Knowledge Transfer In International Acquisitions

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This paper reports on a multi-method study of knowledge transfer in international acquisitions. Using questionnaire data we show that the transfer of technological know-how is facilitated by communication, visits & meetings, and by time elapsed since acquisition, while the transfer of patents is associated with the articulability of the knowledge, the size of the acquired unit, and the recency of the acquisition. Using case study data, we show that the immediate post-acquisition period is characterized by imposed one-way transfers of knowledge from the acquirer to the acquired, but over time this gives way to high-quality reciprocal knowledge transfer.

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INTERNATIONAL KNOWLEDGE TRANSFER IN ACQUISITIONS

Over the last few years there has been an upsurge in interest among scholars on the importance of knowledge management in firms. An argument usually put forward is that we have gone from an industrial age in which the most important resource was capital, into an age in which the most critical resource is knowledge. The implication for the firm is that it is increasingly difficult to attain and sustain a competitive advantage through the reallocation of capital and other assets of the balance sheet. Meanwhile, those who have gained a competitive edge over their rivals, have increasingly done so through innovative recombination of knowledge. To put it somewhat more dramatically, there is evidence suggesting that the winners in tomorrow’s market place will be the masters of knowledge management [see e.g. Nonaka and Takeuchi, 1995; Arthur, 1996].

An essential aspect of knowledge management is the process of knowledge transfer between business units. While the transfer of knowledge between departments or between sister units in the same country is far from trivial, it is clear that the problems associated with transfer will increase with geographical and cultural distance. And indeed most research conducted on questions of knowledge transfer has been undertaken in an international setting [e.g. Teece, 1976; Mansfield and Romeo, 1980; Zander, 1991]. Moreover, the value of knowledge transfer in international firms can be particularly high because foreign markets often provide access to new ideas and stimuli that can be subsequently applied in other countries [Hedlund, 1986; Bartlett and Ghoshal, 1989; Sölvell and Zander, 1995].

International transfer of knowledge between units may occur in a number of different modes. At one end, transfer can occur under a hierarchical mode of governance between two units of the same firm, and at the other end it can occur through a pure market transaction between two independent firms. Knowledge transfer can also occur in hybrid modes of governance [Borys and Jemison, 1990], such as alliances, joint ventures and licensing arrangements. Indeed, much of the existing literature (see below) has focused on these intermediate modes.

One hybrid mode that has not so far been the focus of knowledge-transfer research is mergers and acquisitions. Nevertheless, a key reason for an acquisition has often been to gain access to knowledge in the acquired company, and to transfer that knowledge to other parts of the firm. In particular, since the speed of competition in many industries has made organic growth seem excessively time-consuming, many managers have come to consider acquisition to be an attractive means to expand a firm’s knowledge base quickly. What many acquiring firms have discovered, however, is that the transfer and utilization of knowledge through acquisitions can be a daunting task. It is contingent on a successful integration of the acquired unit [Haspeslagh and Jemison, 1991], and very often the process of integrating the acquired units fails outright [Jemison and Sitkin, 1986].

This paper addresses the phenomenon of knowledge transfer in international acquisitions. The knowledge management literature has mentioned the potential of acquisitions as a means of gaining access to new knowledge [e.g. Huber, 1991; Madhok, 1997]; and the acquisition literature has stressed the impor-
tance of knowledge transfer for the acquisitions to create value [Haspeslagh and Jemison, 1991; Capron, 1996]. But to our knowledge no study has explicitly focused on the international transfer of knowledge in acquisitions, and in particular, the factors facilitating such transfer.

The study was undertaken with a multi-method approach. First, we collected questionnaire data from forty-two cases of international acquisitions involving knowledge transfer. This data was collected in 1992-1993. It was used to test hypotheses about international transfer in acquisitions derived from the literature. Second, we undertook detailed case studies of three international acquisitions. The acquisitions took place in 1988 or 1989, and we collected data at two points in time: 1991 and 1996. Our objective, in this case study analysis, was to examine the patterns of knowledge transfer over time. In order to ensure that we focused on cases where knowledge transfer was important, we restricted ourselves in both parts to R&D acquisitions, i.e. cases where the acquired company was being bought in large part for its R&D activities. We also restricted ourselves to Swedish parent companies for practical reasons.

The objective of our study, then, is twofold. First, to identify the factors that facilitate knowledge transfer in cases of international acquisition. Second, to identify the patterns of international knowledge transfer—from the acquiring company to the acquired company and vice versa—during the post acquisition integration process. The rest of the paper is organized as follows. First, we review relevant literature on knowledge management and acquisitions. Second, the theory is used to build a conceptual framework from which propositions are developed. Third, the research methodology is described. Fourth, the findings of the study are reported. Finally, we present our conclusions and the implications are discussed.

**The Management of Knowledge**

The inter- and intra-firm management of knowledge has been the subject of ample research among business scholars recently. In many industries, the importance of developing abilities to better utilize the knowledge contained in the firm’s network has become apparent to managers. Many of the management fads of recent years have assisted in this process of recognition. Benchmarking has demonstrated the potentially great benefits of best practices transfer.Instances of failure in downsizing, on the other hand, have revealed the costs of losing knowledge. Empowerment and globalization have created local knowledge with potential for utilization elsewhere, and information technology has given individuals increasingly differentiated knowledge, unknown to head office. One of the most cited reasons for the importance of knowledge management is the increasing speed of competition [e.g. Hedlund, 1994; Nonaka and Takeuchi, 1995]. Reinventing the wheel, it is argued, is a serious waste of time when the requisite knowledge is already contained in other parts of the organization.

A number of organizational models of the multinational corporation (MNC) have addressed the issue of how firms should organize to utilize their dispersed knowledge. Prominent among those are Hedlund’s Heterarchy [1986], and Bartlett and Ghoshal’s Transnational [1989]. A common feature of these models is the development of structures designed to handle the seemingly contradictory demands of reaping global benefits of scale and utilizing dispersed
knowledge to be locally responsive. An important finding is that the establishment of sophisticated mechanisms for the transfer of knowledge throughout the far-flung networks of the MNC is necessary to stay abreast in rapid international competition. Kogut and Zander [1992: 383] take the argument even further when they conclude that a firm’s ability to transfer knowledge is a reason for its very existence:

"... what firms do better than markets is the sharing and transfer of the knowledge of the individuals and groups within an organization... What is central to our argument is that knowledge is held by individuals, but is also expressed in regularities by which members cooperate in a social community.”

The concept of a social community can be traced to the writings of Durkheim [1933], Etzioni [1965], Selznick [1966] and Ouchi [1980]. In essence, a social community emerges when a common set of values and beliefs among a group of individuals provides the preconditions for a governance system in which the risk of opportunistic behavior is low. Expressed in terms of knowledge flows, we can argue that individuals will only participate willingly in knowledge exchange once they share a sense of identity or belonging with their colleagues. This line of reasoning, followed up in subsequent articles by Kogut and Zander [1995; 1996], represents an explicit challenge to the transaction-cost theory of the firm in that it sees the need to share knowledge among individuals as the *raison d’être* of the firm, rather than the failure of the market for intermediate goods. From the perspective of the current study, this point of view is particularly important because an acquisition represents the bringing together of two “social communities” that over a period of years (the post-acquisition integration process) become a single social community. If Kogut and Zander are correct, it seems likely that the flow of knowledge between the two parties will be very limited in the years immediately following an acquisition, but will gradually increase as a single social community emerges.

**Knowledge Transfer Under Different Modes of Governance**

While knowledge transfer in acquisitions has received very little explicit attention, there has been considerable attention devoted to the related questions of knowledge transfer within a single company, knowledge transfer in alliances and joint ventures, and knowledge transfer between independent firms. Here we briefly review this literature and some of its main findings as a prelude to our focus on the specific case of acquisitions.

**Knowledge Transfer within the Firm**

Research on intra-firm knowledge transfer has a long history emanating from studies on choice of international technology transfer mode [see e.g. Pavitt, 1971; Mansfield et al, 1979; Vernon and Davidson, 1979]. Close scrutiny reveals a focus on a relatively small number of variables. One line of research on the timing of transfer has shown a dramatic increase in transfer speed from product introduction to transfer of technology to subsidiaries [e.g. Mansfield and Romeo, 1980; Davidson, 1980; 1983]. Another line of research on transfer costs has generally found that experience is an important factor [e.g. Teece, 1976; 1977;
Mansfield et al, 1979]. More recently, Zander [1991] and Szulanski [1996] have taken a broader approach to internal knowledge transfer. Zander [1991] found that the tacit-articulated dimension of knowledge had an important impact on the smoothness of transfer. In particular, he found that the transfer of tacit knowledge was more difficult to accomplish than the transfer of more articulated knowledge. Szulanski [1996] focused on the transfer of best practices within firms, and the difficulties experienced in the transfer process. His findings were consistent with Zander's. When analyzing factors causing difficulties in the knowledge transfer process, Szulanski found that the tacit-articulated dimension explained more variance than any other factors, such as motivation.

**Knowledge Transfer in Alliances and Joint Ventures**

Research into knowledge transfer through alliances and joint ventures is a relatively recent phenomenon. Kogut [1988] was the first to explicitly argue that joint ventures could be motivated by an organizational learning imperative. He proposed that a joint venture "...is used for the transfer of organizationally embedded knowledge which cannot be easily blueprinted or packaged through licensing or market transactions" [Kogut, 1988: 319]. At around the same time, Westney [1988], Hamel [1991], and Inkpen [1992] developed related perspectives on the ways in which learning can be achieved through alliances and joint ventures. Since then, there has been a proliferation of research into the knowledge transfer process across alliance and joint venture boundaries [e.g. Inkpen and Crossan, 1995; Doz, 1996; Mowery et al, 1996]. The common thread in the results of these studies is that the ability to re-evaluate and learn is key to success.

**Knowledge Transfer Between Independent Firms**

The transfer of knowledge between independent firms has not received nearly as much attention as the modes of transfer discussed so far. Obviously managers would prefer that valuable knowledge not get transferred to other firms, but the reality is that the process does occur, through some combination of imitation, reverse engineering, movement of personnel and business intelligence. Mansfield [1985], for example, found that a decision to develop a major new product or process was known to competitors within 12-18 months. Levin et al [1987] studied the cost of imitation, and showed that "major innovations" incurred higher imitation costs than "typical innovations". Further, Zander [1991] found that the level of difficulty of an intra-firm knowledge transfer is not necessarily the mirror image of the level of difficulty of its imitation.

**Knowledge Transfer in Acquisitions**

Our literature review revealed little if any research explicitly directed at this phenomenon. Most relevant is the so-called "process" school, which is concerned with the creation of value through post-acquisition integration [Lindgren, 1982; Shrivastava, 1986; Haspeslagh and Jemison, 1991; Håkanson, 1995; Greenwood et al, 1995]. Haspeslagh and Jemison [1991], for example, discussed the issue of knowledge transfer, but their focus was on how knowledge transfer may lead to overall value creation, not on the factors facilitating knowledge transfer per se. There has also been some recognition at an
aggregate level that resource redeployment (e.g. knowledge transfers) can have an important impact on value creation in acquisitions [Capron, 1996], but of course such studies do not provide much insight into the processes of resource redeployment. Finally, a related body of literature has looked at the acculturation process [Berry, 1983] when two different organizations are brought together. The essential contribution of such studies to the current work is that knowledge transfer between the merging organizations depends on the development of a cooperative relationship.

One important point comes out of this brief review, namely that acquisitions represent a distinctly different situation from the other three modes of governance. While many of the facilitators of knowledge transfer are likely to be the same (communication, articulability of knowledge etc.), we can expect their relative importance, and the process itself, to change significantly over time as the integration of the acquisition runs its course. It is the evolution in the mode of governance (from "market" to "hierarchy") and everything that it entails that makes knowledge transfer in acquisitions interesting.

A DEFINITION OF KNOWLEDGE TRANSFER

Knowledge is an elusive concept that has been classified and defined in a variety of ways [see e.g. Hedlund, 1994; Nonaka and Takeuchi, 1995]. For the purposes of this study, we use the definition of knowledge used by Kogut and Zander that incorporates both the relatively tacit "know-how", defined as "the accumulated practical skill or expertise that allows one to do something smoothly and efficiently" [Kogut and Zander, 1992]; and, information or "know-what", which accommodates more articulable dimensions of knowledge. The concept of transfer is also difficult to capture. The issue here is that no definite distinction between transfer of knowledge and creation of new knowledge exists [see e.g. Granstrand, 1982; Sahal, 1981]. As Zander [1991] observes, "Recipients would normally be obliged to devote substantial resources to assimilate, adapt, and improve upon original technology. Modification and further development of the technology are thus very often an integrated part of the transfer." Along the same lines, Hayami and Ruttan [1971] introduced a distinction between kinds of transfer according to the degree of change the knowledge is subjected to during transfer. Thus, a literature search reveals that what some call knowledge transfer, others define as knowledge combination, knowledge creation, or learning [see e.g. Bartlett and Ghoshal, 1989; Westney, 1993; Hedlund, 1994; Nonaka and Takeuchi, 1995]. For the purpose of this study, we use the term knowledge transfer only. Knowledge may be transferred in either or both of the following directions: from the acquiring unit to the acquired unit; from the acquired unit to the acquiring unit. Hence, in the case of a joint product development effort for example, when knowledge is cross-transferred between the acquired and the acquiring units, we speak of reciprocal knowledge transfer. Reciprocal knowledge transfer comes with considerable potential for the creation of new knowledge embodied in new competitive products and systems.

Knowledge transfer in this context implies successful knowledge transfer, which in line with Zander [1991] means that transfer results in the receiving unit accumulating or assimilating new knowledge. It may be argued that an alternative
dependent variable would be the result of the transfer in monetary terms, measured for example as revenues from jointly developed products. Except for the practical difficulties inherent in such a design, we argue that successful knowledge transfer is such an important prerequisite for financial success, that it qualifies as a dependent variable in its own right. This argument is consistent with what has been suggested by a number of scholars [see e.g. Zander, 1991; Haspeslagh and Jemison, 1991].

**PROPOSITION DEVELOPMENT**

Figure 1 (below) illustrates the organizing framework that will be used to structure our study of knowledge transfer in international acquisitions. Our focus here is on the patterns of interaction between acquirer and acquired units, and the impact that they have on knowledge transfer. We also consider the nature of the knowledge (tacit vs. articulated), the time since acquisition, and the size of the acquired unit as additional factors which are likely to influence knowledge transfer. We conceptualize knowledge transfer as a two-way flow, from acquirer to acquired and vice versa. Often firms are acquired for their technological capabilities, in which case we would expect to see knowledge transfer from acquired to acquirer. But equally likely is the reverse case, in which the acquiring firm believes it can enhance the performance of the acquired firm by transferring its superior technology. All the propositions are therefore open to the possibility of flows in both directions.

Our hypotheses relate, mostly, to patterns of communication of knowledge, while knowledge transfer, per se, leads us to develop an inductive research question.

*Communication between Acquirer and Acquired*

The hypothesis developed here is that the more frequent the communication between individuals in the acquirer and acquired units, the greater the knowledge transfer. Communication will occur through two distinct but overlapping processes. First, the post-acquisition integration process, as a whole, relies on extensive and intensive communication to be effective [Bastien, 1987; Buono and Bowditch, 1989; Haspeslagh and Jemison, 1991]. It is argued that effective communication alleviates anxiety caused by misinformation, facilitates interaction between individuals in the acquirer and acquiring companies, and ensures that the decision making process during integration is explicit and transparent. All

![Figure 1: Factors Facilitating Knowledge Transfer](image-url)
these factors, in turn, are likely to lead to the creation of a supportive environment or "social community" in which the transfer of knowledge between parties is facilitated [Kogut and Zander, 1992]. Second, there is also a direct process at work, in that specific knowledge transfer episodes—particularly those involving tacit knowledge—are very communication-intensive, often involving several months of heavy interaction between transmitting and receiving parties [Szulanski, 1996]. Evidence on international innovation projects [Ghoshal, 1986; Ridderstråle, 1997], for example, suggests that the ongoing level of communication between merged units is likely to be associated with a high level of reciprocal knowledge transfer. In a similar argument, Cohen and Levinthal (1990) used the term "absorptive capacity" to describe the capacity to utilize new knowledge. They found communication to be an important pre-requisite for the development of this capacity.

Hypothesis 1: Ceteris paribus communication (face-to-face and other media) between acquirer and acquired will be positively related to knowledge transfer (in both directions) in acquisitions.

More Protracted Modes of Interaction

While communication between individuals is important to both post-acquisition integration and knowledge transfer, there are also a variety of more protracted modes of interaction that can be used to enhance the quality of the relationship between acquired and acquirer. These include technical meetings, extended visits and joint training programs. In general, we would expect that the more such interactions were encouraged, the more effective the post-acquisition integration process, and the higher the level of knowledge transfers [e.g. de Meyer, 1991; Haspeslagh and Jemison, 1991]. In this study we focus on Visits and meetings between the two parties, by which we mean face-to-face interactions lasting from less than a day to a couple of weeks, that are undertaken to address specific tasks or problems. However, while the primary motivation for these visits and meetings is task-related, they typically have social components and as such they also represent a tool for enhancing normative integration within the corporation [Van Maanen and Schein, 1979; Ouchi, 1980].

Hypothesis 2: Ceteris paribus the frequency of visits and meetings will be positively related to knowledge transfer (in both directions) in acquisitions.

The Nature of Knowledge

As indicated earlier, the nature of the underlying knowledge will have an important impact on the knowledge transfer process. If the relevant knowledge is tacit, and thus not readily communicated in written or symbolic form, it follows that its transfer across the acquirer-acquired boundary will be far from trivial. Such transfers can be facilitated by intense interaction between the two parties, and by the gradual creation of a single organization with a single social community, but our ceteris paribus expectation is that tacit knowledge will not be readily transferred. In contrast, articulated knowledge such as that found in patents and blueprints is likely to be quite straightforward to transfer between acquirer and acquired units, because it does not rely on a strong social bond between the parties. Thus:

Hypothesis 3: Ceteris paribus the
extent to which the firm's knowledge can be articulated will be positively related to knowledge transfer (in both directions) in acquisitions.

**Time Elapsed**

The argument here is that the time elapsed after the acquisition will slowly facilitate knowledge transfer, in the (hypothetical) absence of all other integration efforts by the management of the acquiring company. Any ill feelings or stressful conditions at the time of the acquisition will gradually recede; uncooperative or disillusioned individuals will gradually leave; and new people will be recruited who do not see the former boundary between the previously separate entities [Buono and Bowditch, 1989; Haspeslagh and Jemison, 1991]. Of course, we believe as argued above that the knowledge transfer process can be actively encouraged by management, but at the same time there will be an underlying drift over time towards greater integration and hence towards greater reciprocal knowledge transfer.

Hypothesis 4: *Ceteris paribus* elapsed time will be positively correlated to knowledge transfer (in both directions) in acquisitions.

**Size of Acquired Unit**

Finally, it is important to explicitly consider the effect of firm size on the knowledge transfer process, as a control variable\(^1\). The expectation here is that larger operations will *ceteris paribus* undertake a greater volume of knowledge transfer than smaller operations simply by virtue of the number of individuals that could potentially be involved in such a process. Our focus, as the following section explains, is on the characteristics of the acquired unit. Thus:

Hypothesis 5: *Ceteris paribus* the size of the acquired unit will be positively correlated to knowledge transfer (in both directions) in acquisitions.

**Patterns of Knowledge Transfer**

The second objective of this paper was to examine the patterns of knowledge transfer in international acquisitions. Our *a priori* reasoning here was that knowledge transfer is a complex process that cannot be completely understood through simple measures of incidences of transfer. We expected that there would be variations in the type of knowledge being transferred at different stages in the process, the direction of knowledge transfer (acquirer to acquired or vice versa), and the quality of the transfer. However, the lack of any prior studies in this area made it impossible to specify research propositions. Thus, we were guided by the following research question.

Inductive research question: What are the patterns of knowledge transfer (type of knowledge, direction of transfer, quality of transfer) during the post-acquisition integration process?

**Research Methodology**

We decided to collect data through two complementary methods (questionnaire and case study) because it was clear than one method alone could not satisfactorily answer the questions we were interested in. Thus, we used the questionnaire data to test propositions 1 to 5, and we used the case study data to address the question on patterns of knowledge transfer over time. Below, we discuss the methodologies for the two phases of data collection.

**Questionnaire Survey**

We put together a questionnaire in 1992, following our first phase of case
study interviews. Fifteen large Swedish MNCs agreed to participate in the questionnaire study. Following discussions with corporate management, we identified 210 R&D operations. The manager of each unit was mailed a copy of the questionnaire with a cover letter indicating the support of the parent company. Follow-up telephone calls and a second mailing to non-responders yielded a total of 110 usable responses. Of these 110 responses, 42 were cases of acquisitions by the Swedish parent company, in which gaining access to the R&D knowledge of the acquired unit was a main objective. The sample used in this study was therefore forty-two.

We wrote an initial draft of the questionnaire using a combination of scales taken from prior studies and original questions based on issues uncovered during the first phase of case study research. We then assembled a reference group consisting of three corporate R&D managers from major Swedish MNCs, representatives of the royal academy of engineering and the Swedish agency for technical development (NUTEK), and several academics with expertise in this area. The group met twice to discuss the face validity of the questions and any modifications or enhancements that they felt were appropriate. This process resulted in several substantive changes to the questionnaire.

The sample consisted of companies that had been acquired between 1927 and 1990. In terms of countries represented, 10 were of originally American companies, 9 were from the U.K., 5 each from Germany, Belgium and Sweden, 2 each from Finland, Netherlands and Italy, and one each from Norway and Switzerland. Thirteen Swedish MNCs were represented, specifically Alfa Laval (9 separate acquisition cases), ABB (8 cases), Volvo (7), Atlas Copco (4), Trelleborg (3), Tetra Pak (2), Ericsson (2), Esab (2), Nobel industries (1), Kabi (1), Sandvik (1), and SKF (1). The wording of specific questions relating to this study are described below. Note that for these 42 cases we only had the acquired unit's responses to work with. The individual in charge of the acquired unit is clearly the key respondent, in that he or she will be most knowledgeable about the extent of knowledge flows in and out.

**Case Studies**

We studied three MNCs that had acquired companies with as main objective to gain access to and utilize the acquired companies' R&D knowledge. The sample consisted of ABB’s acquisition of Taylor Instruments in the production automation industry, Eka Nobel’s acquisition of Albright & Wilson in the paper chemicals industry, and Alfa Laval’s acquisition of Sharples in the decanter industry. Taylor Instruments and Sharples were headquartered in the US; Albright and Wilson was headquartered in the UK. In each case, we established in advance that the acquired company’s R&D was an important factor in the acquisition decision. For example, in the ABB case we elected to focus on the Taylor Instruments division because of its important R&D component, rather than the Combustion Engineering acquisition which was made largely for market presence reasons.

**Data collection methods**. The acquisitions had taken place two to three years before the first phase of data collection started. The first round of interviews took place in the spring of 1992 at divisional headquarters in Sweden, and thereafter, at the acquired companies’
R&D units (total of 19 interviews). Semi-structured interviews were used. On completion of the interviews a questionnaire was distributed to all personnel at the central R&D units and the R&D units of the acquired companies. In total, 148 responses were obtained from seven R&D units. The questionnaire asked about how individuals viewed the impact of the acquisition on their personal situation, their impressions of the other company, and their perceptions of various work practices in the company.

The second round of data collection was conducted according to the same method in the spring of 1996. We interviewed an additional 31 individuals, and collected a further 71 questionnaires. This mix of qualitative and quantitative data allowed us to get rich insights into the integration process as it unfolded as well as some relatively objective measures of the changes that had occurred over the four years between the phases of data collection.

Data analysis. The analysis was undertaken by all three researchers, and discrepancies reconciled through discussion. The qualitative findings were summarized in the form of a case history, and sent to the lead respondents to verify our interpretation. This analysis was used primarily to address the question of patterns of knowledge transfer, but we were also able to induce possible causal relationships with the facilitating factors that were subsequently reconciled with the questionnaire findings.

Construct Measurement

Knowledge transfer. As the central construct in the study, we took considerable care over the measurement of knowledge transfer. The primary measure was a four-item scale with the following wording[7]:

In the period 1986-1991 has your unit actively transferred locally developed technological know-how to other manufacturing or R&D units in your company? No; Yes, to units in Sweden on _ number of occasions; yes, to units outside Sweden on _ number of occasions.

In the period 1986-1991 has your unit received by the same means as above technological know-how developed in other R&D units in your company? No; Yes, from units in Sweden on _ number of occasions; yes, from units outside Sweden on _ number of occasions.

A great deal of time was spent with the reference group in formulating this question, particularly around the term technological know-how to capture the forms of knowledge we were interested in, the phrase active transfer, and the period of 5 years to smooth out fluctuations over time. Nonetheless it is important to acknowledge that this measure is still limited in the extent to which it can represent the full complexity of the construct knowledge transfer. Statistical analysis of these four questions revealed that the discriminant validity between the two directions of knowledge transfer (A → B vs. B → A) was weak. Essentially, it became apparent that those acquired units with high levels of inward transfer were the same as those with high levels of outward transfer. As a result, we decided to aggregate the questions to form a single scale with acceptable reliability (Cronbach's Alpha = 0.75).

A secondary aspect of knowledge transfer was also measured, namely the number of patents generated by the acquired unit in the last five-year period[8] (i.e. a measure of transfers of
technical knowledge from the acquired unit to the acquirer). This measure clearly taps into a rather different aspect of knowledge management than technological know-how (see the low correlation between the two of -.15 in table 1). Patents represent a relatively articulated form of knowledge, and they are unlikely to require the same level of personal interaction between individuals to be effectively transferred. Nonetheless, it is still interesting to consider the factors that facilitate the transfer of this form of knowledge. By undertaking the statistical analysis using both measures of knowledge transfer and comparing the results, we are able to build a richer understanding of the phenomenon under investigation.

Communication. Respondents were asked to indicate the frequency of their internal communication with other R&D units in the local market, in Sweden, and in other countries, and for each to distinguish between face-to-face communication and other types of contact (fax, phone etc.). The scale was anchored to specific frequencies, i.e. 7 = daily, 6 = weekly, 5 = monthly etc. While we expected to see some differences in patterns between face-to-face and other types of contact, the analysis indicated a single 6-item construct with strong reliability (Alpha = 0.90).

Visits and meetings. Respondents were asked to indicate how often people from their unit travelled to technical meetings (with R&D personnel only, and with personnel from other functions), how often they visited other R&D units, and how often they received visitors from other units. These aggregated to a single scale with strong reliability (Alpha = 0.90).

Articulability of knowledge. Following Zander [1991], we created a three-item scale to indicate the extent to which the knowledge in the unit was articulable: (1) New R&D personnel can easily learn their job by studying a complete set of blueprints, (2) new R&D personnel can easily learn their job by talking to experienced personnel, and (3) educating and training new R&D personnel is a quick and easy job. Reliability was good (Alpha = 0.75).

Time elapsed. Respondents indicated the year in which the R&D unit had been acquired. Thus a higher number referred to a more recent acquisition.

Size of acquired unit. Because the focus in the study was on R&D activities, we asked respondents to state the number of people employed in R&D in the acquired unit.

FINDINGS

Facilitators of Knowledge Transfer

Table 1 lists the zero-order correlation coefficients between all the variables. A couple of observations should be made. First, as suggested by the earlier discussion, patents appear to be a more codified form of knowledge than technological know-how, in that articulability of knowledge is positively correlated with patents (marginally significant) and negatively with technological know-how transfers (not significant). Second, there are potential multicollinearity problems on account of the high correlation between communication and visits and training (r = .45). Accordingly we ran the regression models using these variables separately. Third, as hinted by the descriptive statistics, the patent variable is not normally distributed, so OLS regression is inappropriate. Instead, we used a negative binomial distribution (a generalized Poisson) for the estimation (Chacar, 1999; Hausman, Hall and Griliches, 1984).
Table 2 lists the results of the regression analysis. Models 1 and 2 are estimates of the predictors of technological know-how transfer, with visits and transfers absent from the first model and communication absent from the second model. Models 3 and 4 are estimates of the predictors of Patents generated by the acquired unit, again separating communication and visits and transfers.

Considering first the predictors of technological know-how transfer, we see strong support for hypotheses 1 and 2, in that both communication and visits and transfers are highly significant. Hypothesis 3 is not supported, and indeed model 2 provides evidence for a negative relationship – meaning that the less articulable the knowledge, the more technological know-how is transferred. We will come back to this point later. Hypothesis 4 is supported in the second model, confirming that elapsed time is positively related to the level of technological know-how transfer. Finally, hypothesis 5 regarding the size of the acquired unit is not supported.

When we look at models 3 and 4 regarding the transfer of patents generated by the acquired unit, we see a very different story. Communication and visits and transfers are not significant predictors of transfer of patents, though it is worth noting that if the analysis is done

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Technological know-how</td>
<td>2.49</td>
<td>1.12</td>
<td>-.155</td>
<td>.428*</td>
<td>.614**</td>
<td>-.067</td>
<td>.241</td>
<td>.193</td>
</tr>
<tr>
<td>2. Patents</td>
<td>21.0</td>
<td>76.3</td>
<td>.288</td>
<td>.171</td>
<td>.259</td>
<td>-.271</td>
<td>.354*</td>
<td></td>
</tr>
<tr>
<td>3. Communication</td>
<td>5.14</td>
<td>1.54</td>
<td>.450**</td>
<td>-.172</td>
<td>.220</td>
<td>.376*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Visits &amp; Transfers</td>
<td>3.53</td>
<td>1.19</td>
<td>.220</td>
<td>.376*</td>
<td>.093</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Articulability of knowledge</td>
<td>2.61</td>
<td>1.20</td>
<td>.126</td>
<td>.031</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Elapsed time</td>
<td>2.48</td>
<td>0.94</td>
<td>.303</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. R&amp;D employees</td>
<td>75.90</td>
<td>165.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

† p <.10  * p<.05  ** p<.01  *** p<.001

<table>
<thead>
<tr>
<th>Measure of knowledge transfer:</th>
<th>Technological know-how (OLS)</th>
<th>Patents generated by acquired unit (Negative Binomial)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td>.382*</td>
<td>.237</td>
</tr>
<tr>
<td>Visits and meetings</td>
<td></td>
<td>.643***</td>
</tr>
<tr>
<td>Articulability of knowledge</td>
<td>-.076</td>
<td>-.209†</td>
</tr>
<tr>
<td>Elapsed time</td>
<td>.174*</td>
<td>.504†</td>
</tr>
<tr>
<td>Size (R&amp;D employees)</td>
<td>-.015</td>
<td>-.595</td>
</tr>
<tr>
<td>R-squared</td>
<td>.212</td>
<td>.012*</td>
</tr>
<tr>
<td>F test</td>
<td>2.02*</td>
<td>.013*</td>
</tr>
<tr>
<td>Log Likelihood</td>
<td>-84.54</td>
<td>-93.81</td>
</tr>
</tbody>
</table>

† p <.10  * p<.05  ** p<.01  *** p<.001
without controlling for acquired unit size they do come out significant. Thus, hypotheses 1 and 2 are not supported in this analysis. Hypothesis 3 receives some support, meaning the articulability of knowledge is significantly associated with the transfer of patents from the acquired unit. Hypothesis 4, by contrast, is refuted through a significant negative relationship. In other words, the greater the time elapsed, the less patents are transferred from acquired unit to acquirer. Finally, hypothesis 5 regarding the size of the acquired unit is strongly supported.

Taken together, the statistical analysis reveals a richer story than the one we had hypothesized. Two different patterns can be discerned. The more tacit form of knowledge (i.e. technological know-how) is best transferred through intensive communication, with many visits and meetings, and when the acquisition is fully integrated. But when knowledge is relatively articulated, i.e. in the form of a patent, it can be made available to the other party with little regard for personal interaction. Such knowledge transfers are instead a function of the size of the acquired unit, the articulability of the knowledge, and a relatively low level of integration between the two sides.

The latter finding may seem counter-intuitive, and deserves further reflection. One plausible explanation for an observed pattern over time of decreasing transfer of articulable knowledge and increasing transfer of tacit knowledge would be that the alternative of transferring tacit knowledge gets more feasible as a single social community emerges with increased integration. Furthermore, as the transfer of tacit knowledge gets increasingly possible, it may be preferable to the transfer of articulable knowledge from a strategic viewpoint since it involves knowledge that is harder to copy.

A second and complementary explanation would be that amid the chaos of the early days of an acquisition, a primary managerial focus is to try to extract value from codified knowledge, i.e. from the acquired unit’s patents. This interpretation receives some support from our case studies. In the case of ABB’s acquisition of Taylor, a Product Council was immediately set up headed by a senior ABB manager and staffed by three individuals from each company. One of the new group’s tasks was to assess the state of knowledge at the R&D sites. This entailed identifying overlaps and opportunities for cost cutting, but also identifying opportunities for cross-fertilization. At this early stage, opportunities for cross-fertilization were all but exclusively searched for in the stock of codified knowledge, and here patents played an important role. Screening patents, the group tried to find opportunities to combine technological competencies. Moreover, the ABB people—who some Taylor people regarded as overly meticulous—actively encouraged filing new patents at Taylor sites. The Product Council, which was put in place as a mechanism of integration, was dissolved after a few years. Analogously, Eka Nobel established a number of Technical Centers to facilitate the integration of Albright & Wilson with an initial boost in patent filings as a result.

Patterns of Knowledge Transfer

The second objective of this paper was to examine the patterns of knowledge transfer in international acquisitions. The findings of this section are based on qualitative measures, coupled with some illustrative analysis of questionnaire responses in the three case study compa-
nies. The findings are exploratory in nature since there are no previous longitudinal studies of knowledge transfer patterns in acquisitions.

Our analysis of the three case studies suggested a two-phase process. The first two or three years ("early stages") were characterized by a high level of imposed knowledge transfer from the acquirer to the acquired firm, and a very low level of transfer the other way. The phase from year three through to year six ("late stages") was characterized by a high level of knowledge flow in both directions and the emergence of combined knowledge development projects which we label as reciprocal knowledge flow. This interpretation can best be exemplified in reference to table 3, which represents a count of all the cases of knowledge flow of different types broken down into the two phases.

Knowledge Transfer in Early Stages. The first few years post-acquisition were a difficult time for all three companies. Eka Nobel’s acquisition of Albright and Wilson was well received by Albright and Wilson managers, but there was a high degree of uncertainty regarding what would happen to the R&D activities in the UK, Holland and Spain. Eka Nobel’s management made a lot of efforts in the first few months to build relationships. They also sent a number of people to the UK and transferred various aspects of their work practises to Albright and Wilson. In the Alfa Laval case, the first few years were very awkward because Sharples’ management saw Alfa Laval as an unwelcome buyer. Relationships were therefore very frosty, and for that reason there were no attempts made to undertake joint development work. The only transfers that occurred were imposed: Alfa Laval transferred its manufacturing technology, accounting system and sales force training methods to the US operations of Sharples. In the ABB case, the acquisition of Taylor instruments was favourably received, but again there was a concern on the part of acquired employees that their operation would be shut down (this was not the case, as it happened). ABB adopted its tried-and-tested approach to managing acquisitions. A team was transferred to the U.S. from Sweden, and ABB’s management systems were imposed on the new unit. In addition, a massive joint development project was begun. This was meant to involve knowledge transfer in both direc-

| TABLE 3 | INCIDENCES OF KNOWLEDGE TRANSFER IN CASE STUDY FIRMS |
|---|---|---|---|---|---|---|
| Eka Nobel | Alfa Laval | ABB | Eka Nobel | Alfa Laval | ABB |
| Knowledge flow, acquirer to acquired (i.e. imposed) | Knowledge flow, acquired to acquirer | Reciprocal knowledge flow (e.g. joint development projects) | Knowledge flow, acquired to acquirer | Reciprocal knowledge flow (e.g. joint development projects) | Knowledge flow, acquired to acquirer |
| 4 minor | 2 major | 2 minor | 1 minor | 2 minor | 1 minor |
| 2 minor | 1 major | (partial success) | 3 minor | 2 major | 3 major |
| 1 minor | 3 minor | 2 major | 2 minor | 2 minor |

Key: "Major" incidence of knowledge transfer is one mentioned by 3 or more interview respondents. "Minor" incidence of knowledge transfer is one mentioned by at least one interview respondent.
tions, but for the first few years the lack of relationship between the units in Sweden and the U.S. meant that very little knowledge transfer actually transpired.

To summarize, the early stages of the acquisitions saw primarily imposed knowledge transfers from acquirer to acquired. The main reason for the lack of other forms of transfer, in our interpretation, was the lack of personal relationships between the individuals in the two units, which made it very difficult for either party to trust in the abilities of the others. Cultural distance may also have been a factor, in that many respondents mentioned the misunderstandings that occurred between individuals in the early days of the acquisitions. And in the case of Alfa Laval, the uneasy pre-acquisition relationship was certainly a contributory factor to the lack of knowledge transfer.

The Integration Process. In all three cases, we attempted to understand the efforts that were made to integrate the acquired company with the acquirer. These were grouped into four categories: (1) The visibility and continuity of the leadership provided by the acquirer; (2) the communication process, as orchestrated by the acquirer; (3) the integrating mechanisms used, such as personnel transfers and joint development pro-

<table>
<thead>
<tr>
<th>Table 4</th>
<th>THE INTEGRATION PROCESS</th>
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<tbody>
<tr>
<td><strong>Visibility and continuity of leadership</strong></td>
<td><strong>Eka Nobel / A&amp;W</strong></td>
</tr>
<tr>
<td></td>
<td>New R&amp;D manager “a great networker”. Spent most of first year on the road visiting the other sites.</td>
</tr>
<tr>
<td><strong>Communication process during integration</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>“Very professional”</td>
</tr>
<tr>
<td></td>
<td>“Lots of time and effort spent on communication”</td>
</tr>
<tr>
<td></td>
<td>“It was handled very well”</td>
</tr>
<tr>
<td><strong>Integrating mechanisms used</strong></td>
<td>International meetings</td>
</tr>
<tr>
<td></td>
<td>Joint R&amp;D meetings</td>
</tr>
<tr>
<td></td>
<td>Mixed project teams</td>
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<tr>
<td></td>
<td>Joint R&amp;D personnel training programs</td>
</tr>
<tr>
<td></td>
<td>Job rotation programs</td>
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<tr>
<td><strong>Acquired personnel retained</strong></td>
<td>90%</td>
</tr>
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</table>
Table 5

<table>
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<tr>
<th>Effect of Acquisition on Personal Situation and Respect for Others</th>
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<tr>
<td>---------------------------------</td>
</tr>
<tr>
<td><strong>Eka Nobel</strong></td>
</tr>
<tr>
<td>Acquirer (SW)</td>
</tr>
<tr>
<td>Acquired (GB)</td>
</tr>
<tr>
<td><strong>Alfa Laval</strong></td>
</tr>
<tr>
<td>Acquirer (DK)</td>
</tr>
<tr>
<td>Acquired (US)</td>
</tr>
<tr>
<td><strong>ABB</strong></td>
</tr>
<tr>
<td>Acquirer (SW)</td>
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<tr>
<td>Acquired (US)</td>
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</table>

Effect on personal situation: Respondents were asked how the acquisition had affected their own personal situation, in terms of (1) tasks and responsibilities, (2) salary, pension and other benefits, (3) work satisfaction, and (4) job security. Scale: 1 = much worse, 4 = no change, 7 = much better. Score above is the mean of all four questions.

Respect for other party: Respondents were asked to evaluate the R&D of the other company in comparison to their own, in terms of, (1) technical competence, (2) efficiency of R&D, (3) market contact, (4) technical resources, and (5) willingness and ability to cooperate. Scale: 1 = much worse, 4 = no change, 7 = much better. Score above is the mean of all five questions.

** Pairs significantly different at p <.05 using t-test
* Pairs significantly different at p <.10 using t-test

grams; and (4) the percentage of acquired personnel retained. Table 4 is a summary of our analysis. It shows that Eka Nobel and ABB both worked very hard to manage the integration process well, while Alfa Laval pushed less hard (in large part because the acquired firm was less receptive).

The effects of the integration process were very clear. We polled individuals in both acquired and acquiring units at two points in time (1992, 1996), and asked them about the impact of the acquisition on their personal situation, and their respect for the other firm. Table 5 presents the results of this analysis. The key finding is that in all three cases the attitudes in the acquired firm became more positive over time: Individuals felt their personal situation had improved, and their respect for the acquiring firm increased significantly.9

We discuss the integration process here to help explain the transformation that occurred from 1989 to 1996. Stated in terms of the constructs used in this research, the three companies actively fostered a communication process and pushed for visits and transfers as a means of enhancing integration. These in turn helped to overcome the uneasy relationship (in the case of Alfa Laval) and to surmount the inter-cultural problems that are endemic to international acquisitions. Moreover, we have strong evidence (table 5) that the results of this
process had a strong positive impact on the acquired employees’ respect for their acquirers and belief in their personal prospects.

Knowledge Transfer in Late Stages. The knowledge transfer pattern in the late stages of the integration process was markedly different from the early-stage pattern (table 3), in that it focused on reciprocal transfer. In Eka Nobel, R&D work was focused on two sites (Sweden and UK), but with a large number of joint development projects between the two. In Alfa Laval, the emphasis shifted from separate development to much greater co-operation between Denmark and the US. The new R&D manager’s goal of building a “virtual R&D organization” spanning five countries was beginning to take shape by 1996. In ABB, the problems experienced in the original joint development project had been understood, and a second phase of joint development work was begun with a much higher level of international collaboration. One sub-project, for example, involved people from eight countries, and it was kicked off in the US with a six-week period of cultural training for those involved.

Implications of the Case Study Evidence. The case study evidence complements the questionnaire data by showing how the knowledge transfer patterns changed over the course of the post-acquisition integration period. Early-stage transfers were primarily imposed, and they represented one-off changes that the acquiring firm felt were particularly easy and/or important to make to enhance the performance of the acquired firm. The knowledge transferred in these cases was in a relatively articulate form, e.g. project management systems and patented technologies. Late stage transfers were much more typical of what one would expect to see in a single firm, in that they involved high levels of collaboration, sharing of resources, and transfers of individuals between units. The knowledge in such cases was more tacit than in early-stage transfers.

This shift explains why we had problems discriminating between the two directions of knowledge flow in the questionnaire data. Our data represented cases of acquisitions that had mostly occurred more than five years ago. In such cases, we would expect high levels of reciprocal knowledge flow, rather than distinct flows in both directions. Thus, no discriminant validity between knowledge transfer in one direction vs. the other would be expected.

The shift in knowledge transfer patterns can be attributed to the emergence of a social community in the newly merged firm, as was indicated in the introductory part of this paper. The efforts made by the three companies studied here are typical of the broader attempts made by multinational companies to inculcate their employees around the world with a common set of values and beliefs. This process has been referred to as normative integration or socialization [Etzioni, 1961; Van Maanen and Schein, 1985; Bartlett and Ghoshal, 1989].

Conclusions

The main contribution of this study is its multi-method documentation of knowledge transfer in acquisitions. A survey of R&D organizations in 42 multinationals analyzed with OLS and negative binomial regression, combined with detailed longitudinal case studies of three international acquisitions gave us a unique opportunity to address our research questions from multiple angles. Our first objective was to identify facili-
tators of international knowledge transfer in acquisitions. We showed that communication, and visits and meetings were significant predictors of technological know-how transfers, while the impact of the articulability of knowledge and time elapsed since acquisition varied according to the type of knowledge being transferred. An important implication of the study is the observation that two rather different forms of knowledge transfer can be discerned, and that their facilitators are not the same.

Our second objective was to explore patterns of knowledge transfer during the post-acquisition integration process. An analysis of our longitudinal case studies revealed, maybe not surprisingly, that international knowledge transfer increased over time. Interestingly, in addition to the change in the quantity of transfer, we found that the quality and type of transfer changed as well. In the early stages, knowledge transfer was mostly one-way from the acquiring to the acquired unit, and typically imposed. In the later stages, knowledge transfer was in both directions and reciprocal transfer was more frequent. Furthermore, there was a sense that the knowledge transferred later in the process was more sophisticated. This change over time in the pattern of knowledge transfer is an important characteristic that distinguishes acquisitions from other modes of knowledge transfer.

An important conclusion, then, is that the knowledge transfer process in acquisitions is distinctly different from the process under other modes of governance, because of the rapidly-evolving relationship between the two parties. In the early stages, knowledge transfer is undertaken in a relatively hierarchical manner, but this then gives way to a more reciprocal process. And over time the type of knowledge being transferred shifts in emphasis from relatively articulate (e.g. patents) to more tacit. These findings have been discussed above. The point to make here is simply that the acquisition context gives us a story that is not seen under other modes of governance. The only comparable situation would appear to be in strategic alliances, in which the approach to knowledge sharing changes as the alliance evolves [e.g. Arino and de la Torre, 1998; Doz, 1996].

This study has three significant limitations. First, we restricted ourselves to Swedish multinational firms and their acquisitions in the R&D area. Obviously there is no reason to assume that this sampling frame is generalizable to other countries or to other functional areas, but it does represent a reasonable starting point. Second, we worked with a rather small sample of firms. This resulted in many of the propositions receiving only marginal support despite the existence of reasonably strong correlations. There is thus considerable scope for a similar study being done with a much larger sample, in the hope that some of the marginal relationships suggested in this paper will gain stronger support. Finally, the operationalization of knowledge transfer is far from perfect. By using two different questionnaire measures as well as qualitative evaluations we sought to “triangulate” on the phenomenon, and indeed this did yield some interesting results. But it may be that studying specific transfers allows for much greater construct validity than studies done, like this one, at the aggregate level.

Questions of knowledge transfer continue to be important to scholars in international business, and our focus on acquisitions was intended to complement
the related studies that have been done on alliances, joint ventures, and intra-firm knowledge transfer. This paper has shown that there are important areas of overlap between the different governance structures under which knowledge transfer occurs, but also that there are unique elements as well. Future research, we suggest, can usefully be directed towards a more explicit understanding of the peculiarities of the different governance structures, in order to understand the ways in which the knowledge transfer process differs from one to the next.

NOTES

1. Note that we also looked into the acquiring firm and host country as possible control variables (dummies), but none was significant.

2. The questionnaire was designed to test the emerging ideas in this study, and also to follow up on a separate study on the patterns of communication between foreign operations of Swedish MNCs [see Håkanson and Nobel [1993] and Nobel and Birkinshaw [1998].

3. Although we did obtain a response rate in excess of 50 percent, non-respondent bias could still be a problem. We compared the respondents and non-respondents on two dimensions, host country and parent company. The only significant difference was in terms of the parent company, in that some companies were over-represented (Alfa Laval and ABB) and others were under-represented (Sandvik and SKF).

4. This sample included five cases of acquisitions by Swedish MNCs of Swedish companies. It could be argued that a study of international acquisition should eliminate these, but because they actually served to increase the variance in our measure of cultural distance, they were retained.

5. We polled head office managers on the same issues, but it became apparent that they could not answer the detailed questions about the specific units, so their responses were not used.

6. Taylor was part of the acquisition of its parent, Combustion Engineering.

7. This figure was pro-rated upwards for those acquisitions that had occurred within the last five years.

8. To be specific, we asked for the number of granted patents generated by the R&D units over the most recent five year period.

9. It is interesting that the attitudes of individuals in the acquiring firms were not so positive; in fact, a few felt that their situation had become worse, and most felt less respect for the acquired firm. This suggests to us that these individuals had overly-high initial expectations that were not met.

REFERENCES


Fornell, Claes and D. Larcker 1981. Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research. 18: 39-50.


Ghoshal, Sumantra. 1986. The innovative multinational: a differentiated network of organizational roles and manage-
 KNOWLEDGE TRANSFER IN INTERNATIONAL ACQUISITIONS


Research in organizational behaviour, Greenwich, CT: JAI Press.


