

Supplier-Buyer Relationship Development via Knowledge Transfer

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Abstract

Knowledge transfer is a critical contributor to the innovation process. The purpose of this article is to analyse how Multinational Corporations transfer knowledge to their local suppliers. We present the results of a survey of 121 US multinational subsidiaries in Brazil. In a first step of the research, using an analysis based on hierarchical cluster, we identify four different transfer methods. In a second step of the research, using analysis of variance, we analyse each transfer method with a view to defining the strategic objectives behind the transfer and identifying the transfer mechanisms used. With the results of this research, we intend to extend research on the topic of supplier-buyer relationships and knowledge transfer in international settings by providing definitions of types of transfer methods, and by highlighting the strategic interests of the transfer for the source organisation.

Keywords: knowledge, transfer, suppliers, buyers, inter-firm relationships, networks, multinational corporation, Brazil

Introduction

Knowledge transfer is a key activity in the management of organisations, whether in order to diffuse best practices in the firm with the aim of maximising productivity or in order to transmit knowledge to other firms to facilitate and develop inter-firm relationships and networks. It plays a key role in conditioning innovation processes. In this study we focus on the second type of transfer: inter-firm transfer of knowledge. One focus for attention that has been highlighted is that of networks of supplier-buyer relationships (Pulles, Veldman and Schièle, 2014). In particular, we study knowledge transfer by US multinationals purchasing companies to their local suppliers in Brazil. The purpose of this research is to identify and categorise transfer methods according to dimensions identified on the basis of a literature review. These dimensions are used to build a typology. The methods identified are then defined from two perspectives: the strategic objectives of the source of the transfer and the mechanisms used for the transfer.

In the first part of the article we define the main concepts relative to knowledge transfer. We then present the methodology used, specifying how the data was gathered and defining the variables which were used to build the typology. We organize these variables in two groups: the characteristics of the transfer method and the components of this method (strategic objectives and mechanisms). We present the results of our analysis in the third part. In the fourth part, we discuss these results.

Conceptual framework

Knowledge transfer

The “Knowledge-Based View” (Kogut & Zander, 1992; Conner & Prahalad, 1996; Spender & Grant, 1996), has placed knowledge at the heart of analysis in the theory of the firm. The notion of knowledge transfer is particularly important since it is a central element which defines a firm and its relationship development process: “Firms are social communities which use their relational structure and shared coding schemes to enhance the transfer and communication of new skills and capabilities” (Zander & Kogut, 1995, p.76). Knowledge transfer leads to the integration and coordination of specialised knowledge (Grant, 1996) for it makes replication possible (Zander & Kogut, 1995). Replication means the internal diffusion of knowledge and competences: “Replication involves transferring or deploying competences from one concrete economic setting to another” (Teece, Pisano, Shuen 1997: 525). Knowledge transfer also plays a huge role in the creation of new knowledge (Nonaka, 1994).

Argote, Ingram, Levine & Moreland (2000) define knowledge transfer as follows: “Knowledge transfer is the process through which one unit (e.g. group, department or division) is affected by the experience of another. [...] Knowledge transfer in organizations manifests itself through changes in the knowledge or performance in the recipient unit.” (p.3). Szulanski (1996) proposes a definition which highlights how complex transfer is: “The exchange of organizational knowledge consists of an exact or partial replication of a web of coordinating relationships connecting specific resources so that a different but similar set of resources is coordinated by a very similar web of relationships” (p.28).

The importance of intra-firm knowledge transfer is highlighted in studies in many management domains: knowledge creation (Nonaka, 1994), development of productivity (Epple, Argote & Murphy, 1996), and management of multinationals (Gupta & Govindarajan, 2000; Kostova & Roth, 2002). However, some research has also studied the interest of sharing knowledge between organisations (Inkpen & Tsang, 2005), and innovation in particular where networks are concerned (Freitag & Young, 2014). A firm which knows how to organise and manage a collection of inter-organisational relationships improves its learning process (Powell, 1998). A firm must be able to enter the relevant networks. In order to do this, it must develop “collaborative know-how” (Simonin, 1997). Taking part in successful co-operations gives the firm the reputation of being a “valuable partner” (Powell, Koput & Smith-Doer, 1996). This reputation is useful for concluding future co-operations. In this context, the transfer of knowledge by one firm to other firms plays an important role because it helps it to enter a network. Therefore knowledge transfer is a considerable advantage in building a firm’s relational capability. This notion of relational capability is defined by Lorenzoni and Lipparini (1999) as a “Firm’s capability to develop, integrate and transfer knowledge across different actors in a network” (p.320). Knowledge transfer to other organisations can therefore be conceived as a central element in knowledge creation and development: “Firms must learn how to transfer knowledge across alliances and locate themselves in those positions that enable them to keep pace with the most promising scientific or technical developments.” (Powell et al, 1996: 119-120).

Research on inter-organisational transfer is not limited to networks. Simonin (1999, 2004) and Muthusamy and White (2005) study transfer in alliances. Makhija and Ganesh (1997), Inkpen and Dinur (1998) and Dhanaraj, Lyles, Steensma and Tihanyi (2004) analyse transfer between the parents and a joint venture. Darr, Argote and Epple (1995) analyse transfer between firms in the same franchise group. Argote, Beckman and Epple (1990) and Baum and Ingram (1998) study the transfer between companies in the same industry. There is also a strain of research which studies transfer methods used by firms in order to transfer knowledge to their suppliers (Prevot & Spencer, 2006; Modi & Mabert, 2007), in particular in the Japanese automobile sector (Cusumano, Takeichi, 1991; Dyer & Nobeoka, 2000; Laseter, 2001; Takeishi, 2001; Kotabe, Martin & Domoto, 2003). In this article, we study inter-organisational knowledge transfer by multinationals to their local suppliers.

Knowledge, source and recipient

Knowledge occupies a central place in management theory. The interest given to knowledge is certainly not new, since it can be found at the basis of the principle of limited rationality in Simon’s theories from the 1940s. But, from the end of the 1980s, researchers in strategic management have been developing a real use of this notion by making it a privileged source of competitive advantage (Itami, 1987; Kogut & Zander, 1992; Conner & Prahalad, 1996). Despite a wide use of the concept of knowledge, the question of how to define it remains a topic of debate between researchers. A point of agreement however is in the systematic recourse to the distinction developed by Polanyi (1962) between tacit and explicit knowledge. This distinction is still very much used and has been deepened, in particular in the research on transfer by the likes of Winter (1987), Zander and Kogut (1995) or, more recently, Hall (2000), Simonin (1999, 2004) and Dhanaraj et al. (2004). The opposition between tacit and explicit knowledge leads to the definition of different kinds of knowledge according to the level of barriers to transfer. Tacit knowledge can not be codified; therefore to try to teach it to an individual or an organisational unit supposes a collection of adaptations and the use of transfer mechanisms allowing for rich media (Murray & Peyrefitte, 2007).

The participants involved in a transfer are generally defined as the “source” for a firm which transfers knowledge and “recipient” for the receiving firm (Szulanski, 2000). In their analysis of the organisation of knowledge transfer, Argote and Ingram (2000) show that transfer consists of displacing what they call “reservoirs of knowledge”. There are three kinds of such “reservoirs”: individual members of an organisation, the tasks they undertake, and the tools and technology they use. By interacting, these “reservoirs” form networks. In principle, the transfer can be made by displacing one or other of the elements of these networks. In practice, this is complex because each component of the network (and, of course, the network itself) should be compatible with the organisational context of the recipient. Thus, there should be compatibility between the knowledge transferred and the recipient’s organisational context.

This is underlined by Inkpen and Dinur (1998). They show that the more the contextual variables of the recipient are similar to those of the source, the easier it will be to make the transfer and the higher the probability of success. According to Inkpen and Dinur (1998), the nature of the relationships between the source and the recipient will influence the success of the transfer since it can facilitate the compatibility between the knowledge and the recipient’s organisational context. The interaction between source and recipient plays a fundamental role in knowledge transfer. The importance of this interaction is emphasised in many studies on knowledge transfer (Baum & Ingram, 1998; Hansen, 1999; Darr & Kurtzenberg, 1999; Szulanski, 1996, 2000; Simonin, 1999, 2004). This interaction is of primary importance because transfer implies adaptation of knowledge to the source’s organizational context (Hurt & Hurt, 2005; Szulanski & Jensen, 2006; Williams, 2007).

Method

Data collection

This article presents the results of a survey of a sample of 121 US multinationals in Brazil. It is based on a questionnaire which had been previously tested on four managers working in multinationals. It was then sent by e-mail to 416 Brazilian subsidiaries of US companies. In total, 121 responses were sent back. We had the support of the American Chamber of Commerce in Brazil which sent out the questionnaire to hand-picked individuals. The companies we targeted were the sources of the transfer. Then, all the questions linked to the recipients’ characteristics represent how the source perceived these characteristics. We studied knowledge transfer linked to logistic operations. The US companies are the source and local suppliers in Brazil are the recipients.

Given the complex, or even paradoxical, character of the objective of a knowledge transfer in a competitive context we chose to restrict the field of research to relationships between buyer and supplier (“vertical” relationships between firms which are not in competition). The majority of the studies on technology transfer have been performed in an international context (Zhao & Reisman, 1992). Studies on inter-firm knowledge transfer also often concern relationships between companies of different nationalities (Mowery, Oxley & Silverman, 1996; Lyles & Salk, 1996; Tsang, 1999, Simonin, 2004). We therefore chose to place our study in an international context and particularly in Brazil which is both an attractive zone for foreign investors (Montgomery, 1999; McKinsey & Co, 2000). South America presents a lot of logistic opportunities but with considerable progress still to be made as Rodrigues, Bowersox and Catalone (2005) point out. These characteristics translate as a particularly rich relationship context between multinationals and local Brazilian suppliers for knowledge transfer purposes. We studied US multinationals as the United States, according to the Central Bank of Brazil, represents almost 40% of foreign direct investment in Brazil.

Variables

For this study, we defined two groups of variables: one representing the characteristics and the other representing the components of the transfer method. The constituent items of the variables are presented in the appendix.

The characteristics of the transfer method

By characteristics, we mean the elements which define the transfer method. These are the variables which were used in the typology to establish the different groups of firms. Each group is characterised by a type of knowledge transfer method. In order to define these variables, we performed Principal Component Analysis on a collection of 16 items which we identified on the basis of a literature review. Using the Kaiser method we retained 5 factors which group 14 identified items. The five factors explain around 88% of the variance.

Factor 1 describes the reciprocal commitment between the source and the recipient in the knowledge transfer process. How long the source estimates the relationship to last is an indicator of the extent of their commitment, as is the time and the personnel it dedicates to the transfer (Simonin, 2004). Equally, the recipient demonstrates commitment in the transfer process when it also agrees to dedicate time and personnel. Being receptive to external information is in fact essential to successful transfer and successful learning (Hamel, 1991). The time and personnel dedicated to the transfer is a tangible indicator of this receptivity (Simonin, 2004). It can also easily be perceived by the source. Another indicator of this receptivity is the recipient's willingness to adapt its organisational context in line with the transferred knowledge. The importance of this ability to adapt is stressed in studies on technology transfer (Lassere, 1984; Madu, 1989), knowledge transfer (Inkpen & Dinur, 1998; Baum & Ingram, 1998; Szulanski, 2000) and also in research on organisational learning (Huber, 1991).

Factor 2 describes the mastering of the transfer process by the source. The capability of the source to perform the transfer depends on how well it masters the knowledge to be transferred. Szulanski (2000) suggests associating to the notion of mastering knowledge the fact that there are concrete performance measures linked to implementing knowledge. In addition, past experience in making transfers is an indicator of the mastering of the transfer process. A useful indicator of this experience is the number of such transfers previously done (Lassere, 1984; Tsang, 1999; Szulanski, 2000; Simonin, 2004).

Factor 3 describes the capacity of the source to deal with informal aspects. The tacit nature of certain elements of knowledge make the transfer particularly difficult (Winter, 1987). The lack of formalisation of part of the knowledge contributes to causal ambiguity, which is one of the main barriers to successful transfer (Szulanski, 2000; Simonin, 2004). A successful transfer therefore presupposes mastering the way the informal aspects of knowledge are managed (Kogut & Zander, 1993; O'Dell & Grayson, 1998). On the other hand, mastering the informal aspects supposes an adaptive capacity of both the source and the recipient. In fact, the knowledge should be in line with the context in which it is implemented. This context is defined according to the participants in the transfer process, the tasks they undertake and the tools and technology they use (Argote & Ingram, 2000) or, more generally, according to a collection of dimensions such as the culture, the strategy, the decision making process, the environment and the technology (Inkpen & Dinur, 1998). Knowledge transfer involves extracting the knowledge from its "natural" context and putting it in a new context. To make this transfer easier, on the one hand, the source can try to adapt the knowledge in advance to the recipient's context. On the other hand, after the transfer, the recipient can adapt gradually the knowledge to its organisational context (Szulanski & Jensen, 2006) or even adapt its context to the knowledge. In fact, knowledge transfer implies the transformation of both the content and the context of knowledge (Yakhlef, 2007). Then, the source's perception of the recipient's capability to adapt the knowledge post transfer can influence how the transfer is done.

Factor 4 describes the source's perception of the level of cultural difference between the source and the recipient. Given the importance of a match between an organisational context and the knowledge, the existence of strong cultural differences leads the source to implement specific transfer methods designed to overcome these differences. Szulanski (2000) defines these differences on two levels: organisational culture and national culture.

Factor 5 describes the source's perception of the recipient's absorptive capacity. This refers to a firm's capability to recognise the value of new external information, to assimilate it and to use it to create

value (Cohen & Levinthal, 1990). The absorptive capacity is essential to successful transfer. Szulanski (2000) evaluates this absorptive capacity according to the recipient's experience of activities linked to the knowledge transferred and to their general managerial know-how.

The components of the transfer method

We used two dimensions to define the components of the transfer method: the strategic objectives of the transfer and the mechanisms used.

Certain theoretical bases from the studies on technology transfer or knowledge management in the context of alliances help to define objectives for inter-firm knowledge transfer. Knowledge transfer to a partner can be done by the source to save money in its own organisation for activities whose implementation relies on the relationships with this partner (Hall, 2000; Laseter, 2001). Beyond the savings, the transfer can contribute to improving the management of the relationship between the source and the recipient. The objective is therefore not reduced to a simple search for advantages which can be directly evaluated from the financial point of view (Prevot & Spencer, 2006; Modi & Mabert, 2007)). Among other things, the transfer is likely to generate a feedback effect. After the transfer is done, the source benefits from improvements made by the recipient whilst assimilating the knowledge transferred. The transfer can also be used as a way of creating specific relationships between the source and the recipient. Because it leads to a sharing of the knowledge, and thus provides the basis for exchanges based on the particularities of the partners, the transfer may be a source of creation of relational rents (defined by Dyer and Singh (1998) as profit generated in an exchange relationship which can not be generated by a sole firm and can only be created via the common contribution of different partners). The transfer can also play a fundamental role as a catalyst in the creation of new knowledge; thanks to the transfer the source will favour the emergence of learning in common with the recipient. The transfer can also be a way to implement strategies or organisational methods. Finally it can be conceived as a strategy in itself, following the example of the organisation chosen by Japanese firms in the automobile sector. By sharing its production know-how with its suppliers, Toyota has established a rule for sharing (the idea of knowledge property in production activities no longer exists and knowledge is conceived as the property of the network consisting of Toyota and its suppliers) so, in the long term, Toyota benefits from the effects of sharing knowledge among all the suppliers in its network (Dyer & Nobeoka, 2000).

We established a list of twelve transfer mechanisms based on a literature review. In particular, certain studies define lists of mechanisms: Rebentisch and Ferretti (1995) who studied technology transfer based on an approach they called "knowledge asset-based view"; Makhija and Ganesh (1997) who defined control mechanisms for joint ventures and linked them to knowledge transfer; Almeida and Grant (1998) who analysed knowledge transfer in multinationals; Brewer and Nollen (1998) who listed inter-firm knowledge transfer mechanisms, and Dyer and Nobeoka (2000) who identified the range of exchange mechanisms used by Toyota for knowledge transfer to suppliers. The documents are collections of rules and procedures which help highly formalised knowledge transfer. Messages can be diffused to a wide audience during annual general meetings or occasional symposiums. The fax and the phone can be used for knowledge diffusion. A common IT system can also be used to share formalised knowledge. Site visits allow a recipient to have first hand knowledge of a source's organisational context. Face to face meetings also provide exchange on a personal level. Team work goes even further in terms of interaction since it allows for learning by doing when tasks are realised. The personnel in charge of managing the relationship with suppliers can also be included in the transfer process and be in charge of diffusing knowledge and checking how well it has been assimilated. More formally, the source can create groups in charge of auditing and advising suppliers. The source can also provide the recipient with training programmes. Finally, the transfer process can involve exchanging personnel for a pre-determined period.

Results

Transfer methods: characteristics

Our first research objective was to identify different inter-firm knowledge transfer methods. This is the first step of our analysis. We organized this first step of the study in three phases. In the first phase, we made a hierarchical cluster (Ward's Method) from which we obtained four groups of firms. The characteristics of the inter-firm transfer methods in each group were particularly homogeneous (the characteristics of the transfer method of each group were established according to the results obtained for the five factors described above and named "characteristics of the method"). Table 1 shows the percentage of the sample represented by each group.

Table 1: Constitution of clusters

	Group 1	Group 2	Group 3	Group 4
Number of firms	30	18	30	43
%	25%	15%	25%	35%

In the second phase, we then identified the profiles in terms of transfer methods for the four clusters on the basis of an analysis of variance (see Table 2). From Table 2 we noticed that the dimensions "Perception of cultural differences" and "Perception of absorptive capacity" hardly varied from one group to another. There are common elements for all four groups. Cultural differences and the recipients' absorptive capacity are elevated. In fact, the existence of cultural differences (and differences in practices) and the recipient's absorptive capacity provide a rich context for transfer. The groups are distinguished along the three other dimensions. For this analysis of variance we used the F-test. The significance is evaluated on the basis of a probability p inferior to 0.01.

Table 2: Profile of clusters according to the characteristics of the transfer method

Characteristics	Global average	Group 1	Group 2	Group 3	Group 4	F-test
Reciprocal commitment ⁽¹⁾	3.58	3.03	3.83	4.27	3.37	13.51**
Mastering of the transfer process ⁽¹⁾	3.93	3.11	3.39	4.30	4.53	31.87**
Dealing with informal aspects ⁽¹⁾	3.09	2.73	4.33	3.53	2.51	38.88**
Cultural differences ⁽¹⁾	3.79	3.60	4.06	4.17	3.56	2.16
Absorptive capacity ⁽¹⁾	4.65	4.73	4.56	4.71	4.58	0.30

⁽¹⁾ scale: 1 to 7

** $p < 0.01$

In the third phase, in this analysis of variance, each group was compared with all the other groups to establish the significance of the difference of the mean score between them. This comparison was done using the Least Significant Distance test (significance of the difference of the mean score with $p < 0.05$). The comparison was done for the three variables: "reciprocal commitment", "mastering of the transfer process" and "capacity to deal with informal aspects of the transfer". For "reciprocal commitment" there are significant differences at all levels except between groups 1 and 4 and between groups 2 and 3. For "mastering of the transfer process" there are significant differences at all levels except for between groups 1 and 2 and between groups 2 and 4. For "capacity to deal with informal aspects of the transfer" there are significant differences at all levels except between groups 1 and 4. From these results we can distinguish or associate the groups on each of the dimensions. In Table 3 "Low" represents a mean score which is significantly lower than the total mean score (i.e. the mean score for all the groups), "Average" represents an equivalent mean score and "High" represents a mean score which is significantly higher than the total mean score.

Group 1 (25% of the sample) is characterised by a low level on three variables. Group 2 (15% of the sample) presents a high reciprocal commitment, a high capacity to deal with informal aspects of the transfer but a low mastering of the transfer. On the other hand, group 4 (35% of the sample) presents a

low reciprocal commitment, a limited capacity to deal with informal aspects of the transfer but a high mastering of the transfer. Group 3 (25% of the sample) is characterised by a high level of reciprocal commitment and mastering of the transfer.

Table 3: Distinction of clusters according to the characteristics of the transfer method

	Low	Average	High
Reciprocal commitment	G1 G4		G3 G2
Mastering of the transfer process	G1 G2		G4 G3
Dealing with informal aspects	G4 G1	G3	G2

Transfer methods: objectives and mechanisms

In the second step of our research, we went into more depth into the study of profiles by using two other analyses of variance; one on the strategic objectives of the transfer (Table 4) and the other on the transfer mechanisms (Table 6). For each factor we compared the groups using the Least Significant Distance test. In Tables 5 and 8 we present a summary of these comparisons based on the model used in Table 3 above.

Table 4: Comparison of clusters according to the strategic objectives of the transfer

Objectives ⁽¹⁾	Global mean	Group 1	Group 2	Group 3	Group 4	F-test
Savings	4.57	4.43	4.56	4.47	4.74	1.30
Relationship management	4.28	4.03	4.56	4.47	4.21	2.80
Feedback effect	2.15	1.27	3.06	2.57	2.09	30.41**
Relational rents	3.86	2.97	4.39	4.27	3.98	18.17**
Knowledge in common	1.65	1.00	2.83	2.03	1.35	31.47**
Implementation of strategies	3.93	2.87	4.17	4.47	4.21	22.71**
Network management strategy	1.63	1.00	1.44	2.17	1.77	9.29**

⁽¹⁾ Scale: 1 to 7

**p<0.01

On studying the mean scores we notice that certain objectives often recur (saving money and improving the management of the relationship) or fairly often recur (use of transfer as a way to implement strategic objectives and create relational rents) while others are rare (feedback effect, creation of knowledge in common, implementation of a real network management strategy). Saving money and improving the management of relationships are frequently the objectives of transfer methods (the mean score is high: 4.57 and 4.28). These objectives can be found in all four types of method. On the other hand, the transfer methods differ for five other objectives. We therefore use these to distinguish the emergent groups. This distinction is presented in Table 5. Given that, for three out of the five variables all the groups were opposed in terms of the mean scores, we introduced a fourth level: “very high”.

Group 1 presents only the objectives which are limited to those which are common to all four methods (saving money and improving the management of relationships). Groups 2 and 4 are directly opposed on the objectives of the feedback effect (average for G4 and very high for G2) and on the creation of knowledge in common (average for G4 and very high for G2). It is useful to note that these two types of objectives are very rare but nevertheless are found in Group 2 at a very high level. They therefore can be said to really characterise this group. Group 3 presents a high level for all the objectives and a very high level (compared to other groups) for the implementation for the “network management strategy” objective based on the transfer.

Table 5: Distinction of clusters according to the strategic objectives of the transfer

	Low	Average	High	Very high
Feedback effect	G1	G4	G3	G2
Relational rents	G1		G2 G3 G4	
Knowledge in common	G1	G4	G3	G2
Implementation of strategies	G1		G3 G4 G2	
Network management strategy	G1	G2	G4	G3

Table 6: Comparison of clusters according to transfer mechanisms

Mechanisms ⁽¹⁾	Global mean	Group 1	Group 2	Group 3	Group 4	F-test
Documents	0.91	0.90	0.61	0.97	1.00	10.09**
AGM	0.46	0.30	0.33	0.63	0.51	2.88
Fax	0.05	0.07	0.06	0.03	0.05	0.12
Site visits	0.91	0.83	0.89	0.93	0.95	1.13
Phone	0.20	0.27	0.17	0.23	0.14	0.71
Face to face meetings	0.58	0.33	0.89	0.87	0.42	12.00**
Personnel in charge	0.74	0.57	0.72	0.83	0.81	2.52
Common IT system	0.26	0.07	0.06	0.40	0.37	5.83**
Trainings	0.21	0.00	0.22	0.60	0.19	13.30**
Audits-consulting	0.33	0.07	0.39	0.67	0.26	10.73**
Team work	0.35	0.13	0.61	0.57	0.23	7.93**
Exchanging personnel	0.04	0.00	0.00	0.13	0.10	3.07

⁽¹⁾ Dummy variables: 1 (used) or 0 (not used)

**p<0.01

Certain mechanisms are often used (that means that many firms use them, whatever the transfer method), others much more infrequently. In Table 7 we classify the mechanisms according to their mean score (a high mean score represents a high level of use).

Table 7: Use of transfer mechanisms

Very frequent use	Documents ; Site visits
Frequent use	Personnel in charge of managing the relationship
Average use	Frequent face to face meetings ; AGM
Rare use	Team work; Audits-consulting ; IT systems ; phone
Very rare use	Fax ; personnel exchange

Faxes are practically never used as a knowledge transfer mechanism. Personnel exchange is also rarely used (groups 3 and 4), or not at all (groups 1 and 2). The phone is relatively rarely used. Annual general meetings are used by all the groups, but the most frequently by group 3 (however, the difference in mean score is not really significant). Site visits are often used by all the groups, as are personnel in charge of managing relationships with suppliers. The other mechanisms are used in different ways according to the different groups. Table 8 presents the distinction of clusters according to their use of transfer mechanisms.

Group 1 is characterised by a moderate intensity of use of transfer mechanisms, though these are common to all the groups (documents, site visits, and personnel in charge of managing relationships with suppliers). In comparison with other groups, group 2 makes moderate use of documents and a

common IT system. On the other hand, it is characterised by a high use of face to face meetings and team work. At the other extreme, group 4 uses a common IT system but very rarely uses face to face meetings and team work. Group 3 uses all the mechanisms and is characterised by a high use (in comparison with other groups) of training and audits-consulting.

Table 8: Distinction of clusters according to transfer mechanisms

	Moderate	Average	High
Documents	G2	G1	G4 G3
Face to face regular meetings	G4 G1		G2 G3
Common IT system	G1 G2		G3 G4
Training	G1	G2 G4	G3
Audits-consulting	G1	G2 G4	G3
Team work	G4 G1		G2 G3

Discussion

The typological analysis allows us to distinguish four groupings of inter-firm relationship settings based on three characteristics of transfer methods:

- reciprocal commitment on the part of the source and the recipient in the transfer process
- mastering of the transfer process by the source
- source's capacity to deal with informal aspects of the transfer

Each of the four groups thus identified represents a type of transfer method based on these three characteristics. The transfer method type is also defined based on its components:

- the source's strategic objectives
- the mechanisms used to make the transfer

The studies on knowledge transfer generally give the mechanisms in the form of a list and it then seems useful to define classification modes of these mechanisms. This will allow us in particular to better characterise the groups according to the transfer mechanisms used. The elements for such a classification are proposed in the work of Rebentisch and Ferretti (1995), Brewer and Nollen (1998), and Almeida and Grant (1998). Brewer and Nollen (1998) distinguish the exchange of a unique message between two people and the diffusion to a wide audience. These authors add two other dimensions: mechanisms supposing movement of people and mechanisms based on documents. In the work of Almeida and Grant (1998) we find two of these dimensions to which are added two other dimensions. The classification of the transfer mechanisms proposed by these authors relies on the following elements: capacity for transferring different types of knowledge (tacit or explicit), breadth of communication (restricted number of individuals or wide audience), richness of communication (complexity of language that the mechanism permits), and degree of formality (use of documents). Rebentisch and Ferretti (1995) have proposed a classification which is close to that of Almeida and Grant (1998) but which adds certain other dimensions. This classification relies on five elements: cost, amount of human resource effort required, ability to employ a variety of signals or information types, volume of information the mechanism is able to transfer, ability to give feed-back. In order to define the transfer mechanisms, on the basis of these classifications, we selected three common dimensions. We added a fourth dimension along the lines of Inkpen and Dinur (1998): possibility to adapt the knowledge to the recipient's organisational context (Table 9).

Table 9: Classification of transfer mechanisms

Type of knowledge which can be transmitted (capacity of the mechanism to transfer tacit knowledge)
Breadth of the communication (mechanism allowing transfer to a wide audience or a restricted audience)
Cost of the mechanism and mobilisation of resources (cost, number of people required, time investment)
Possibility of adaptation to the recipient's organisational context (adjustments and possible feed-back)

Previously we underlined the importance of interaction between source and recipient. From this notion, we can define mechanisms leading to more or less interaction. The four dimensions proposed above therefore allow us to qualify the different mechanism types with precision. In Table 10 we associate to each group the mechanisms used. This association is done according to the mean scores presented in Table 6, while taking into account a certain level of specificity linked to how frequently the mechanisms are used as defined in Table 7 (if a mechanism is rarely used and if its level of use by the group is high, this mechanism is part of the characteristic of the group). We have also taken into account the differences in the mean scores between groups using the Least Significant Distance test. These are presented in Table 8. An "average use" does not necessarily mean that the mechanism is very rarely used by the firms in the group but that the difference of use is not significant when compared to other groups. This allows us to highlight the mechanisms which are really specific to each group.

Table 10: Transfer mechanisms specific to each group

	Group 1	Group 2	Group 3	Group 4
High use		Face to face Team work	Documents AGMs Face to face IT system Training Audits-consulting Team work	Documents IT systems
Average use	Documents Site visits	Site visits Personnel managing the relationship Audits-consulting Training	Site visits Personnel managing the relationship	Site visits AGMs Audits-consulting Personnel managing the relationship Training

In the same way we have associated to each group the strategic objectives of the transfer method (Table 11).

Table 11: Strategic objectives of the transfer method specific to each group

Group 1	Group 2	Group 3	Group 4
	improvement of knowledge (feedback) knowledge in common relational rents implementation of strategies	improvement of knowledge (feedback) knowledge in common - relational rents implementation of strategies network management strategy	relational rents implementation of strategies network management strategy

Group 1 is characterised by moderate use of the transfer mechanisms. The mechanisms used are limited to those generally used by all the groups. In addition, the firms in this group present low levels on the dimensions “reciprocal commitment”, “mastering of transfer” and “capacity to deal with informal aspects”. The strategic objectives of the transfer method associated with this group are limited to objectives which are common to all the groups (saving money and improving the management of the relationship). We have therefore called the transfer method characterising this group the “Moderate method”.

Group 2 is characterised by mechanisms implicating a high interaction between source and recipient, with a strong capacity of adapting the knowledge to the recipient’s organisational context but poor breadth of communication (inter-personal communication favoured as opposed to communication to a large audience) and a relatively high mobilisation of resources (time and personnel). This group is characterised by “high reciprocal commitment” and “capacity to deal with informal aspects” despite poor “mastering of the transfer process”. One of the specific transfer objectives of this group is also to improve knowledge by feedback effect and to create knowledge in common, which supposes a high level of interaction between source and recipient. We have therefore called this transfer method the “Relational method”.

Firms in Group 3 use a wide range of mechanisms, both informal ones which imply strong interaction and formal ones which allow communication to a wide audience. In addition this group is also characterised by the organisation of annual meetings and the setting up of training seminars which supposes high mobilisation of resources (financial, human and time). The group presents high “reciprocal commitment”, high “mastering of the transfer process” and high “capacity to deal with informal aspects” as well as high levels for all the strategic objectives. It is therefore in opposition to group 1 and we have named it the “Full method”.

Group 4 uses the mechanisms which are adapted for transferring formal knowledge and diffusing to a wide audience. These mechanisms do not imply high interaction between the source and the recipient and do not allow for a very high adaptation of the knowledge to the recipient’s particular organisational context. The capacity to deal with informal aspects of the transfer is limited. There is no objective to improve knowledge by feedback effect or to create knowledge in common. This group is in direct opposition to group 2 and we have called the method characterising it the “Technical method”.

In the following figure we represent the groups according to the three characteristics of the transfer method (Figure 1).

We notice two levels of opposition. In the first dimension, there is opposition between, on the one side, a Technical method defined by a low capacity to deal with informal aspects, an average reciprocal commitment but a high mastering of the transfer process, and, on the other side, a Relational method defined by high capacity to deal with informal aspects and high reciprocal commitment. This dimension opposes the method based on formalisation and the method based on less formal aspects. A second dimension opposes the Moderate method (which is restricted: few mechanisms used and limited strategic objectives) and the Full method (which is very wide: numerous mechanisms and numerous strategic objectives). Figures 2 and 3 represent these oppositions.

These two dimensions, extent and formalisation of the transfer method, allow us to summarise elements for the definition of transfer methods.

With more precision, the transfer methods can be defined according to mechanisms and objectives. The mechanisms can themselves be defined according to the level of interaction between the source and the recipient. In Table 12 we summarise the definition of the four transfer methods.

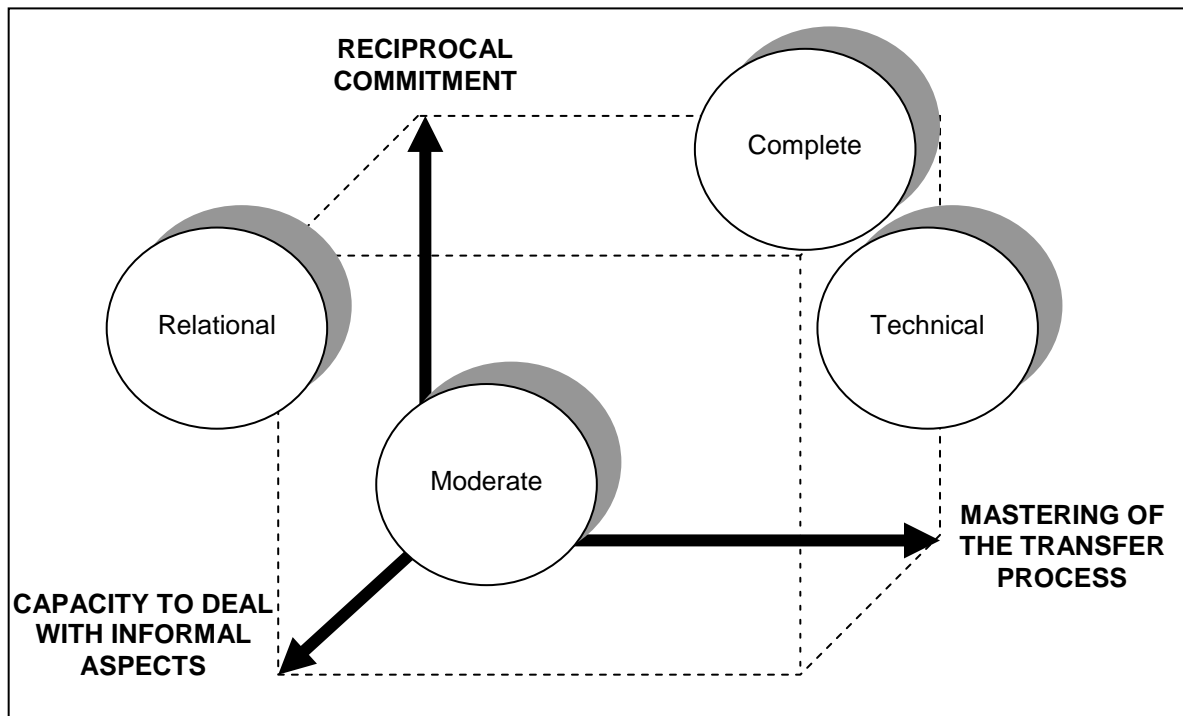


Figure 1: Representation of types of method according to their characteristics

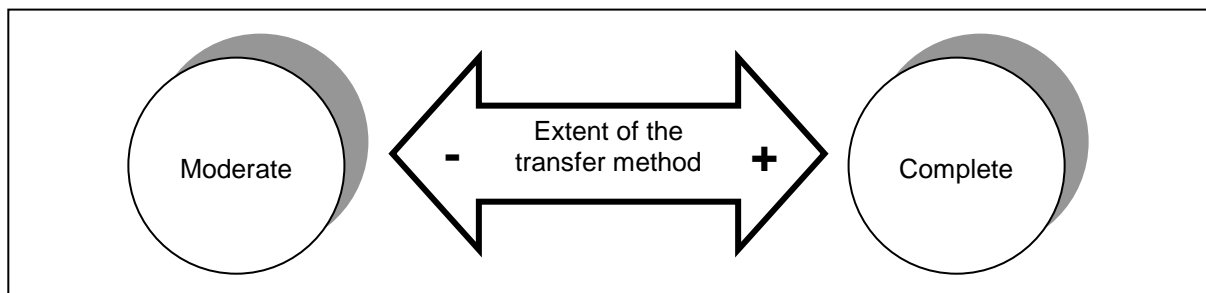


Figure 2: Opposition according to the extent of the transfer method

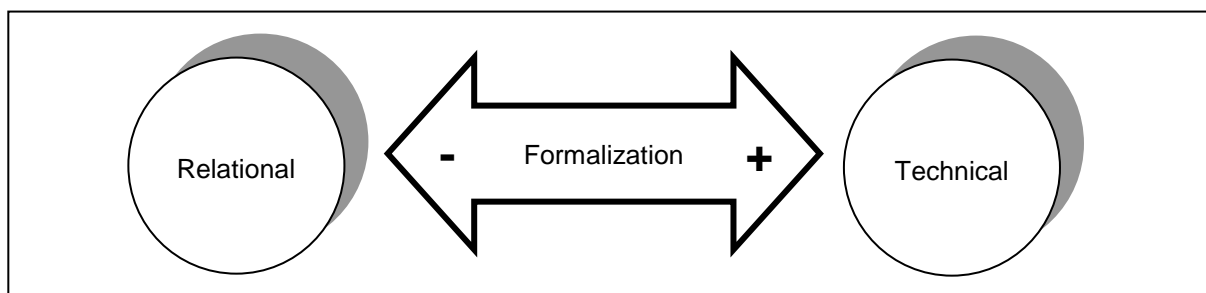


Figure 3: Opposition according to the formalization of the transfer method

Linking transfer methods and strategic objectives suggests a future research agenda: it would be particularly interesting to deepen the study by analysing the performance of each method (in terms of the achievement of the source's strategic objective). To do this, it would be useful to define performance measures for each strategic objective. The choice of one method by a firm will therefore depend on its strategic objectives. Then the efficiency of the method will be measured by the extent to which the strategic objectives have been achieved.

Table 12: Definition of the inter-firm knowledge transfer methods

		MODERATE	RELATIONAL	COMPLETE	TECHNICAL
% sample		25%	15%	25%	35%
Reciprocal commitment		Low	High	Very high	Average
Mastering of the process		Low	Low	High	Very high
Capacity to deal with informal		Low	Very high	Average	Low
Use of the mechanisms	High use		Face to face Team work	Documents AGMs Face to face IT system Training Audit-consulting Team work	Documents IT system
	Average use	Documents Site visits	Site visits Personnel managing the relationship Audit-consulting Training	Site visits Personnel managing the relationship	Site visits AGMs Audit-consulting Personnel managing the relationship Formations
Level of interaction between source and recipient		Low	High	Use of all mechanisms	Low
Main strategic objectives of the transfer method			- Improving knowledge - Knowledge in common - Relational rents - Implementation of strategies	- Improving knowledge - Knowledge in common - Relational rents - Implementation of strategies - Network management strategy	- Relational rents - Implementation of strategies - Network management strategy

Conclusions

In this study, on the basis of a typological analysis, we have identified four knowledge transfer methods which were used by American multinationals in their relationships with local suppliers in Brazil. In order to propose a simple and useable definition of transfer methods the results lead us to distinguish two main dimensions and two components of the method. It is possible to use these four elements to characterise a transfer method:

- extent of the method (moderate or complete)
- formalisation of the method (relational or technical)
- types of mechanism used (implying strong or weak interaction between source and recipient)
- types of strategic objectives

The results of this research allow us to extend the work on knowledge transfer by specifying definitions of transfer method. In addition, they can be useful to practitioners who wish to evaluate the interest of implementing knowledge transfer to other firms and who want to know what different transfer methods are available to them. The coherence between the components of the method (strategic objectives, mechanisms, breadth and formalisation) can be a condition of the success of the transfer.

On a theoretical level, this study contributes to extend the research results on knowledge transfer in a relationship and network context. In particular, while the studies on knowledge transfer in general

focus on the recipient and mainly on the notion of learning, the present study is focused on the source and proposes an analysis of the transfer objectives and the choice of method and associated mechanisms. Therefore, in terms of contribution to management theory, this study allows us to highlight the interests of the transfer for the source and to identify transfer methods.

This research could still be completed. In particular, it would be useful to study in more depth, for each method, the firms' organisational characteristics (size of firm in terms of workforce and turnover, number of years in the foreign country, nature of operations undertaken, degree of autonomy in the relationships with the headquarter, nationality, sector of activity). In addition, the study could be developed by other analyses such as an analysis to check the existence of a relationship between type of method and success of transfer.

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APPENDIX

We sent the questionnaire below to subsidiaries of US multinationals in Brazil (which are therefore the source of the transfer). Only the questions relative to items contributing to the definition of factors in the Principal Component Analysis are presented. For more clarity the questions were reorganised in the order corresponding to each of the variables.

Characteristics of the transfer method

Reciprocal commitment

1. Does your firm envisage relationships with suppliers who will benefit from the transfer for a time period which is:

Very low 1 2 3 4 5 6 7 Very high

2. Resources (financial, human resources and autonomy in decision making allowed to the transfer team) dedicated by your firm for the implementation of the transfer method are:

Very low 1 2 3 4 5 6 7 Very high

3. Time and personnel dedicated to the transfer process by the benefiting supplier (recipient) are:

Very low 1 2 3 4 5 6 7 Very high

4. The ability and the willingness of the recipient to adapt its organisational context to the knowledge once it has been transferred are:

Very low 1 2 3 4 5 6 7 Very high

Mastering of the transfer process

5. You consider that your firm masters the knowledge to be transferred:

Very low 1 2 3 4 5 6 7 Very high

6. Implementation of performance measures in your firm linked directly to the application of the knowledge that you decide to transfer to suppliers is:

Very low 1 2 3 4 5 6 7 Very high

7. Your firm's experience in transfers (in terms of the number of transfers previously done) is:

Very low 1 2 3 4 5 6 7 Very high

Capacity to deal with informal aspects

8. The tacit nature of the knowledge transferred (meaning that only a small part of the knowledge is codified in manuals, instructions, procedures) is:

Very low 1 2 3 4 5 6 7 Very high

9. The level of previous adaptation by your firm of the knowledge to the recipient's organisational context is:

Very low 1 2 3 4 5 6 7 Very high

10. The ability and the willingness of the recipient to adapt the transferred knowledge to its organisational context are:

Very low 1 2 3 4 5 6 7 Very high

Cultural differences

11. The differences in organisational culture and the management style between your firm and the recipient are:

Very low 1 2 3 4 5 6 7 Very high

12. The cultural differences (in terms of national culture) between your firm and the recipient are:

Very low 1 2 3 4 5 6 7 Very high

Absorptive capacity of recipients

13. The experience of the recipient in realising the activities linked to the transferred knowledge is:

Very low 1 2 3 4 5 6 Very high 7

14. You consider that the general managerial know-how of the recipient is:

Very low 1 2 3 4 5 6 Very high 7

Components of the transfer method

Strategic objectives of the transfer

Please indicate the level of importance of the following seven transfer objectives (questions 15 to 21) in the definition of your own transfer method.

15. Saving money in the management of the relationship or in the management of your internal organisation:

Very low 1 2 3 4 5 6 Very high 7

16. Improving the management of the relationship between your firm and the recipient:

Very low 1 2 3 4 5 6 Very high 7

17. Improving your own knowledge by benefiting from the recipient's experience during the knowledge transfer process (feedback effect):

Very low 1 2 3 4 5 6 Very high 7

18. Creating specific relationships with your suppliers thanks to the knowledge transfer:

Very low 1 2 3 4 5 6 Very high 7

19. Creating new knowledge in common with your suppliers:

Very low 1 2 3 4 5 6 Very high 7

20. Using the transfer as a way to implement general strategies in your firm:

Very low 1 2 3 4 5 6 Very high 7

21 Using the transfer to create a knowledge sharing network among your suppliers:

Very low 1 2 3 4 5 6 Very high 7

Transfer mechanisms

22. For each of the mechanisms cited below please indicate if it is used by your firm in the transfer method:

Documents of rules and procedures		
Not used		Used
Annual General Meetings		
Not used		Used
Fax (used for the transfer process)		
Not used		Used
Site visits		
Not used		Used
Phone, e-mail (used for the transfer process)		
Not used		Used
Regular face to face meetings		
Not used		Used

Personnel in charge of managing the relationship with the supplier		
Not used		Used
IT system in common		
Not used		Used
Training seminars		
Not used		Used
Consulting team providing audit and consulting services to the supplier		
Not used		Used
Regular team work		
Not used		Used
Personnel exchange		
Not used		Used