Managing Transfer Mechanisms - Efficiency of Knowledge Transfer in MNC

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Track: The MNC as a Knowing Organization

Abstract

This paper studies innovation transfer within multinational corporations. Using data on 89 transfer relationships, we test the relation between three aspects of transfer performance, i.e. cost, speed and implementation, and four mechanisms for transfer, i.e. hierarchical governance, existing routines, project groups, and standardized documentation. The results of the regression analysis show that hierarchical governance is associated with "un-efficient" transfer performance. Routines are efficient vis-à-vis cost, while project groups are efficient regarding implementation but increase the cost of transfer. Standardized documents show no strong significant effect on the aspects of transfer performance.

Introduction

The main assumption of the knowledge-based theory of organizational capability is that the value of a firm lies not only in monetary profits and cash flow generations but also lies in its ability to create and transfer knowledge, which in turn will yield to better performance. In short it claims that knowledge is the principal productive resource of the firm. Thus the firm has advantage over the market, since the firm has the ability and the resources to coordinate knowledge where the market falls short. The firm is to be understood as a social community specializing in the speed and efficiency in the creation and the transfer of knowledge (Kogut & Zander, 1996). Taking the above assumption further, it is clear that one firm's advantage over other firm then will lie on firm's ability to create and transfer knowledge more efficiently. However, integrating all the activities necessary to transfer knowledge is difficult, especially in multinational firms due to its diversity and dispersed subsidiaries.

Therefore many organization theory scholars have researched on mechanisms of coordination, covering from the more formal tools to subtle and informal coordination forms. Martinez and Jarillo (1989) article has done an extensive literature review on the mechanisms of coordination used by multinational firms, where the mechanism of coordination is defined as "…any administrative tool for achieving integration among different units within an organization." (Martinez and Jarillo, 1989, pp.490) However this

paper revamps the concept of coordination mechanism to coordinating transfer mechanism, which focuses only on the tool for achieving temporally integration among different units to facilitate knowledge transfer. In other words this paper focuses on the factors that affected performance of the execution of knowledge transfer itself. Since the use of unsuitable transfer mechanisms may cause loss of knowledge in the transmission process or may involve unnecessarily high communication costs-both with potentially negative effects on the overall performance of the organization (Pedersen, Petersen & Sharma, forthcoming), the appropriate transfer mechanism should be in place to ensure effective and swift knowledge transfer.

In order to investigate just what it entails to have the appropriate transfer mechanism, this paper identifies four different transfer mechanisms; hierarchical governance, transfer routines, temporary mutual project groups and standardized documents & codification using literature review of past research on knowledge transfer, than empirically tests the effects of these four different transfer mechanisms on different transfer performance measurements, which are stipulated in this paper as transfer achieved/implementation, transfer speed and transfer cost.

Research Setting

To show more practical side of knowledge management, and to show the relevance and the merit of studying the knowledge transfer mechanism in MNC, following two cases are used to show the impact of different knowledge transfer mechanisms to the process of developing a product. The knowledge transfer mechanisms mentioned in these cases are first the departmentalization or grouping of activities within a unit sanctioned by the hierarchy of formal authority, where formal responsibility of developing, in this case, basic engineering is given to one particular unit, in order to promote knowledge exchange among the subsidiaries. The second mechanism used for smooth knowledge exchange among the subsidiaries is the standardization of information storage and retrieval in a form of database and product management data system.

CASE I

> "Now days we are not officially allowed to do basic engineering here. However we do support Sweden never the less. We take our work packages (order) although it is hard for

> us to get cooperation from the organization here. When we talk to other departments here such as testing, production and engineering, everyone says 'why are you doing this? Sweden is responsible for this core-engineering task'. So it's hard to support them [Sweden] now, even when we have new ideas and even when we have the capacity and even when Sweden says OK please help us. It's not easy but the more we get to know people in Sweden the better it works. I think now we are on our way, still we have to improve communication with other units on what we are doing in order to avoid double work. So there is something between the way we did it in the formal times and the way we have to do it today. So I think there is something between it, that would be more efficient." (Interview was conducted on March 20, 2003)

This is a comment by a chef engineer working in a German subsidiary of a Swedish Multinational Company regarding the recent restructuring of the organization[1]. It is important to note that the engineering and the product development are the backbone of this MNC and a major part of product development is influenced by or performed together with its customers.

During the interview, it became clear that recent restructuring of the organization was a managerial attempt to coordinate the knowledge transfer process within the MNC. The purpose of restructuring of the organization was to prevent double work in core engineering. Before the restructuring, each subsidiary had their own core-engineering department, where their customers and suppliers were important participants in improving and development of products by giving inputs and requesting changes. However this led to inefficient use of resources due to lack of coordination of knowledge transfer mechanisms. The headquarter managers realized in some cases; the subsidiaries are developing same technology without knowing that other subsidiaries are also doing the same. It seems unnecessary resources are used up by this redundancy caused by lack of inter-unit communication and coordination to transfer knowledge. Thus the restructuring occurred by dividing the core engineering responsibilities and now only one subsidiary is responsible for developing one particular research area. For example Sweden is responsible of core engineering in X product. Now all the information, knowledge or technology on this X product must be directed to Sweden and Sweden is responsible in collecting and transferring necessary knowledge to other units.

According to the above statement of the German engineer, this formal mechanism of coordination of knowledge development and transfer seems to have its problems. As he said "Why are you doing this? Sweden is responsible for this core-engineering task",

[1] Due to the security reasons and promise of anonymity, the name of the company is concealed.

when the responsibility, given by the headquarter was removed, the incentive to transfer knowledge was no longer there to support the willingness of individual to share knowledge. It seems that once one knowledge transfer mechanism is removed, it has to be replaced by another. In this case business and/or personal meetings between German engineers and Swedish engineers seem to take the role of knowledge transfer mechanism and facilitates the knowledge sharing: "… the more we get to know people in Sweden the better it works".

CASE II

To extricate the communication problem attributed by the above restructuring process, the same company as above has been developing ways to facilitate information exchange, which was done by implementing and forming separate department to develop, to coordinate and to introduce a business process database and product management system to be used by all the business units, as well as their customers, suppliers and business partners. This implementation allows all the participating business divisions to share information on changes in product development and production. However the biggest problem in implementing these database systems was the reluctance of each individual within the units to use the system, since it was not invented by them and because they did not have any input in developing the system.

In both cases knowledge transfer mechanisms were put in place in order to better manage the information and the knowledge transfer between different subsidiaries. However, what seems to be clear improvement in facilitating knowledge transfer did not give positive results. In first case, the key knowledge generated by working together with customers and suppliers is dismissed by the subsidiary due to lack of incentive to transfer it to necessary unit. In the second case, not invented here syndrome prevented the use of knowledge transfer mechanism. Looking at both cases, it is clear that there is a need to study the role of transfer mechanism due to its complexity such as; not all knowledge transfer mechanism assists efficient transfer process; and different knowledge transfer mechanism has different effect on various aspect of transfer performance. Thus this paper breaks down the role of knowledge transfer into more specific mechanisms and

look at the effect of each transfer mechanism on various knowledge transfer performance measurements.

Theoretical Background

In the past research on knowledge transfer and the coordination mechanisms, it seems that dichotomy such as inter-intra, formal-informal and centralization-decentralization, takes over the main discussion of knowledge transfer (see Figure 1). According to Martinez and Jarillo studies on the evolution of MNC research on mechanisms of coordination, most of the studies can be grouped into formal and informal mechanisms: the two early ones, going from the late sixties until today, concentrate on the more formal mechanisms of coordination. The third, fully developed only in the last decade, has analyzed the informal, subtler mechanisms of coordination. In all three cases, an evolution from unidimensional to multidimensional perspectives on coordination can be observed.

The formal collaboration involves relationships governed by formal contractual agreement. It usually involves a formal network of two or more firms joined together to develop, to market or to sale a new product or services or to conduct R&D activities. The formal network can also exist within the firm, where different units, departments or subsidiaries are working together sanctioned by the HQ. Different forms of formal network would be joint ventures, strategic alliances, different research collaborations, licensing agreements and unit collaboration. The formal network is collaborations between firms or between units, departments, and subsidiaries, thus individuals involved in this network is working as a group and identifies and acts on the behalf of the firm or the unit. Therefore most of knowledge acquired by formal network is regulated by contracts and most of time it is limited to explicit knowledge, such as procedures, product specifications, codified systems, manual, software or scientific formula. The knowledge transferred within formal network can be best coordinated by formal mechanisms. The formal and structural mechanisms listed by Martinez & Jarillo's (1989) includes:

- Departmentalization or grouping of organizational units, shaping the formal structure.

- Centralization or decentralization of decision making through the hierarchy of formal authority.
- Formalization and standardization: written policies, rules, job descriptions, and standard procedures, through instruments such as manuals, charts, etc.
- Planning: strategic planning, budgeting, functional plans, scheduling, etc.
- Output and behaviour control: financial performance, technical reports, sales and marketing data, etc., and direct supervision.

Unlike the formal collaboration, informal knowledge sharing is not bounded by formal contractual agreement or institutional structure, and it usually evolves in the informal network which is formed by business or personal meetings, such as social gatherings, conferences, meeting, and the workplace, with the counter part such as customers, suppliers and competitors, as well as colleagues from other units and departments. These meetings are personal in nature, often unstructured and ad hoc. Thus the knowledge acquired is tacit (not easily documented and codified) and embedded to individuals. According to Martinez & Jarillo's (1989) list of the most common mechanisms of coordination, informal and subtle mechanisms includes:

- Lateral or cross-departmental relations: direct managerial contact, temporary or permanent teams, task forces, committees, integrators, and integrative departments.
- Informal communication: personal contacts among managers, management trips, meetings, conferences, transfer of managers, etc.
- Socialization: building an organizational culture of known and shared strategic objectives and values by training, transfer of managers, career path management, measurement and reward systems, etc.

Adding a new dichotomy, besides the formal and informal, to the knowledge transfer research, many studies have been done on these two issues; knowledge sharing activities with external business partners (Andersson, Forsgren & Holm 2002, Bresman, Birkinshaw & Nobel 1999), and knowledge sharing routines within a firm (Ghoshal & Bartlett 1990, Szulanski 1996, Ghoshal, Korine & Szulanski 1994), with more recent studies focusing on the importance of the firm ability to cross its organizational boundaries when accessing new knowledge. When crossing the organizational boundaries

a "network" serves as mediator for accessing knowledge and resources. However a "network" is not limited to crossing the organizational boundaries but it also exist within the firm, between units, departments and/or subsidiaries. Thus knowledge sharing occurs both inter and intra firm. The important issue is the transfer process within both inter-organization and intra-firm.

Ghoshal and Bartlett (1990, 1994) in their analysis of the "transnational firm," emphasized the need to simultaneously be responsive to different strategic requirements in order to remain competitive in today's economic and political environment. To do so, however, an MNC must develop an extremely sophisticated set of coordination mechanisms for knowledge transfer, avoiding the simplistic centralization-decentralization dichotomy. All informational mechanisms (developing informal networks of communication, stressing a corporate culture, managing career paths, etc.) must be used if the firm is to have enough flexibility to remain responsive to local differences and, at the same time, have enough consistency to take advantage of global opportunities, especially of learning and exploiting local expertise at a world level. Taking the above idea from Ghoshal and Bartlett, this study moves away from the dichotomy of inter-intra, formal-informal and centralization-decentralization issues in knowledge transfer research and study the knowledge transfer more as a phenomenon in organic network.

The organic network is not a novelty, but always exist in various extents and as an obvious part of a firm's daily business. Studies on organic networks are traditionally built on social exchange theory as formulated by Homans (1961), Blau (1964) and Emerson (1976) and organizational studies (see e.g. Lincoln (1982); Fombrun (1982); Astley and Fombrun (1983); DiMaggio (1986)). The fact that organic network is formed by interaction between individuals representing self-interest and self-advancement within the firm (not to say that it can't be in the same interest as the organization), raises the issue; to what extent organizations should operate in terms of official and prescribed internal networks or whether they mobilize the spontaneous, informal, and interpersonal ties in order to achieve organizational goals (Lincoln, 1982). Unlike formal business networks, organic business networks are not designed by any single actor according to a master plan or a strategic decision. They emerge and develop as a consequence of interaction between

semiautonomous, interdependent actors. Focusing on knowledge as a resource in the organic network there are several distinguishing implications when it comes to knowledge development and transfer. Firstly, knowledge flows in interactions between actors and make them modify and develop their activities. Secondly, with an approach that ignores the legal boundaries, knowledge is being developed and transferred within as well as between the MNE and other market actors. Thirdly, the knowledge as well as the transfer is difficult to recognize for actors that are not involved in the network. Thus the distinction, of which formal and/or informal coordination mechanism is more efficient in inter-organization and/or intra-firm settings, is no longer a relevant issue, rather the knowledge transfer mechanism itself and its effect on transfer performance become the important focus.

MNCs as knowledge transfer facilitator

In the case of Multinational Companies (MNCs), a lot of research has been carried out to show that the above assumption; the firm has ability to create and to transfer knowledge more efficiently than over the market has its merits when considering the importance of foreign subsidiaries. The importance of foreign subsidiaries as strategic resources and knowledge developers in the competitive international business arena for MNCs has been studied considerably by many researchers. (Birkinshaw, 1996; Gupta and Govindarajan, 1991; Hedlund, 1986; Roth and Morrison 1992)

In earlier writings it has been implicitly assumed that the center, the parent company, was carrying out the innovation of new products and processes and that the subsidiaries were exploiting this innovation in the local markets. Today it is recognized that this "center-periphery" perspective is somewhat obsolete and that subsidiaries often have substantial roles in knowledge creation depending on its location, history, human resources and administrative heritage. It has become conventional wisdom that the decentralized multidivisional (M-form) structure is a better management strategy within multinationals, since it favors goal pursuit and least-cost behavior in line with neoclassical maximization behavior than top down functionally organized corporations (Williamson 1975). Further studies show a new perspective called "multi-center" perspective, indicating that some subsidiaries can be on an equal footing with the parent

company in terms of competence and importance for the whole corporation (Forsgren 1990, Forsgren et al 1992 & Holm and Pedersen 2000). Thus it is clear that it is important to incorporate resources and knowledge from subsidiary level to the entire firm's competitive advantage.

A distinct characteristic of MNC's subsidiaries is it's geographical dispersion, which adds both positive and negative dimensions to knowledge management. As it is mentioned above, each subsidiary has its unique local connections such as customers, suppliers and competitors to draw in new knowledge that can lead to competitive advantage in terms of new innovation, better product, better production system and so on. However this geographical dispersion could also lead to difficulty in the management of knowledge transfer coordination. Especially if the firm's profitability assumes cost advantages through centralization of various activities from its subsidiaries, as well as to maintain local subsidiaries' responsiveness to their connections. With emphasis on the importance of the local assets; the knowledge asset gained by business and social transaction with customers, suppliers and competitors, for the knowledge development and innovating process, the study of knowledge transfer mechanisms in MNCs becomes crucial, since successful knowledge transfer from distant and diverse activities is essential to the strategy of MNC managers.

The Dimensions of Transfer Performance

We have argued above that the focus of knowledge transfer studies should be on the factors that affect the execution of transfer, thus measuring the success or the failure of these factors lies in the performance of the transfer itself. The performance-based measurements of the transfer process eliminate some of the challenges that come with measuring transfer of tacit knowledge. Since tacit knowledge may not be captured through the verbal reports, knowledge transfer is better measured by measuring changes in knowledge or changes in performance. The knowledge transfer in organizations manifests itself through changes in the knowledge or performance of the recipient units, so knowledge transfer in organizations can be assessed through measuring changes in the knowledge of the recipient unit. (Argote and Ingram 2000) However there are several problems in measuring changes in the knowledge of the recipient unit. One problem

arises due to the fact that the knowledge is received by individual actors, and experience of each actors would play a big role in changing the knowledge base of the recipient unit, since more experienced actor will capture and use the knowledge better than the less experienced actor. Another challenge to measuring knowledge transfer through measuring changes in knowledge is that knowledge in organizations resides in different repositories, such as individual members, firm's routines, practices, structures and culture. (Argote and Ingram 2000)

Since this study is based on sending unit's point of view, we were able to avoid the above problems by assuming that transferred knowledge adds value to the recipient unit and presuming that performance of the received knowledge is satisfactory to the recipient. Instead this study focuses on the performance measurements of the transfer; here we mean performance to represent the ease or the difficulty and/or successfulness or unsuccessfulness of knowledge transfer. We have selected following construct to represent the transfer performance measurements: the cost of transfer, the speed of transfer and the level of achieved transfer/the level of implementation. The selection was based on literature review and statistical analysis of variables from our data.

The most cited research on the costs of transfer is 1977 Teece article on the resource cost of technology transfer, where the determinants of transfer cost are the age of the technology, the recipients' previous experience with transferring the technology, and the number of firms using similar technologies. Here Teece argues that performance (the ease or difficulty/ successful or unsuccessful) of transfer is reflected in the cost. Teece defines technology transfer costs as "the costs of transmitting and absorbing all of the relevant unembodied knowledge. The costs of performing the various activities which have to be conducted to ensure the transfer of the necessary technological know-how will represent the cost of technology transfer." (Teece 1977: 245) Using this definition, there can be number of factors that can influence the transfer cost, however in this study the cost variable is from the interview question, which gives general idea of total cost.

Zander and Kogut (1995) article examines the influence of knowledge characteristics (codification, teachability, complexity etc.) has on the time of transfer and the time to imitate, thus measuring how the different types of knowledge effects the performance of knowledge transfer, in this case the performance is measured in speed of

transfer. The speed of transfer is also used as one of the transfer performance variables in our article. The speed variable was constructed by using these two measurements: the starting point of the innovation transfer, and the end of transfer process, which is indicated by the first day of innovation usage.

The final transfer performance variable used in this paper is the level of implementation or the level of achieved transfer. Szulanski in his 1996 article brings up implementation as one of the four stages in the transfer process.

> The implementation stage begins with the decision to proceed. During this stage, resources flow between the recipient and the source (maybe a third party). Transfer-specific social ties between the source and the recipient are established and the transferred practice is often adapted to suit the anticipated needs of the recipient, to pre-empt problems experienced in a previous transfer of the same practice, or to help make the introduction of new knowledge less threatening to the recipient. Implementation related activities cease or at least diminish after the recipient begins using the transferred knowledge. (Szulanski, 1996, pp. 29)

The implementation being one of the stage in the transfer process, it should be interesting to see how different knowledge transfer mechanisms would effect the implementation stage. The implementation construct is factor of these two variables: level of completion and easiness of adaptation. (For list of variables see Appendix 1)

The Dimensions of Transfer Mechanism

We have constructed four different knowledge transfer mechanisms that would influence three above performance measurements. These transfer mechanisms are hierarchical governance, transfer routines, temporary mutual project groups and standardized documents/codification. According to the framework of Argote & Ingram (2000) knowledge is embedded in three basic elements of organizations, which are the members, tools, and tasks. Members are the human components of organizations. Tools include both hardware and software of technology component. Tasks reflect the organization's goals, intentions, purposes, routines and standard operating procedures used by the organization. Since knowledge is embedded in these three elements, the transfer mechanisms/tools should also reflex these three elements. This idea theoretically gives some support to our selection of the transfer mechanisms; where the hierarchical

governance and routines should have influence on the transfer of the knowledge embedded in tasks, the temporary mutual project groups should influence the transfer of the knowledge embedded in members and finally standardized documents/codification influences the tools. Using these four factors, following propositions regarding the effect of the knowledge transfer mechanisms on the transfer performance are presented.

Hierarchical Governance:

The hierarchical governance variable was constructed from the following variables; HQ's formal instruction, involvement and requirement were used as transfer mechanism. (see Appendix 2) Since HQ has better overview of structure of cost, strategic needs and anticipates for possibility of firm's growth as a whole, when the knowledge transfer is sanctioned by the HQ, the importance of the HQ governed transfer becomes greater than locally governed transfer. The importance of the knowledge transfer will determine the incentives for the units and for the individuals, thus more incentives better knowledge transfer performance.

> Proposition 1: There is positive relation between the HQ governance and the performance of innovation transfer in terms of cost, speed and implementation.

Transfer Routines:

The variable, transfer routine was constructed using these measurements; level of previous cooperation; level of knowledge shared; and existing knowledge sharing routine with the counterpart. (see Appendix 2) According to Levitt and March (1988), "routines" includes the forms, rules, procedures, conventions, strategies, and technologies around which organizations are constructed and through which they operate. It also includes the structure of beliefs, frameworks, paradigms, codes, cultures, and knowledge that buttress, elaborate, and contradict the formal routines. Routines are independent of the individual actors who execute them and are capable of surviving considerable turnover in individual actors. (Levitt and March, 1988, pp. 320) Furthermore these routines are history dependent and based on interpretations of the evaluation of past outcomes. Thus previous cooperation and level of knowledge shared will affect the performance of the current

knowledge transfer. (Teece 1977) Once a routine of knowledge transfer is in place with the counterpart, less resources are needed for initial search for information source and method of transfer, thus transfer routine will facilitate the performance.

> Proposition 2: There is positive relation between existing transfer routines between units and the performance of innovation transfer in terms of cost, speed and implementation.

Temporary Mutual Project Groups:

The temporary mutual project groups was constructed with variables concerning usage of temporary training at partner sites and cross-unit teams, project groups, etc. as a method of transferring knowledge. (see Appendix 2) Kogut and Zander (1992) states that teaching of know-how and information requires frequently interaction within small groups, often through the development of a unique language or code. According to Agrote and Ingram (2000) study on the framework of knowledge reservoirs, the effect of knowledge transfer, moving technology or tasks from one site to another has been found to be more effective when accompanied by moving people because people are capable of adapting the tools and technology to the new context. Thus, moving people as a knowledge transfer mechanism improves transfer performance, since people are able to transfer tacit and explicit knowledge and able to adapt their knowledge to new contexts.

> Proposition 3a: There is a positive relation between using temporary mutual project groups and the performance of innovation transfer in terms of speed and implementation.

However due to the high cost involved in moving groups or individual, we don't expect any positive relation between the temporary mutual project groups and the innovation transfer cost.

> Proposition 3b: There is a negative relation between using temporary mutual project groups and the performance of innovation transfer in terms of cost.

Standardized Documents & Codification:

The standardized documents or the codification of knowledge was constructed by using the variables: extensive documentation on the innovation and level of documents, reports and Cdrom usage during knowledge transfer. (see Appendix 2) There are number of prior research on the influence of knowledge characteristics, especially tacit or explicit knowledge has on the performance of knowledge transfer. (Winter 1987, Zander 1991, Zander and Kogut 1995) Where codifiable knowledge has been found to transfer more readily, thus having more positive influence on performance.

> Proposition 4 - There is a positive relation between the use of standardized documents and codification and the performance of innovation transfer in terms of cost, speed and implementation.

Types of Knowledge

The word knowledge can be very dubious due to its multifaceted denotations. There are many ways to characterize knowledge: Kogut & Zander (1992) distinguish knowledge into two categories information and know-how. Nelson (1982) divides knowledge into techno and logy. Winter's (1987) taxonomy divides knowledge into four dimensions: tacit or articulable, complex or simple, an element of a system in or dependent, and non - observable in use or observable in use. R&D management theorists conceive knowledge as firm-specific information concerning the characteristics and performance properties of the production process and of the product design. The production process or operations technology is embodied in the equipment or the means to produce a specific good. (Zhao & Reisman, 1992) Thus knowledge can be information, know-how, technology, innovation and so on. On top of identifying different type of knowledge, there arises the issue of different characteristics of knowledge. For example information is one type of knowledge, that can have tacit, complex and non-observable characteristics or it can have the opposite characteristics. This complex dimensions and definitions of knowledge give empirical study on this topic difficult. Thus in this study, the knowledge is limited to innovations that can be a product, a core technology that is used in a certain product, and

any innovation (innovative way of doing and/or product helping) in production process, marketing and administration. The data sample contains 38 innovations, where almost all innovations are developed and released between 1989 and 2003, with the exception of one innovation, which is developed and released between1960 – 1980.

Data collection:

The data was collected for the research project titled "Transfer of Innovation in Multinational Enterprises" (T.I.M.E)[2]. The T.I.M.E project focuses on knowledge transfer related to development of new products by looking at large business areas in highly internationalized firms, mainly Swedish MNC's.[3] The data collection was carried out through structured interviews with managers and engineers involved in both development and transfer process of innovation in question using a standardized questionnaire. The sample data was collected in conjunction with the headquarter of each business areas, where the headquarter helped identify the key units involved in production and transfer process of the particular innovation. The data contains total of 89 transfer relationships of 38 innovations, where each innovation was transferred to between one to five different units. The interviews were conducted at subsidiaries, division and MNC head quarters of nine participating European (7 Swedish, 1 German and 1 Italian) MNCs in tools, chemistry, forest, engineering, electronics and food industry. Participating subsidiaries of these 9 MNCs were located in following countries: Belgium, Czech Republic, France, Germany, Italy, Netherlands, Sweden and UK.

Statistical Design:

Factor analysis (principal component analysis), which provides the empirical basis for assessing the structure of variables and the potential for creating composite measures or selecting a subset of representative variables for further analysis (Hair et al. 1998) was carried out in order to statistically support the construct of dependent and independent variables. The dependent variable is transfer performance variables, which consists of

[2] The project group consists of seven members of faculty and doctoral students from the Department of Business Studies, Uppsala University, headed by Professor Mats Forsgren.

[3] The main purpose of the project is to investigate the structure and function of MNCs, especially from a knowledge transfer perspective, by answering questions about the roles of the subsidiaries and the preconditions for creation and diffusion of innovations within MNCs.

cost, speed and implementation of transfer. The independent variable is transfer mechanisms, which consists of hierarchical governance, transfer routines, temporary mutual project groups and standardized documents/ codification. Each of the variable that construct the performance variables and the transfer mechanism variables were measured by questions (see Appendix 2 & 3) indicated by the respondent on a 7-point Likert scale. The Likert scales went from 1 = totally disagree to 7 = totally agree, 1 = not at all to 7 = very high, and 1 = not at all to 7 = very much. The value –9 (= do not know/ NA) were treated as missing value. When attempting to define underlying structure among the variables, the adequate content validity of concepts is very important. The reliability of the summated scale is best represented by Cronbach's alpha. The generally agreed upon lower limit for Cronbach's alpha is 0.70, although it may decrease to 0.60 in exploratory research. (Hair et al. 1998) The reliability for the final construct ranged from $\alpha = 0.62$ to $\alpha = 0.79$. Since three of the constructs had $\alpha < 0.70$, a second measurement of reliability, the correlation matrix was consulted. The rationale is that the individual items or indicators of the scale should all be measuring the same construct and thus be highly intercorrelated. The inter item correlations were all significant at 0.01 level. (see Appendix 2 & 3). After treating for missing values, our sample sizes arranged from 81 to 89 observations, since our sample size is less than 100 there was some concern about assessing statistical significance of the factors. This concern was remedied by assessing the factor loadings, since factor loading represents the correlation between an original variable and its factor, it can be used to interpret the significance level of the loading factors. However due to its substantially large standard error compare to typical correlations, it is evaluated at considerably stricter levels. For our sample size 89, factor loading should be higher than 0.60 in order to be significant. The significance is based on a 0.05 level, a power level of 80%, and standard errors assumed to be twice those of conventional correlation coefficients. (Hair et. al 1998) The factor loading for our variables were over 0.61. [4]

Once the 3 dependent and 4 independent variables were constructed multiple regression analysis was conducted with following assumption for all three regressions:

$$Y = f(X_1, X_2, X_3, X_4) = \beta_0 + \beta_{i1}X_{j1} + \beta_{i2}X_{j2} + \beta_{i3}X_{j3} + \beta_{i4}X_{j4} + \varepsilon$$

[4] The cost variable is a single question variable, thus not been subjected to factor analysis

Where Y = Performance (Cost, Speed and Implementation)

X_1 = Hierarchal Governance

X_2 = Transfer Routines

X_3 = Temporary Mutual Project Group

X_4 = Standardized Documents & Codification

The estimated regression coefficients are used to calculate the predicted values for each observation and to express the expected change in the dependent variable for each unit change in the independent variables. (Hair et. al 1998, pp.187) However in addition to making the prediction, we wanted to assess the impact of each of the four independent variables in predicting the dependent variables. This was done by assessing the coefficient beta.

Results

The regression results (see Table 1) show that our independent variables have varying impact on each of the dependent variables. In assessing at our regression model where performance = f (hierarchical governance, transfer routines, temporary mutual project groups, codification), first let's look at the general picture of the effect of independent variables on the dependent factors: cost, speed and level of implementation of transfer. When predicting the cost of transfer, three variables showed significant influence. They were hierarchical governance (at 0.01 significant level), transfer routines (at 0.01 significant level) and temporary mutual project groups (at 0.001 significant level). Thus indicating that using hierarchical governance and temporary project groups as a transfer mechanisms will have the tendency to increase the cost of transfer, while relying on past routines will have the tendency to decrease the cost. Hierarchical governance (at 0.001 significant level) had a strong influence on the speed of transfer, giving negative indication thus using hierarchical governance will tend to decrease the speed of transfer. On implementation, hierarchical governance (at 0.01 significant level) and temporary mutual project groups (at 0.05 significant level) had effect, indicating that using hierarchical governance can hinder the implementation of the transfer but using temporary mutual project groups can facilitate the implementation. There was also very

weak negative effect from standardized documents (at 0.10 significant level), which shows that using standardized documents can possibly hinder the implementation.

In connection with proposition 1, we expected the cost of innovation transfer to be lower when hierarchical governance was used as a transfer mechanism, however our statistical results show the opposite, there was a negative effect on the cost. We also expected the speed and the level of implementation would be positively related, thus using HQ governance will shorten the transfer time and the level of implementation will be high. However our test showed very strong negative effect on the speed and the implementation. Thus proposition 1 is rejected and there seems to be strong negative relation between HQ governance and the performance of innovation transfer in terms of cost, speed and implementation. Proposition 2 purports that using existing transfer routines between units, as a transfer mechanism will have a positive influence on the cost of innovation transfer. The statistical results concurs that existing transfer routines have positive influence on the cost. However there wasn't any conclusive result on the speed of innovation transfer and on the level of implementation. In proposition 3a, we expected that there is a positive relation between using temporary mutual project groups and the speed of innovation transfer as well as the implementation level. The statistical results showed using temporary mutual project groups, as an innovation transfer mechanism will have positive impact on the implementation of transfer level, thus increasing the implementation level. However there was no significance on the speed of innovation transfer. Proposition 3b expected that there is a negative relation between temporary mutual project groups and the cost. The statistical results concurred with our proposition. Finally for the proposition 4, which stipulates that there is a positive relation between the use of standardized documents & codification and the performance of innovation transfer in terms of cost, speed and implementation, we could not find strong conclusive results that showed using standardized documents as a transfer mechanism influencing any of the performance measurements.

Discussion

Our objective in this paper was to investigate some of the effect of 4 selected knowledge transfer mechanisms (hierarchical governance, existing routines, project groups and

standardized documentation) that are widely used by management, as well as its' implications studied in knowledge management literatures, on the performance of innovation transfer. Here we have selected 3 different (cost, speed and implementation) variables to represent transfer performance measurements. Through an empirical study of fully implemented 89 innovation transfer cases of 38 innovations, only one transfer mechanism, the use of HQ governance showed conclusive results for all three transfer performance variables (cost, speed and implementation). Despite widely accepted notion that HQ governance should facilitate the knowledge transfer, our statistical result shows that involvement of HQ governance actually hinders the transfer performance. One explanation for this unexpected result for our hypothesis 1 can be that the hierarchical governance is in itself a formal mechanism (Martinez and Jarillo, 1989), thus when used in a formal network setting where the legitimacy of incentive system by the HQ is strong and this incentive is the driving force behind better transfer performance, then the positive result will occur. However, in our organic network paradigm, where formal and informal, or centralized and decentralized dichotomy exist side by side, the incentive system is no longer clear cut driving force behind the transfer, thus other factors such as transfer pricing, "not invented here syndrome" and "no choice effect" can hinder transfer performance.

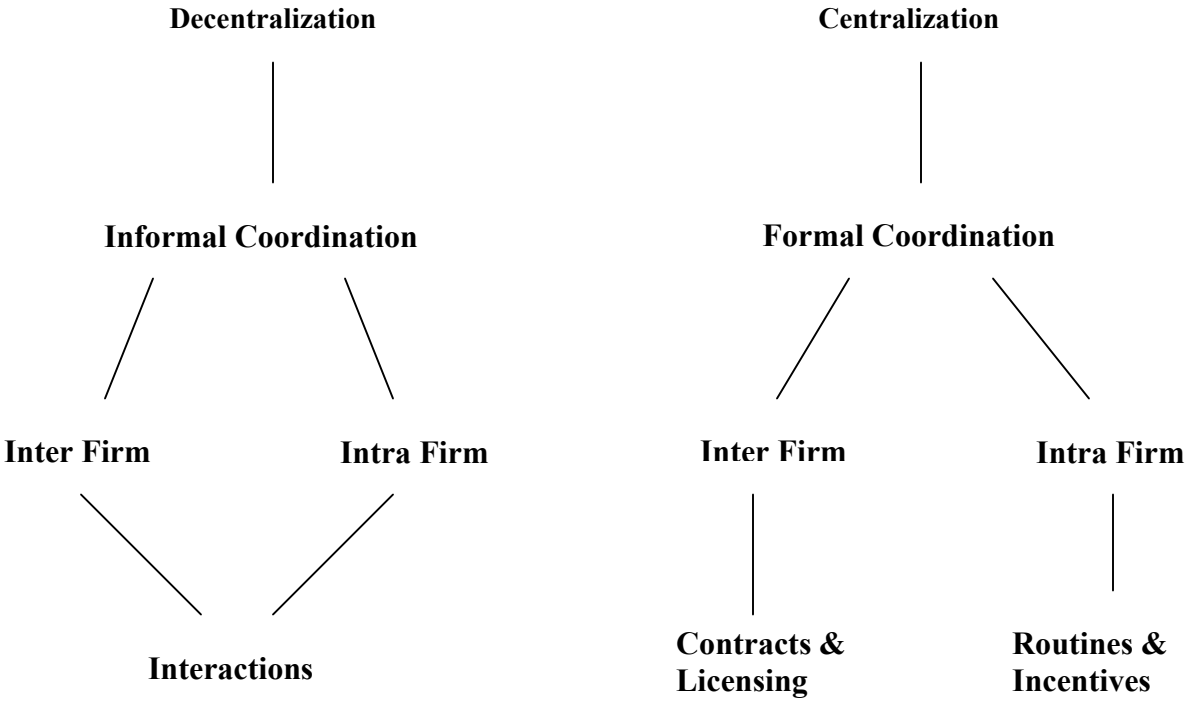
The result also showed that when existing routines of transfer between units is used there would be decrease in the cost of transfer. Also using temporary mutual project groups would increase the cost, at the same time the level of implementation or achieved transfer would increase, and rests of the results were inconclusive when measured together as having linear relations to the performance measurements. These mixed results show that different method of transfer cannot be analyzed as one category called transfer mechanism, rather it shows that different performance results are achieved depending on the mechanisms used and there are several different proxy that measure performance. Therefore it implicates that matching "the right" transfer mechanism with the desired performance effect is important. For example, in the case of using temporary mutual project group as method of knowledge transfer between units, our result would recommend not to use project group, if the low cost of transfer is vital to the unit. However, if implementation of knowledge is more important than the cost, project groups

would be efficient mechanism. Our findings show the relationship between the knowledge transfer mechanism and the transfer performance is more dynamic and can not be generalized in past research setting dominated by dichotomy of centralized or decentralized, informal or formal and inter or intra firm issues.

The above results from our empirical testing have its limitations that probably lead to the inconclusiveness of many of our hypothesis. As mentioned earlier in the paper, the issue of different characteristics of knowledge is not addressed in this paper, which certainly would influence the transfer performance as well as choice of transfer mechanism. Another issue influencing the knowledge transfer within MNCs, drawn from the institutional theory, is the effect of country's institutional profile (Kostova, 1999 & Scott, 1995) on social exchange. According to Scott (1995) institutional environments are composed of different types and he suggests three types, which he calls "pillars": regulatory, cognitive and normative. Each of these pillars reflects and promotes certain types of behaviors, thus condition of knowledge transfer would vary according to the types of institutional environments, and hence it would affect the transfer performance. Our limitation also extends to our data sample, where industrial level analysis was not considered and the innovations were not treated according to industry, which would of influence the circumstances surrounding the transfer, i.e. innovations from low tech industry would be easier to transfer compare to high tech industry. Other concern with our data was the small sample size to conduct factor analysis, which might have contributed to low significant level of coefficient beta in some of the independent variables in our regression. Addressing these and other issues in addition to this study will add to our understanding of complex processes that managers find themselves in when dealing with knowledge transfer in MNCs.

Figure 1

Dichotomy in the main issues of Knowledge Transfer



APPENDIX 1: Transfer Performance Variables

COST (perceived transfer costs)

1. The actual costs of innovation transfer were much higher than expected

   (1 = totally disagree to 7 = totally agree, -9 = do not know/N.A.)

SPEED (perceived transfer speed)

1. The starting point of the innovation transfer was much earlier than expected

   (1 = totally disagree to 7 = totally agree, -9 = do not know/N.A.)

2. The first day of innovation use by the receiver was much earlier than expected

   (1 = totally disagree to 7 = totally agree, -9 = do not know/N.A.)

Cronbach's alpha: 0.7942

Correlations for Speed Variable

		1	2
1	Pearson Correlation	1	0.659**
	Sig. (2-tailed)	.	0.000
	N	89	89
2	Pearson Correlation	0.659**	1
	Sig. (2-tailed)	0.000	.
	N	89	89

**. Correlation is significant at the 0.01 level (two-tailed).

IMPLEMENTATION (perceived level of implementation or achieved transfer)

1. Evaluate the level of completed innovation transfer

   (1 = not at all to 7 = very high, -9 = do not know/N.A.)

2. The counterpart adopted the innovation very quickly

   (1 = totally disagree to 7 = totally agree, -9 = do not know/N.A.)

3. The innovation has been very easy to adopt by this counterpart

   (1 = totally disagree to 7 = totally agree, -9 = do not know/N.A.)

Cronbach's alpha: 0.6812

Correlations for Implementation Variable

		1	2	3
1	Pearson Correlation	1	0.506**	0.291**
	Sig. (2-tailed)	.	0.000	0.006
	N	87	87	87
2	Pearson Correlation	0.506**	1	0.447**
	Sig. (2-tailed)	0.000	.	0.000
	N	87	89	89
3	Pearson Correlation	0.291**	0.447**	1
	Sig. (2-tailed)	0.006	0.000	.
	N	89	89	89

**. Correlation is significant at the 0.01 level (two-tailed).

APPENDIX 2: Transfer Mechanisms

HIERARCHICAL GOVERNANCE

1. MNE HQ has formally instructed you to share this innovation with the counterpart

   (1 = totally disagree to 7 = totally agree, -9 = do not know/N.A.)

2. MNE HQ have themselves been heavily involved in conducting the actual transfer process with the counterpart

   (1 = totally disagree to 7 = totally agree, -9 = do not know/N.A.)

3. To what extent is the transfer driven by requirement from HQ

   (1 = not at all to 7 = very much, -9 = do not know/N.A.)

Cronbach's alpha: 0.7367

Correlations for Hierarchical Governance

		1	2	3
1	Pearson Correlation	1	0.660**	0.471**
	Sig. (2-tailed)	.	0.000	0.000
	N	89	89	87
2	Pearson Correlation	0.660**	1	0.351**
	Sig. (2-tailed)	0.000	.	0.001
	N	89	89	87
3	Pearson Correlation	0.471**	0.351**	1
	Sig. (2-tailed)	0.000	0.001	.
	N	87	87	87

**. Correlation is significant at the 0.01 level (two-tailed).

TRANSFER ROUTINES

1. Level of previous cooperation

   (1 = not at all to 7 = very much, -9 = do not know/N.A.)

2. Level of knowledge shared

   (1 = not at all to 7 = very much, -9 = do not know/N.A.)

3. To what extent is the transfer driven by existing routines of sharing knowledge with this counterpart

(1 = not at all to 7 = very much, -9 = do not know/N.A.)

Cronbach's alpha: 0.7385

Correlations for Transfer Routines

		1	2	3
1	Pearson Correlation	1	0.550**	0.490**
	Sig. (2-tailed)	.	0.000	0.000
	N	85	85	83
2	Pearson Correlation	0.550**	1	0.439**
	Sig. (2-tailed)	0.000	.	0.000
	N	85	86	84
3	Pearson Correlation	0.490**	0.439**	1
	Sig. (2-tailed)	0.000	0.000	.
	N	83	84	87

**. Correlation is significant at the 0.01 level (two-tailed).

TEMPORARY MUTUAL PROJECT GROUPS

1. The level of temporary training at partner sites used in the transfer

(1 = not at all to 7 = very high, -9 = do not know/N.A.)

2. The level of cross-unit teams, project groups, etc. used in the transfer

(1 = not at all to 7 = very high, -9 = do not know/N.A.)

Cronbach's alpha: 0.6821

Correlations for Temporary Mutual Project Groups

		1	2
1	Pearson Correlation	1	0.521**
	Sig. (2-tailed)	.	0.000
	N	81	81
2	Pearson Correlation	0.521**	1
	Sig. (2-tailed)	0.000	.
	N	81	81

**. Correlation is significant at the 0.01 level (two-tailed).

STANDARDIZED DOCUMENTS & CODIFICATION

1. Counterpart use extensive documentation about the innovation

   (1 = totally disagree to 7 = totally agree, -9 = do not know/N.A.)

2. Level of use of documents, reports, Cdrom

   (1 = not at all to 7 = very high, -9 = do not know/N.A.)

Cronbach's alpha: 0.6208

Correlations for Standardized Documents & Codification

		1	2
1	Pearson Correlation	1	0.458**
	Sig. (2-tailed)	.	0.000
	N	89	87
2	Pearson Correlation	0.458**	1
	Sig. (2-tailed)	0.000	.
	N	87	87

**. Correlation is significant at the 0.01 level (two-tailed).

Table 1: Regression Results

	Dependent Variables: Transfer Performance		
	Cost n = 77 $R^2 = 0.32$	***Speed*** n = 77 $R^2 = 0.16$	***Implementation*** n = 77 $R^2 = 0.14$
Independent Variables: Transfer Mechanisms	Coefficient Beta (t-value)	Coefficient Beta (t-value)	Coefficient Beta (t-value)
Hierarchal Governance	0.230 (2.332)*	-0.378 (-3.443)***	-0.265 (-2.392)**
Transfer Routines	-0.238 (-2.367)*	-0.072 (-0.645)	0.138 (1.222)
Temporary Mutual Project Groups	0.434 (4.301)***	-0.019 (-0.166)	0.226 (1.996)*
Standardized Documents & Codification	0.042 (0.416)	0.133 (1.173)	-0.179 (-1.566)†

*** 0.001significant level (two-tailed)

** 0.01 significant level

* 0.05 significant level

† 0.10 significant level

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