To be or not to be… – the question of subsidiary and headquarter involvement in MNE knowledge transfer

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Abstract

Building on the concept of innovations as bearers of technological knowledge this paper provides insights into the understanding of knowledge transfer between MNE subsidiaries. The focus is not only on transmission of knowledge but more specifically on how well the transfer was performed. Knowledge transfer is framed as distinct projects, with the purpose of economizing on what is already known, taking place between a sending and a receiving subsidiary. Data from 169 innovation transfers between MNE subsidiaries is used to give support for the findings. Unit similarity, prior collaboration and cross-border transfer are found to affect transfer performance positively. A positive motivational disposition of the sending subsidiary is found to affect the transfer performance negatively. Headquarter involvement in the development and transfer process of innovations is shown to have an unrelated impact on transfer performance. Taken together, these findings suggests that structural aspects related to the subsidiaries engaged in knowledge transfer is more important than if headquarters are involved in the innovation transfer process.

Keywords: Knowledge transfer; transfer performance; multinational enterprises; subsidiary; headquarter.

Introduction

The firm can be said to consist of a bundle of resources, i.e. the "resource-based view of the firm" (Penrose, 1959). Amongst these different resources knowledge is considered to be a source for competitive advantage and a way for firms to distinguish themselves from others both in relation to the creation of new knowledge and the transfer of the knowledge created. Knowledge can be considered to constitute a key component of the multinational enterprises (MNEs) resources, thus constituting a competitive advantage since the MNE is argued to have an advantage in transferring knowledge internally compared to external transfer through the market (Hymer, 1960; Kogut and Zander, 1993). Consequently, knowledge has been the object of study for scholars from different perspectives, the focus has mostly been on determinants of knowledge transfer related to the knowledge characteristics or on relational aspects between units (c.f. Bartlett and Ghoshal, 1989; Nonaka, 1994; Szulanski, 1996; Lane and Lubatkin, 1998; Hansen, 1999; Gupta and Govindarajan, 2000). Also, the MNE can be conceptualized as a heterogeneous organization with units that are loosely coupled and full knowledge about operations is not possessed anywhere in the organization (Forsgren et. al., 2005). The MNE is perceived as a network of differentiated subsidiaries dispersed geographically around the world. This of course has implications for the management of knowledge in such organizations. In this setting, subsidiaries are a central unit of analysis because they provide the MNE with knowledge, ideas and opportunities, thus enhancing the competitiveness of the organization by being embedded in different business networks (Andersson et. al., 2002).

The cost of developing new knowledge in MNEs is substantial, hence a key task for subsidiaries is outbound knowledge transfer of already existing knowledge. Previous research has identified different organizational mechanisms facilitating knowledge transfer as well as

contributing to the understanding of the internal stickiness of knowledge (Szulanski, 1996; Gupta and Govindarajan, 2000) However, even if knowledge transfer has been realised this doesn't mean transfer performance is satisfactory. In order to be able to study knowledge transfer performance, individual transfer projects have to be studied. Building on the work of Teece (1986) this paper studies innovations since they can be conceptualized as consisting of technological knowledge of how to do things better compared to the current state of the art. The issue of knowledge transfer performance is dealt with in relation to subsidiary relationships, i.e. a sender-receiver perspective, international geographical dispersion, the sending subsidiary's disposition towards knowledge transfer and headquarter involvement in knowledge transfer processes. Specifically, this paper deals with knowledge transfer using data from 169 transfers of innovations in MNEs. The effects of knowledge flows between subsidiaries on transfer performance in dispersed MNEs are studied. This study contributes to the understanding of knowledge transfer by focusing on specific transfer projects, i.e. the transfer of technological innovations, and this approach makes it possible to analyze the performance side of transfer projects. This approach is novel to the literature in the field. Also, this paper contributes to the understanding of knowledge transfer by identifying important structural aspects of the MNEs by reporting on subsidiary characteristics relevant for transfer performance adding to the understanding of barriers and facilitators to knowledge transfer.

The paper is divided in six sections. The first section deals with knowledge management in MNEs. This is followed by a section developing six research hypotheses all dealing with knowledge transfer performance as the dependent variable. The third section describes the data and operationalization of the variables. This is followed by a presentation of the results.

A discussion of the results comprises the fifth section of the paper. The sixth section delineates suggestions for further research and managerial implications.

Knowledge management in MNEs

Knowledge can be developed in different MNE units and exploited in other units, i.e. the knowledge is transferred internally in the MNE. The MNE is viewed as a superior vehicle for transferring knowledge between units located in different countries and business contexts. Consequently the ability to create and transfer knowledge constitutes a basis for MNE competitive advantage (Kogut and Zander, 1993; Argote and Ingram, 2000). Knowledge can reside at different levels in the organization, i.e. at the individual level or at a more collective level in groups etc. (Hedlund, 1994). A distinction between tacit and explicit knowledge is common in the literature (Polyani, 1966) and the degree of codifiability has an impact on knowledge transfer (Zander and Kogut, 1995). Tacit knowledge resides in the mind of the individual, consequently such knowledge is hard to communicate to others. Explicit knowledge is characterized by the ability to be codified in documents, drawings, manuals etc. and by nature this kind of knowledge is easier to communicate. Knowledge per se is difficult to study when it is tacit and resides collectively in the organization. However, one approach is to study technological innovations since they embody knowledge about how to do things better than previous practices (Teece, 1986). Technological knowledge includes both tacit and explicit components, i.e. codified information and practices that are learned (Cantwell, 1991). These knowledge characteristics have implications for the dispersion of knowledge in MNEs.

Knowledge transfer and transfer performance

The notion of knowledge creation in one subsidiary and exploitation in another implies internal transfer of knowledge in MNEs. The purpose of knowledge transfer is often to make use of existing knowledge in other parts of the MNE in order to enhance overall MNE

performance. Such intra-MNE transfer of knowledge can be separated into subsidiary relations and headquarters organisation and secondly on knowledge transfer between subsidiaries. A dyadic approach with a sender and a receiver of knowledge constitutes the basics of knowledge transfer and much of the empirical research has focused on factors facilitating or impeding this transfer. However, knowledge transfer in itself has a limited value for the MNE. An important aspect of transfer is how the knowledge is used and integrated in the receiving subsidiary, i.e. the performance side of knowledge transfer. Performance can be understood by studying individual transfer projects between a sender and a receiver. In order to increase understanding of the performance dimension of knowledge transfer the adoption and usage of the knowledge at the receiving subsidiary is an important dimension (Kostova and Roth, 2002). With this approach to transfer performance it is possible to study how quickly and easily an innovation is adopted in a receiving unit. Another performance dimension is the direct and indirect costs of the individual transfer projects. Additionally, only a partial transfer of knowledge can have taken place, hence the degree of completion of the innovation transfer relates to the performance dimension. Consequently, when knowledge management is studied not only the barriers and facilitators is an important area but also the performance dimension is crucial for MNE knowledge management.

Facilitators and impediments to knowledge transfer

Knowledge transfer is dependent on the characteristics of the knowledge, such as the degree of codifiability, but also on the characteristics of and on the relationship between the sending and receiving units. Units differ in their ability to recognize, assimilate and replicate new knowledge. This capability is commonly referred to as absorptive capacity and is viewed as path dependent, i.e. it builds on prior related knowledge (Cohen and Levinthal, 1990). Szulanski (1996) found that lack of absorptive capacity is a barrier to internal knowledge

transfer. Other studies have highlighted absorptive capacity as the most important trait of the unit receiving knowledge (Gupta and Govindarajan, 2000).

Another feature related to barriers and facilitators to knowledge transfer is the motivational disposition of both the sending and receiving subsidiaries (Gupta and Govindarajan, 2000). The motivational disposition of receiving units has previously been studied and is commonly referred to as the 'Not Invented Here' (NIH) syndrome (Hayes and Clark, 1985; Katz and Allen, 1982). Since knowledge is considered to be one of the main resources in subsidiaries, the disposition to transfer knowledge may not always be high, i.e. the sending unit has a negative motivational disposition. By transferring knowledge the subsidiary is at risk of loosing a position in the MNE network since the knowledge is disseminated throughout the organization. Research has shown that knowledge sharing is impeded by competition for internal resources and this relates to the motivational disposition of units (Tsai, 2002).

The role of subsidiaries

Characteristics related to the business relationship between subsidiaries can act as facilitators to knowledge transfer. The age of the relationship as well as the adaption, trust and commitment can facilitate the transfer process (Hallén, Johanson and Seyed-Mohamed, 1991). Also, if the subsidiaries engaged in knowledge transfer have a high degree of absorptive capacity and are motivated this will facilitate the process. A central network position has been shown to facilitate access to knowledge (Tsai, 2001). By having a central position subsidiaries are exposed to their business network context to a higher degree which stimulates knowledge creation and since the cost of developing new knowledge is high, the knowledge created can be assumed to be transferred within the MNE. A subsidiary with a

central position is assumed to gain more attention which has implications for knowledge transfer.

Another distinguishing element of MNEs is the geographical dispersion of subsidiaries across countries. As a corollary, subsidiaries face different cultures, social norms, languages and institutional characteristics etc. Exposure to different local networks stimulates knowledge creation but also implies challenges for the MNE and its subsidiaries (Forsgren et. al., 2005). Kogut (1991) showed that knowledge moves more slowly across boundaries. A concentration of geographical space facilitates knowledge transfer and it will be more costly and less effective across boundaries (Buckley and Carter, 2004). Another study also concludes that boundaries affect knowledge flows in the biotechnological industry, however geographical proximity doesn't always matter (Tallman and Phene, 2007). This implies that knowledge transferred across borders face many challenges. However, if the transfer process is expected to be problematic this may be mediated by preparation and an awareness of the obstacles.

A consequence of the geographical dispersion of MNEs is that subsidiaries face conflicting interests of local adaptation and organizational consistency (Rosenzweig and Singh, 1991). A subsidiary gain legitimacy and recognition by adapting the locally appropriate practice (Kostova and Zaheer, 1999). Acting as a pressure on subsidiaries the local interests of subsidiaries are not always the same as those of headquarters or the rest of the MNE (Nohria and Ghoshal, 1994). Research has shown that an MNE differentiation in headquarter-subsidiary relations leads to better performance for the MNE (Nohria and Ghoshal, 1994). Also, subsidiary managers may perceive their role in one way while managers at headquarters perceive the role of the subsidiary differently (Birkinshaw et. al., 2000). The relationship between subsidiaries and headquarters affects knowledge transfer in different directions.

Headquarters sometimes wants to control and influence the behaviour of subsidiaries, even though they aren't knowledgeable about subsidiary operations. Hierarchical power resides at headquarter level even though other kinds of power structures may reside at the subsidiary level (Forsgren et. al., 2005). Headquarters are the ones controlling many resources. For instance, headquarters can force subsidiaries to transfer knowledge (Foss and Pedersen, 2002). Research has found a negative impact on knowledge sharing when centralization is high (Tsai, 2002). This indicates that headquarter involvement isn't always positive. Other studies have shown the opposite, i.e. that headquarter involvement facilitates innovation diffusion (Ghoshal and Bartlett, 1988; Nohria and Ghoshal, 1997)

Even though subsidiary behaviour in a sense is controlled by headquarters the business network of subsidiaries has been shown to be very important, although headquarters can influence local network embeddedness (Andersson, Björkman and Forsgren, 2005; Andersson et. al., 2002). Research about business networks has highlighted the importance for subsidiaries to be locally embedded in relation to knowledge creation and transfer (Forsgren et. al., 2005). Interdependence between units has a positive effect on knowledge transfer (Foss and Pedersen, 2002). By cooperating, trust and commitment is developed in a relationship. Also, the subsidiaries influence each other regarding what knowledge is possessed by sharing knowledge, hence building similar routines etc.

Research hypothesizes

If the units engaged in knowledge transfer activities are similar to each other this has been shown to increase absorptive capacity (Lane and Lubatkin, 1998). More specifically, if the knowledge bases of firms are similar this affects the ability to learn (Lane and Lubatkin, 1998; Hansen, 2002). Consequently, the ability to learn has a positive effect on knowledge transfer. Also, the organizational structure affects how knowledge is transferred between two

subsidiaries. If subsidiaries engaged in knowledge transfer have similar organizational structures this will facilitate the assimilation of knowledge (Lane and Lubatkin, 1998). A similar argument can be found in relation to technological similarity of subsidiaries transferring knowledge. If the subsidiaries are using the same technology, this may increase the understanding of new technological innovations being transferred, thus increasing absorptive capacity (Cohen and Levinthal, 1990) and as a corollary affecting knowledge transfer performance. Accordingly, if similarity exists this can facilitate the ability to use the knowledge in the receiving unit. Lastly, if technological and organizational similarity is present this may affect the degree to which the subsidiaries rely on each other, thus affecting the transfer process. Hence, the following hypothesis is proposed:

Hypothesis 1: Similar subsidiaries engaged in the knowledge transfer process will affect the transfer performance positively.

A subsidiary may have a negative disposition towards receiving knowledge that wasn't created within the firm's own boundaries, i.e. the NIH-syndrome (Hayes and Clark, 1985; Katz and Allen, 1982). The reverse may also be true for the sending unit, i.e. a negative disposition towards transferring knowledge since an advantage may be lost. To mediate this negative disposition regarding knowledge transfer a pre-existing history between the subsidiaries engaging in the transfer process may act as a facilitator to knowledge transfer. Research has shown that social relationships have a positive effect on knowledge sharing (Tsai, 2002). A result of previously cooperating may be that the subsidiaries have adopted similar processes and capabilities, i.e. the absorptive capacity of firms like this is enhanced (Lane and Lubatkin, 1998). It is easier for a sender to gain acceptance for a transfer if it have had relations with the receiving unit prior to the specific transfer given that the previous

relations were successful. The subsidiary is then perceived as a reliable partner regarding transfer of new knowledge between units. A successful previous cooperation has the effect of establishing legitimacy in the relationship. An arduous relationship between source and recipient unit is one of the main barriers to knowledge transfer (Szulanski, 1996). This leads to the following hypothesis:

Hypothesis 2: Previous cooperation between the subsidiaries engaged in knowledge transfer will affect the transfer performance positively.

Knowledge flows into and out of subsidiaries depends on the motivation of the subsidiary to both share knowledge and also on the motivation to receive knowledge (Gupta and Govindarajan, 2000). If a unit is highly motivated to transfer knowledge this is assumed to act as a facilitator to transfer. Here the focus is on the sending unit's motivation to transfer knowledge. By sharing knowledge a subsidiary may gain the attention of other subsidiaries as a good source of knowledge and as a corollary gain status within the MNE. This is related to the benefits associated with knowledge transfer that the sending subsidiary can identify. This in turn can affect the motivational disposition of the sending subsidiary to share more knowledge, thus acting as a facilitator to knowledge transfer. Another aspect influencing the sending subsidiary's motivational disposition is the dependency on the receiving unit. If the sender is dependent on the receiver this can increase the inclination to transfer knowledge in a positive direction, thus affecting knowledge transfer performance. Hence, the following hypothesis is put forward:

Hypothesis 3: A positive motivational disposition towards transferring knowledge from the sending subsidiary will affect the transfer performance positively.

The MNE subsidiaries are naturally geographically dispersed across different nations and cultures etc. Subsidiaries located in the same country are to a certain extent affected by the same institutional characteristics of the host country, e.g. laws, politics. A transfer of knowledge between two subsidiaries such as this may be affected by the unit's ability to asses and gain attention for the knowledge. If the subsidiaries are spatially distant this has been shown to affect competence transfer negatively (Hansen and Løvås, 2004). Barkema and Vermeulen (1997) argue that increasing cultural distance and national differences is likely to decrease trust and the comfort of working together. The possibilities for establishing close interconnections betweens subsidiaries located in the same country are high compared to the situation where the subsidiaries are located in different countries. An outcome of close connections between units may be that knowledge transfer is facilitated. Hansen (1999) showed that transfer of complex knowledge requires strong interunit ties. On the other hand, subsidiaries located in different countries might expect barriers to knowledge transfer, thus preparing for the transfer process in a more thorough way mediating the expected difficulties or even facilitating knowledge transfer. However, most research indicates that transfer of knowledge across countries will be more problematic compared to transfer within countries. This leads to the following hypothesis:

Hypothesis 4: Subsidiaries located in different countries will have a harder time transferring knowledge compared to knowledge transfer between subsidiaries located in the same country. Consequently,

cross-country localization of subsidiaries engaged in knowledge transfer will affect transfer performance negatively.

The MNE headquarter may or may not actively participate in the knowledge transfer process. However, headquarters has been argued to have the potential of being influential in MNE knowledge flows (Ghoshal and Bartlett, 1990; Birkinshaw, 2001). By actively participating in the transfer process, i.e. headquarter involvement or responsibility, the transfer project is given a special position. For the subsidiaries both transferring and receiving knowledge this signals that the transfer process has got the attention of headquarters and also gives the transfer a hierarchical legitimacy. The transfer project gains visibility and perceived importance. With this line of reasoning knowledge transfer performance between subsidiaries is facilitated through headquarter involvement and responsibility. Another line of reasoning is that headquarter involvement impedes knowledge transfer performance. A formal instruction from headquarters about sharing knowledge may have negative effects. A formal hierarchical structure, i.e. centralization, has been shown to have a negative effect on knowledge sharing in multiunit companies (Tsai, 2002). By involving themselves in the transfer process headquarters meddles in the affairs of subsidiaries and in a sense leverages responsibility over a process of which they only have a general understanding whereas the sending subsidiary so to speak is the expert on the knowledge being transferred, i.e. headquarters knowledge about subsidiary operations is low. Thus, headquarter involvement may act as a barrier to knowledge transfer. Consequently, this leads to the following two opposite hypothesizes:

Hypothesis 5a: MNE headquarter involvement in the knowledge transfer process between subsidiaries will affect transfer performance positively.

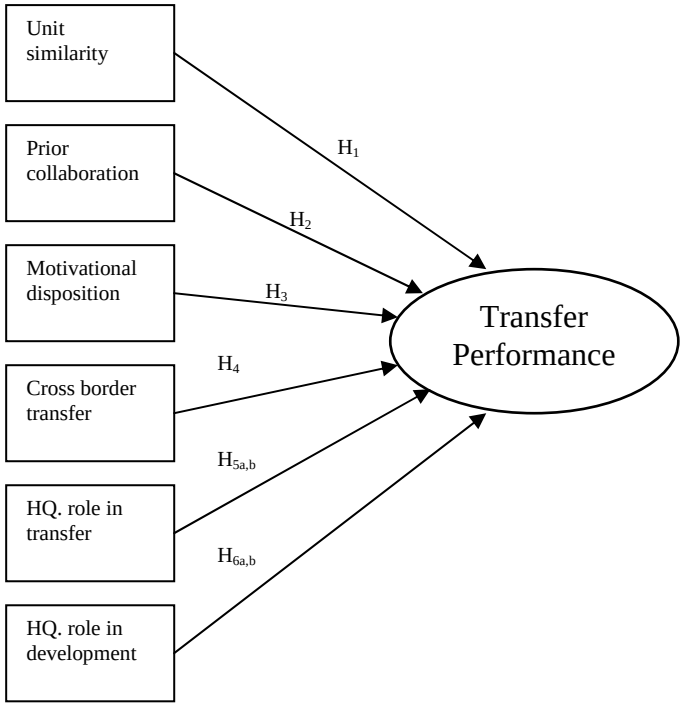
Hypothesis 5b: MNE headquarter involvement in the knowledge transfer process between subsidiaries will affect transfer performance negatively.

When an innovation is developed at a subsidiary, headquarters may or may not participate in the development process. If headquarters are involved, for instance through specifying requests, actively participating in the development or by taking important initiatives, this might lead to a special position for the innovation in itself since other subsidiaries may view the developing project as sanctioned by headquarters, thus giving the innovation legitimacy. This is analogous to the argument related to perceived importance and visibility when headquarters involve themselves in the transfer process. This line of reasoning implies that headquarter involvement in the development of innovations affect knowledge transfer positively. However, the solutions developed at a subsidiary level are to a large extent specific for the subsidiary's business network partners (Forsgren, 1997). Hence, it is possible to argue that headquarter involvement in the development of innovations at the subsidiary level can lead to the effect that other units may have a hard time adapting the innovation since headquarters may not be as knowledgeable about specific issues in the developing subsidiaries business network or of the other MNE subsidiaries need, i.e. headquarter knowledge about subsidiary operations is low. Hence, the following two opposite hypothesizes are put forward:

Hypothesis 6a: MNE headquarter involvement in the development of an innovation will affect knowledge transfer performance between the innovating subsidiary and a receiving subsidiary positively.

Hypothesis 6b: MNE headquarter involvement in the development of an innovation will affect knowledge transfer performance between the innovating subsidiary and a receiving subsidiary negatively.

Figure 1 Conceptual model



Data and methods

This paper is based on data collected 2000-2005 in a research project concerning transfer of innovations in multinational enterprises. Large MNEs with an international presence were approached and innovations were identified using snowball sampling. Data about 85 innovations developed in 63 subsidiaries belonging to 23 Swedish MNEs has been collected. Of these 85 innovations 72 have been transferred to 169 receiving units. The data consists of 1.3 innovations in average per subunit, 3.7 innovations per MNE and 2,3 transfer projects per innovation. The number of employees in the different subsidiaries ranges from 9 to 6000 employees, with a mean of 589, indicating a well distributed sample in terms of size.

Different industries are also represented in the sample, e.g. manufacturing, telecommunications, transportation, steel and the sample is highly international with a geographical dispersion across 14 countries in Europe, Asia and the U.S.

The selection criterion for innovations included was based on if they were deemed as having a certain degree of novelty and value to the organization. This estimation was done by the source unit. Additionally, the innovations had to have the potential of being transferred and they also had to have been completed one to ten years prior to the interview. The data was collected using a standardized questionnaire. A preliminary questionnaire was pre-tested in two pilot interviews and minor changes were made in order to eliminate ambiguous questions and phrasings as well as to exclude erroneous indicators.

Interviews with respondents were conducted with key personnel at the developing unit involved in the development and transfer of the investigated innovations with a face-to-face method. The respondents were mostly R&D managers, project managers, subunit CEOs etc. and more than one interviewer was typically involved in the interview process. By using this method, a deeper understanding of answers is gained since the opportunity to discuss the questions with the respondents is present. Consequently, the need to identify outliers in the data set, as compared to a mail survey etc., is most likely redundant. The interviews lasted for approximately two hours.

Measures

In this study single measure indicators are avoided whenever possible and the advice of Boyd et. al. (2005) is followed by using multiple indicators in both the dependent and independent variables. This method minimizes the measurement error, is parsimonious and gives a multifaceted representation of the underlying construct (Hair et. al. 2006).

Dependent variable

In order to create the dependent variable I built on precious research done in relation to knowledge transfer performance. To start with, a number of indicators were taken under consideration and the construct was created in an iterative process were both theoretical implications and coefficient alphas were considered (Churchill, 1979). With the transfer performance measure both the "transfer effectiveness", i.e. how easy the new knowledge is adopted and used in the receiving subsidiary and a more general measure in relation to transfer performance satisfaction is captured (Pfeffer and Salancik, 1978). The measure transfer performance is a four item construct where the respondents have answered the following questions on a 7-point Likert-type scale from 1 (totally disagree) to 7 (totally agree):<*The performance of the innovation transfer was very satisfactory*>, <*The counterpart adopted the innovation very quickly*> *and* <*The innovation has been very easy to adopt by this counterpart*>. One final item was included in this construct and was measured on a similar scale from 1 (not at all) to 7 (very high): <*To what extent the innovation transfer has been completed*>. The internal reliability of the underlying construct was satisfactory and within acceptable limits with a coefficient α=.817.

The indicators for transfer performance were also examined in a factor analysis (principal component with Varimax rotation and Kaiser normalization). The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was used to test weather or not factor analysis was appropriate. The KMO-value exceeded the acceptable level (0.6) with a value of .791. (Tabachnick and Fidell, 2001). Also, the Bartlett's test of sphericity was at a .000 significance level indicating that sufficient correlations exist between the indicators (Hair et. al., 2006). The eigen value for the first factor was 2,586 and for the second factor .607 indicating that

only one construct could be extracted from the indicators used for the dependent variable. The construct also explains 64.648 % of the variance in relation to the extraction sums of squared loadings. In the statistical analysis, the score for the extracted factor is used as the dependent variable in the regression.

Table 1 Principal Component Analysis for the dependent variable

	Component	Communalities extracted
The counterpart adopted the innovation very quickly	.859	.738
The innovation has been very easy to adopt by this counterpart	.814	.663
The performance of the innovation transfer was very satisfactory	.809	.655
To what extent the innovation transfer has been completed	.728	.529

Independent variables

Unit similarity consists of three indicators capturing if different aspects of the focal units have affected the transfer process from the sender of the innovations point of view. The respondents were asked to indicate, on a scale from (1) totally disagree to (7) totally agree, to which degree with regard to the transfer of the innovation:<*Technical differences makes the transfer problematic*>, <*Organizational differences makes the transfer problematic*> *and* <*The innovation is difficult to use in the counterpart's business*>.[1] The indicators were added up and divided by three to form the construct used in the regression. Internal reliability of the construct was satisfactory, coefficient α=.719.

Prior collaboration is measured with the help of two different indicators. The respondents were asked to indicate, on a scale from (1) not at all to (7) very high, to what extent besides the specific innovation the units previously had interacted with each other:<*Level of previous*

[1] All three items were reverse coded in order to reflect similarity instead of dissimilarity.

cooperation> and <Level of knowledge shared previously>. The indicators were then summed and averaged to form the construct. The internal reliability of the construct was within acceptable limits, coefficient α=.738.

Motivational disposition consists of two items where the respondents were asked to indicate, on a scale from (1) not at all to (7) very much, if the transfer of the innovation was driven by: *<Benefits to your own business from transfer of knowledge to this counterpart> and <High dependence on this counterpart>*. The two indicators were summed and averaged to form the construct. Internal reliability was below the recommended limits by Nunnally (1978) but exceeded the guidelines for some exploratory research with a coefficient α=.601.[2] Additionally, theoretical considerations imply a two item construct instead of a single item measure. Motivational disposition as it is constructed captures both the benefits related to knowledge transfer as well as the motivation to transfer knowledge since the sending unit is dependent on the receiver. This means that the construct capture a broader spectrum of a motivational disposition towards knowledge transfer. Also, this is a two item construct where it can be more acceptable to have low coefficent α. Reliability increases the more items a scale contains (Nunnally, 1978, p. 243). These considerations together with the principal component analysis accounted for in table 2 where both the factor loadings and communalities extracted are high indicates that this construct can be used, since the communalities extracted indicates the amount of variation explained by the model.

Cross border transfer was included as a dummy variable amongst the independent variables. If the innovation transfer took place between units located in the same country this was coded

[2] In a previous edition of Psychometric Theory Nunnally gave the recommendation of acceptable reliability limits to be between .5 and .6 for preliminary research (Nunnally, 1967, p. 226).

as 0 and if the innovation transfer took place between subsidiaries located in different countries this was coded as 1.

In order to capture *headquarters role in the transfer process* of innovations three items were used. The respondents were asked to indicate, on a scale from (1) totally disagree to (7) totally agree, to what extent:<*The MNE HQ has formally instructed you to share this innovation with the counterpart*>, <*The MNE HQ have themselves been heavily involved in conducting the actual transfer process with the counterpart*> *and finally* <*The MNE HQ have taken complete responsibility for the transfer of this innovation to this counterpart*>. As with the other independent variables the individual items were summed up and averaged to form the construct. The coefficient α=.697.

Three items were used to form the construct h*eadquarters role in the development process*. The respondents were asked to indicate, on a scale from (1) totally disagree to (7) totally agree, with regard to the development of the innovation weather:<*The MNE HQ has participated closely in developing this innovation*>, <*The MNE HQ has been important through specifying requests*> *and* <*The MNE HQ has taken important initiatives for developing the innovation*>. The indicators were added up and divided by three in order to form the construct used in the regression. Internal reliability exceeded the recommended limits with a coefficient α=.881.

Control variables

In order to control for unobserved heterogeneity four variables were introduced as control variables in the model. First, age may affect the autonomy of the subsidiaries and older subsidiaries may be more autonomous and they have had the opportunity to accumulate both

more general and dyadic transfer experience. Also, older subsidiaries tend to be more innovative and the ability to exploit innovative opportunities depends to some extent on past experiences of similar activities (Foss and Pedersen, 2002; Cohen and Levinthal, 1990). To control for age, the logarithm of the number of years the subsidiary had been operating in the market was included in the regression equation. Secondly, building on previous research, the characteristics of the knowledge has been put forward as one of the factors influencing knowledge transfer (c.f. Gupta and Govindarajan, 2000). The tacitness of knowledge has been widely studied and identified as one of the main barriers to knowledge transfer (Zander and Kogut, 1995; Szulanski, 1996). Codified knowledge is – in general – easier to transfer compared to tacit knowledge (Nonaka, 1994). Weather or not the knowledge is explicit or tacit has been included as a control variable - "Codifiability" - and this variable consists of a two item construct where the respondents have been asked to indicate, on a scale from (1) strongly disagree to (4) neither/nor up to (7) strongly agree, if:<*The innovation technology/process know-how is easily codifiable (in blueprints, instructions, formulas etc.*> *and <The innovation technology process know-how is more explicit (i.e. easily transferable) than tacit*>. The two items were summed and averaged to form the construct. Internal reliability is somewhat below the recommendation, coefficient α=.661. As discussed previously, theoretical considerations regarding the construct capturing the phenomenon codifiability in a better way compared to a single item measure motivates inclusion of both items despite the low alpha. Additionally, a low alpha can be considered acceptable since the construct only is used to control for unobserved heterogeneity in the model. Thirdly, in order to control for if the transfer took place within the MNE business area or not this was included as a dummy variable where a transfer outside the MNE business area was coded 0 and a transfer between units belonging to the same business area was coded 1. The reasoning behind this being that a transfer within the existing business area may face fewer barriers, thus

affecting transfer performance. Finally, a dummy variable testing if the innovating unit conducted basic research or not was included. If the subsidiary activities didn't consist of any basic research this was coded 0 and if the investigated subsidiary conducted any basic research this was coded 1. Subsidiaries engaged in basic research may have a higher degree of legitimacy for the knowledge stemming from them. The knowledge transferred from subsidiaries engaged in basic research may be accepted more easily in receiving units because of the legitimacy aspect. By engaging in basic research a subsidiary may gain the attention of others as being innovative and get a special position which enables transfer of knowledge to other subsidiaries in the MNE.

Common method bias and multi-collinearity

This study uses self-reported data and consequently there may be a risk of common method bias. In order to check for this Harman's one-factor test was used (Podsakoff and Organ, 1986). The indicators used in the relevant constructs – thus omitting the dummy variable "Cross border transfer" and all the variables used as controls – were included in a principal component analysis. The result from this analysis is accounted for in table 2. High common method variance can be said to exist if only one factor emerges with an eigen-value above one. Another indication of common method variance is if one factor accounts for the majority of the total variance explained. In the principal component analysis five variables were extracted with an eigen-value above 1 and another factor emerged with an eigen-value very close to 1 (0.930). This variable was also included as a factor in the model. Weather or not this should be done is open for discussion, however if the eigen-value was set at 1 or if the items used for the factor in question was dropped many of the values for the extracted communalities dropped indicating that the model explains what is measured in a better way with the variable included. Also, the eigen-value for the seventh variable was considerably

lower (0.785) and not included. Looking at the factor loadings and the extracted communalities for the items in question these were high which also indicates that the variable can be included in the model. Finally, theoretical considerations about that the variable explains phenomenon distinct from what the other variables don't capture motivates inclusion. Consequently, six factors were extracted corresponding to both the dependent and independent variables. None of the factors explained a majority of the variance, the range being between 5.5% and 23.5%. The cumulative variance explained by the six extracted factors is 75.691%. The presence of common method bias can not be excluded, however the results from the principal component analysis indicates that it isn't likely to cause any major issues when analysing the data.

In order to check for multi-collinearity among the predictor variables, the variance inflation factor (VIF) was calculated. The highest VIF-value calculated was 1.594 and the lowest 1.119. The average VIF-value was 1.310. A large VIF-value indicates a high degree of multi-collinearity among the independent variables and a common cut-off threshold for the VIF-value is 10 (Hair et. al., 2006). The values generated for the predictor variables in this study can be considered very low, thus indicating that multi-collinearity won't have any substantial effects on the predictive ability of the regression model and the interpretation of the results (Hair et. al., 2006).

Table 2 Factor analysis of firm-specific variables: varimax rotation

Variable	Factor loadings		Communality
Transfer performance			
Level of completed innovation transfer	0.600		0.633
The counterpart adopted the innovation very quickly	0.819		0.736
The innovation has been very easy to adopt by this counterpart	0.743		0.704
The performance of the innovation transfer process was very satisfactory	0.861		0.779
Eigenvalue		3.132	
% Variance		18.422%	
Unit similarity			
Technical difference makes the transfer problematic[a]	0.878		0.862
Organizational difference makes the transfer problematic[a]	0.527		0.612
The innovation is difficult to use in the counterpart's business[a]	0.521		0.590
Eigenvalue		1.083	
% Variance		6.374%	
Prior collaboration			
Level of previous cooperation	0.903		0.879
Level of knowledge shared previously	0.816		0.826
Eigenvalue		1.563	
Variance		9.191%	
Motivational disposition			
Benefits to your own business from transfer of knowledge to this counterpart	0.825		0.794
High dependence on this counterpart	0.701		0.810
Eigenvalue		0.930	
% Variance		5.468%	
HQ role in transfer			
The MNE HQ has formally instructed you to share this innovation with the counterpart	0.722		0.607
The MNE HQ have themselves been heavily involved in conducting the actual transfer process with the counterpart	0.869		0.778
The MNE HQ have taken complete responsibility for the transfer of this innovation to this counterpart	0.773		0.673
Eigenvalue		2.144	
% Variance		12.611%	
HQ role in development			
The MNE HQ has brought competence of use for the development this innovation	0.893		0.832
The MNE HQ has been important through specifying requests	0.918		0.880
The MNE HQ has taken important initiatives for developing this innovation	0.925		0.873
Eigenvalue		4.016	
% Variance		23.625%	

[a] These items were reverse coded

Results

The mean values, standard deviations and correlations for all the measured variables are presented in table 3. In order to estimate the model an Ordinary Least Squares (OLS) analysis was used. The results of the regression are presented in table 4 estimating the effects of the independent variables on transfer performance. Model 1 examines the entire model whereas model 2 only investigates the control variables.

The significance level of the first model is high, with an F-value of 8.306 ($p<.001$). Also, the amount of variance explained is around 38.5 percent, thus the model both have a high explanatory value and is significant. Model 2 is significant at the .01 level with an F-value of 2.686. However, the explanatory value of the second model is low since only about 4 percent of the variance is explained by the control variables. Three of the four control variables are significant, but only at the .1 level. The control variables are not significant in model 1 indicating that they have some explanatory value for the independent variables. However, they do not add any substantial explanatory value to the model.

Hypothesis 1 states a positive relation between unit similarity and transfer performance. This hypothesis is supported at a highly significant level ($p<.001$). Unit similarity is shown to have a strong effect on transfer performance. Hypothesis 2 posits a positive relation between prior collaboration and transfer performance. The coefficient for prior collaboration is positive and the significance level is acceptable ($p<.05$). Hence, this hypothesis is supported. Hypothesis 3 states that transfer performance will be positively affected by a motivated sending subsidiary. Here the coefficient for this variable is negative at a significance level of ($p<.05$) indicating the opposite relationship compared to the one hypothesised. Consequently, hypothesis 3 is not supported. Hypothesis 4 deals with the effect a transfer across countries has on transfer

performance, stating that cross border transfer will affect transfer performance negatively. The results show a positive coefficient at a high significance level ($p<.01$). This indicates a positive relationship between cross-border transfer and transfer performance. Consequently, hypothesis 4 is rejected and the results indicate an opposite relationship, i.e. cross-border transfer has a positive impact on transfer performance. Headquarters role in the transfer process is hypothesized about in hypothesis 5a and 5b, with respectively a positive and a negative influence in relation to transfer performance. The results from the regression shows a very minor positive effect of headquarter involvement in the transfer process. However, the effect is not significant. Hence, neither hypothesis 5a nor 5b can be supported or rejected. Lastly, the opposing hypothesizes 6a and 6b deals with the issue of headquarters involvement in the development process of an innovation and the effect this has on transfer performance. The coefficient is negative; however the effect is almost not discernable and not significant. Thus, no support nor rejection can be found for neither hypothesis 6a nor 6b.

Table 3 Correlations and descriptive statistics

Variables	Mean	Std. Deviation	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Transfer Performance	0.000	1.000	1.000										
2. Unit similarity	5.696	1.314	0.613**	1.000									
3. Prior collaboration	4.777	1.660	0.292**	0.255**	1.000								
4. Motivational disposition	4.076	1.982	-0.063	0.098	0.353**	1.000							
5. Cross border transfer	0.763	0.426	0.101	0.045	-0.096	0.005	1.000						
6. HQ. role in transfer process	1.924	1.446	0.017	0.065	0.070	0.105	-0.012	1.000					
7. HQ. role in development process	2.159	1.643	-0.115	-0.022	-0.053	0.155	0.034	0.476**	1.000				
8. Age	3.528	0.903	0.032	-0.161*	0.085	0.010	-0.103	0.079	-0.331**	1.000			
9. Basic research	0.555	0.498	0.130	0.023	0.007	-0.074	-0.101	0.115	-0.175*	0.402**	1.000		
10. Codifiabilty	5.474	1.545	0.203*	0.218**	0.132	0.157*	0.118	-0.198*	-0.101	-0.256**	-0.230**	1.000	
11. Business area transfer	0.553	0.499	0.163*	0.031	0.060	0.057	-0.097	-0.547**	-0.362**	0.003	0.065	0.216**	1.000

Spearmans correlation
* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Table 4 Results of the regression for transfer performance[a]

Variable	Model 1	Model 2
Unit similarity	0.547***	
Prior collaboration	0.205*	
Motivational disposition	-0.177*	
Cross border transfer	0.204**	
HQ. role in transfer process	0.036	
HQ. role in development process	-0.003	
Age	0.126	-0.008
Basic research	-0.033	0.168†
Codifiability	-0.053	0.139†
Business area transfer	0.152	0.147†
Diagnostics		
R^2	0.439	0.068
Adj. R^2	0.386	0.043
F-value	8.306***	2.686**

[a] Values are standardized parameter estimates.
N=169
† p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Discussion

This study has focused on structural aspects related to MNE subsidiaries, i.e. organizational and technological similarity and previous cooperation between subsidiaries engaging in knowledge transfer. By focusing on innovations, knowledge transfer performance can be studied. It has been shown that knowledge transfer performance is positively related to these subsidiary features, i.e. if the subsidiaries are alike and if they have cooperated previously this will affect transfer performance positively. It can be argued that it is easier to transfer knowledge to similar units since they might be viewed as more reliable. Also, by having cooperated previously you know what you are facing since experience of working together exists. Unit similarity implies similar routines and structures in the subsidiaries and this can offer one explanation to a facilitated transfer performance. Another aspect is that it is easier to be accepted as an innovating unit with a reputation of reliability if unit similarity and previous cooperation already exists. The sending subsidiary can be said to gain the status of being a reliable partner to engage in knowledge transfer with. A subsidiary such as this will more easily get the attention of other subsidiaries in knowledge transfer projects. The result

regarding cross-country transfer and its positive effect on knowledge transfer performance goes against the findings of many previous studies. One explanation for this can be found in the expected barriers identified by subsidiaries and the fact that they might prepare more for arduous transfer projects such as cross-border transfers. Also, the structural aspects of subsidiaries discussed above can impact knowledge transfer across borders.

Additionally, it was found that even if the sending subsidiary is motivated to transfer knowledge this will not affect the transfer performance in a positive direction. This result is surprising and goes against common belief. One explanation might be found in the complexity of the knowledge and innovations. In a relationship where the subsidiaries are interdependent and have a history of collaborating together more complex transfers may be taking place, hence making the transfer process more difficult. Also, the partners can possibly have higher demands in an existing relationship. Moreover, when dealing with the motivational disposition of subsidiaries it is important to keep in mind the dyadic nature of a knowledge transfer process. Even if the sender is highly motivated to transfer this doesn't automatically mean that the receiver of the knowledge wants to make use of the knowledge being transferred, i.e. the NIH-syndrome. This of course affects transfer performance negatively.

The conclusion from this study is that what matters for transfer performance are structural aspects related to the units engaging in knowledge transfer. The findings indicate that headquarters play a limited role for knowledge transfer performance.

Managerial implications and future research topics

There are several issues for future research stemming from this paper. First, the geographical dispersion of subsidiaries transferring and receiving knowledge needs to be studied more in-

depth in order to see how knowledge flows between units. Is transfer performance not affected by geographical distance at all or can a difference in the transferability of knowledge be identified in relation to subsidiaries operating in different countries but with a geographical proximity? Secondly, the negative impact a positive motivational disposition of a sending subsidiary had on transfer performance needs to be better understood. Possible areas of research are questions related to interdependence between senders and receivers of knowledge but also on the characteristics of the innovation being transferred. A distinction between complex and more simplistic innovations might explain the negative transfer performance result. Also, delving further into the issue of innovation characteristics might be a fruitful area for explaining cross-border transfer of knowledge. Lastly, previous research has focused on how subsidiaries gain the attention of headquarters. The issue of subsidiaries getting business network attention is an area open for research.

This study also has several important implications for managers. It is important for managers to be aware of the dilemma of not only transferring knowledge but the importance of how the knowledge is adapted in the receiving units. When engaging in knowledge transfer the performance will be better when engaging in transfer with subsidiaries with the same structure. Also, if the transfer of knowledge is taking place in an established relationship, i.e. the subsidiaries have collaborated previously, this will facilitate the transfer process which can be an important aspect for managers to consider when complex knowledge is to be transferred and a help developing a strategy for choosing to whom to transfer. Moreover, it isn’t enough to have a motivated sender of knowledge. It is important for managers to consider the motivational disposition of both the sending and receiving subsidiaries. By being aware of the potential barriers to knowledge transfer across countries this may possibly be mitigated by preparation.

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