlund, G., A Model of Knowledge Management and the N-Form Corporation, *Strategic Management Journal*, 12, 1994, pp. 73–90.
- Hedlund, G./Nonaka, I., Models of Knowledge Management in the West and Japan, in Lorange, P./Chakravarthy, B./Roos, J./Van de Van, A. (eds), *Implementing Strategic Processes: Change, Learning and Cooperation*, Oxford: Basil Blackwell 1993, pp. 117–144.
- Hennart, J., Can the “New Forms of Investment” Substitute for the “Old Forms”? A Transaction Costs Perspective, *Journal of International Business Studies*, 20, 1989, pp. 211–234.
- Hitt, M. R./Hoskisson, R./Ireland, R., A Mid-Range Theory of the Interactive Effects of International and Product Diversification on Innovation and Performance, *Journal of Management*, 20, 1994, pp. 297–326.
- Huber, G. P., Organizational Learning: The Contributing Processes and the Literatures, *Organizational Science*, 2, 1991, pp. 88–115.
- Inkpen, A. C./Dinur, A., Knowledge Management Processes and International Joint Ventures, *Organization Science*, 9, 1998, pp. 454–468.
- Iyengar, S., Assessing Linguistic Equivalence in Multilingual Surveys, Bulmer M, Warwick D. (eds.), in *Social research in developing countries*, New York: Wiley 1983, pp. 173–182.
- Jarillo, J. C./Martinez, J. I., Different Roles for Subsidiaries: The Case of Multinational Corporations in Spain, *Strategic Management Journal*, 11, 1990, pp. 501–512.
- Khanna, T./Gulati, R./Nohria, N., The Dynamics of Learning Alliances: Competition, Cooperation and Relative Scope, *Strategic Management Journal*, 19, 1998, pp. 193–210.
- Kobrin, S., An Empirical Analysis of the Determinants of Global Integration, *Strategic Management Journal*, 12, 1991, pp. 17–31.
- Kogut, B./Zander, U., Knowledge of the Firm, Combinative Capabilities and the Replication of Technology, *Organization Science*, 3, 1992, pp. 383–387.
- Kogut, B./Zander, U., Knowledge of the Firm and the Evolutionary Theory of the Multinational Corporation, *Journal of International Business Studies*, 3, 1993, pp. 625–645.
- Kogut, B./Zander, U., What Do Firms Do? Coordination, Identity, and Learning, *Organization Science*, 7, 1996, pp. 502–518.
- Kostova, T., Transnational Transfer of Strategic Organizational Practices: A Contextual Perspective, *Academy of Management Review*, 24, 1999, pp. 308–424.
- Levitt, B./March, J., Organization Learning, *Annual Review of Sociology*, 14, 1988, pp. 319–340.

- Lyles, M. A./Salk, J. E., Knowledge Acquisition From Foreign Parents in International Joint Ventures: An Empirical Examination in the Hungarian Context, *Journal of International Business Studies*, 27, 1996, pp. 877–904.
- Luo, Y., *Entry and Cooperative Strategies in International Business expansion*, Westport, CT: Quorum Books 1996.
- McGee, J./Thomas, J., Strategic Groups: Theory, Research and Taxonomy, *Strategic Management Journal*, 7, 1986, pp. 141–160.
- Meindl, J. R./Stubbart, C./Porac, J. F., Cognition Within and Between Organizations: Five Key Questions, *Organization Science*, 5, 1994, pp. 289–293.
- Nelson, R./Winter, S. G., *An Evolutionary Theory of Economic Change*, Cambridge, MA: Belknap 1982.
- Netter, J./Wasserman, W./Kutner, M. H., *Applied Regression Models*, Homewood, IL: Irwin 1989.
- Nohria, N./Ghoshal, S., Requisite Variety and Share Values: Alternative Approaches to Managing Headquarters-Subsidiary Relations in MNCs, *Strategic Management Journal*, 15, 1994, pp. 491–502.
- Nonaka, I., A Dynamic Theory of Organizational Knowledge Creation, *Organization Science*, 5, 1994, pp. 14–37.
- Nonaka, I./Takeuchi, H., *The Knowledge-Creating Company*, Oxford: Oxford University Press 1995.
- Pearce, R. D., World Product Mandates and MNE Specialization, *Scandinavian Journal of International Business Review*, 1, 1992, pp. 38–58.
- Podsakoff, P./Organ, D. W., Self-Reports in Organizational Research: Problems and Prospects, *Journal of Management*, 12, 1986, pp. 531–544.
- Porter, M., Competition in Global Industries: A Conceptual Framework, in Porter, M. E. (ed.), *Competition in Global Industries*, Boston: Harvard Business School Press 1986, pp. 15–60.
- Prahalad, C K./Hamel, G., The Core Competence of the Corporation, *Harvard Business Review*, May–June 1990, pp. 79–91.
- Pucik, V., Technology Transfer in Strategic Alliances: Competitive Collaboration and Organizational Learning, in Agmon, T./von Glinon, M. A. (eds), *Technology Transfer in International Business*, New York: Oxford University Press 1991, pp. 121–138.
- Robinson P., Structural Interdependence and Practice Conformity: An Empirical Examination of American MNEs and Their Subsidiaries in Japan, *Academy of Management Best Paper Proceedings* 1995, pp. 192–196.
- Romm, C. T./Pliskin, N./Rifkin, W. D., Diffusion of E-mail: An Organizational Learning Perspective, *Information and Management*, 31, 1996, pp. 37–46.
- Roth, K./Morrison, A. J., An Empirical Analysis of the Integration-Responsiveness Framework in Global Industries, *Journal of International Business Studies*, 21, 1990, pp. 541–564.
- Ruggles, R., The State of the Notion: Knowledge Management in Practice, *California Management Review*, 40, 1998, pp. 80–99.
- Slater, M. S., Tailor Incentive Compensation to Strategy, *Harvard Business Review*, 49, 1973, pp. 94–102.
- Snow, C. C./Thomas, J. B., Building Networks: Broker Roles and Behaviors, in Lorange, P./Chakravarty, B./Roos, J./Van de Van, A. (eds), *Implementing Strategic Processes: Change, Learning and Cooperation*, Basil Blackwell 1993, pp. 217–238.
- Spender, J. C., Making Knowledge the Basis of a Dynamic Theory of the Firm, *Strategic Management Journal*, 17, 1996, pp. 45–62.
- Szulanski, G., Exploring Internal Stickiness: Impediments to Transfer of Best Practice Within the Firm, *Strategic Management Journal*, 17, Winter Issue 1996, pp. 27–43.
- Taggart, J. H., Strategy Shifts in MNC Subsidiaries, *Strategic Management Journal*, 19, 1998, pp. 663–681.
- Tsai, W., Social Structure of “Coopetition” Within a Multiunit Organization: Coordination, Competition and Intraorganizational Knowledge Sharing, *Organization Science*, 13, 2002, pp. 179–190.
- Tsai, W./Ghoshal, S., Social Capital and Value Creation: The Role of Intra-Firm Networks, *Academy of Management Journal*, 41, 1998, pp. 464–476.
- Tsoukas, H., The Firm as a Distributed Knowledge System: A Constructionist Approach, *Strategic Management Journal*, 17, Special Issue 1996, pp. 11–25.

- Wah, L., Making Knowledge Stick, *Management Review*, 88, 1999, pp. 24–38.
- Walsh, J. P./Ungson, G. R., Organizational Memory, *Academy of Management Review*, 16, 1991, pp. 57–91.
- Weiss, L., *Collection and Connection: Rationalized and Embedded Knowledge in Knowledge-Intensive Organizations*, Unpublished doctoral dissertation, Harvard University 1998.
- White, R. E./Roynter, T. A., Strategies for Foreign-Owned Subsidiaries in Canada, *Business Quarterly*, Summer, 1984, pp. 59–69.
- Williamson, O. E., *The Economic Institutions of Capitalism*, New York: The Free Press 1985.
- Wood, D. J./Gray, B., Toward a Comprehensive Theory of Collaboration, *Journal of Applied Behavioral Science*, 27, 1991, pp. 139–162.
- Zack, M. H., Managing Codified Knowledge. *Sloan Management Review*, 40, 1999, pp. 45–58.
- Zander, U./Kogut, B., Knowledge and the Speed of the Transfer and Imitation of Organizational Capabilities. An empirical test, *Organization Science*, 6, 1995, pp. 76–92.
- Zollo, M./Singh, H., The Impact of Knowledge Codification, Experience Trajectories and Integration Strategies on Performance of Corporate Acquisition, *Academy of Management Proceedings (BPS)*, 1998, pp. L1–L10.