

Track: Knowledge Management in International Business

**TOWARDS EXPLAINING RECURRENT INNOVATION INFLOWS IN MNC  
SUBSIDIARIES**

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# **TOWARDS EXPLAINING RECURRENT INNOVATION INFLOWS IN MNC SUBSIDIARIES**

## **Abstract**

Despite considerable research on the transfer of knowledge and innovation within multinational corporations (MNC), research on why some subsidiaries receive larger inflows than others within the corporate network is scarce. This paper adopts the view of innovation transfer as the solution to a problem as perceived by the recipient subsidiary and explores factors that can explain why some subsidiaries engage in more intense innovation inflow. These factors are associated with the characteristics of the subsidiary, its integration and linkages within the MNC and the characteristics of the subsidiary's external business environment.

Six hypotheses are tested using data on innovation transfers within MNCs. Concerning the subsidiary characteristics, a subsidiary's own capabilities decreases the frequency of innovation inflow from other corporate units. The degree of social integration within the MNC does not affect the frequency of innovation inflow whereas the degree of technical embeddedness in the HQ relationship is positively associated with innovation inflow. Furthermore, reciprocation in terms of transferring innovations is a significant predictor of the amount of innovation inflow. Regarding the subsidiary's business environment, operating in a dynamic environment has a positive effect on innovation inflow whereas the embeddedness of business network relationships does not affect the frequency of innovation inflow from other corporate units.

**Keywords:** Innovation inflow; MNC subsidiary; subsidiary capabilities; internal integration; external business environment

## **1. Introduction**

The transfer of innovations within the MNC network is claimed to be one of the primary advantages of multinationality (e.g., Kogut & Zander, 1992, 1993; Zander & Kogut, 1995) whereby the knowledge and innovations residing in different MNC units can be utilised in multiple locations. Exploiting existing innovations can be an efficient means for subsidiaries to compete in their respective markets. Most research on knowledge transfer has focused on investigating barriers to knowledge transfer and factors that drive or impede transfer processes (e.g., Simonin, 1999; Szulanski, 1996, 2000, 2003). Additionally, many studies have mainly approached the phenomenon as the transfer of information or know-how between MNC units (Gupta & Govindarajan, 1991, 1996; Hansen, 1999; Schulz, 2001, 2003). The aim of this paper is to go beyond merely determining why certain subsidiaries become recipients of corporate innovations to investigating why some subsidiaries become frequent innovation receivers. Thus, our focus lies on the underlying determinants of innovation inflow into MNC subsidiaries, irrespective of the character of the transfer process.

From research in the field of knowledge transfer it can be concluded that the occurrence of a subsidiary becoming a receiver of innovations can be attributed to, e.g., the motivational disposition of both the sender and recipient units (Katz & Allen, 1982; Szulanski, 1996), the presence of more or less developed channels of communication and information (e.g., Ghoshal & Bartlett, 1988; Ghoshal, Korine & Szulanski, 1994), and contextual issues regarding the applicability and transferability of knowledge (Gupta & Govindarajan, 2000; Szulanski, 1996; von Hippel, 1994). However, we argue that the reason why some subsidiaries become recurrent recipients of corporate innovations can be better explained by addressing the inflow of innovations to recipient subsidiaries as a solution to a specific problem as perceived by the recipient subsidiary. This approach has been emphasised within the knowledge management

literature where knowledge transfer is viewed as a demand-driven process (e.g., Davenport & Prusak, 1998; Monteiro, Arvidsson & Birkinshaw, 2008) or as the result of the recipient's search process (Hansen & Haas, 2001; Hansen & Løvås, 2004; Schulz, 2003). In the same spirit, this paper acknowledges that intra-corporate innovation transfer can be considered to be a problem-solving activity initiated by the recipient subsidiary (Monteiro et al., 2008). Turning to other units within the multinational corporation for innovations can be viewed as a response to the needs and opportunities offered by the subsidiary's local business environment (cf. Schulz, 2003), its corporate context and the subsidiary's own capabilities (Monteiro et al., 2008). The frequency with which MNC subsidiaries receive innovations from MNC counterparts is argued to vary accordingly.

The paper is organised as follows. First, the theoretical framework is presented, followed by the development of hypotheses. Then follows a description and discussion of the methodology, the data collection and the analytical approach used in the study. We then present the results of the empirical test. Finally, we draw some conclusions about the factors associated with frequent intra-MNC innovation inflow and suggest issues for management and for future research.

## **2. Knowledge flows into organisational subunits**

### *2.1. Knowledge search within organisations*

The search for knowledge has been viewed as an important activity within organisations. The conditions under which organisational units engage in search activities have been a central theme within the behavioral theory of the firm (Cyert & March, 1963; March, 1991), the evolutionary theory of the firm (Nelson & Winter, 1982) and among organisational learning theorists (Levitt & March, 1988). It has been argued that organisations search in order to solve problems (Cyert &

March, 1963) and that search is to be viewed as an important driver of learning processes within organisations (cf. Levitt & March, 1988). The scope of search in organisations, in particular innovative search, has been discussed by March (1991) in terms of a distinction between exploration and exploitation. Exploitation, it is argued, is the “refinement of and extension of existing competencies, technologies and paradigms”, whereas exploration is the “experimentation with new alternatives” (March, 1991: 85). March’s distinction thus suggests a search process where the MNC subsidiaries’ innovative search can be either the exploitation of innovations that already exist within the corporation or the experimentation and development of new innovations, or even a combination of the two. In this paper, we focus on the exploitation of already existing innovations within the corporation, i.e., innovation inflow, which is argued to be one way of innovative search for MNC subsidiaries.

## *2.2. Innovation inflow as the solution to a problemistic search process*

Notions of knowledge flows into organisational units vary in the literature. However, some scholars have explicitly stated that the recipient’s search for solutions to a perceived need or requirement affects knowledge transfer (Hansen & Haas, 2001; Monteiro et al., 2008). According to Monteiro et al. (2008), inflow of knowledge to subsidiaries can be viewed as the search for a solution to a problem on the part of the recipient. Drawing on work within the “behavioral theory of the firm” (cf. Simon & March, 1958; Simon, 1947), it is argued that “knowledge transfer between units can be framed as a process of problemistic search on the part of the recipient” (Monteiro et al., 2008: 92). In other words, the perceptions of the recipient unit are the main drivers of knowledge inflows. The importance of the perceptions of the recipient can also be derived from the wider knowledge management literature, in which the value of a demand-driven approach to knowledge transfer has been acknowledged (Stewart, 1998; Davenport & Prusak,

1998). Within the innovation literature, innovative activity has been viewed as the solutions of problems (Adner & Levinthal, 2001; Dosi, 1988). In the same way, an inflow of innovations, or more specifically, the adoption of innovations from other corporate units, can be viewed as the result of a search for a solution of a problem initiated within the recipient subsidiary. Framing our research in this way does not imply disregarding the importance of the sender or of an effective transfer process for achieving knowledge transfer (Szulanski, 1996). Rather, we are simply suggesting that an understanding of why some subsidiaries become frequent receivers of innovations can be seen as the solution of specific problems faced by the recipient unit. Recurrent innovation inflow from other units in the MNC can be motivated by specific problems that a subsidiary faces in association with conducting its business operations, e.g., in order to compete in the local business environment, or as the response to an opportunity offered to the subsidiary, e.g., within the context of an existing business relationship. For the purpose of this paper, the occurrence of a subsidiary becoming a recurrent receiver of innovations is argued to be attributable to the following factors: 1) the subsidiary's own capabilities, 2) the subsidiary's corporate context, and 3) opportunities and demands in the subsidiary's external business environment.

### **3. Hypothesis development**

#### *3.1. Subsidiary capability development*

Subsidiaries within an MNC perform different functional activities and organisational knowledge is developed and integrated around these activities. Some research, including research on subsidiary knowledge sourcing and cross-border knowledge transfer has focused on functional knowledge connected to specific functional activities or capabilities, such as R&D, manufacturing, marketing and sales, etc. (Andersson et al., 2002; Foss & Pedersen, 2002; Holm

& Pedersen, 2000; Schlegelmilch & Chini, 2003; Schmid & Schurig, 2003; Zander, 1991). Hence, subsidiary capability development, which is the term used in this paper, relates to the development of capabilities within these different functional activities (see, e.g., Amit & Schoemaker, 1993; Henderson & Cockburn, 1994; Schmid & Schurig, 2003). Over the course of conducting its operations, an organisation accumulates experience and develops capabilities within those particular activities. For a subsidiary, such capabilities can be considered as assets that provide the subsidiary with an ability to respond to opportunities and threats as they arise in the local market.

Depending on the amount of resources that a certain subsidiary can mobilise, it will have different needs in terms of receiving innovations from other MNC units. The need to engage in innovation flows from other units within the MNC can therefore be assumed to be associated with the level of capabilities or ability to develop innovations within the subsidiary's own organisation. Lacking own capabilities or a sufficient knowledge base required for innovation development makes the subsidiary more dependent on the resources that can be provided from other units or from the MNC HQ. The literature on the resource dependence between firms (e.g., Pfeffer & Salancik, 1978) suggests a similar argument. Or to put it the other way around – the larger the volume of local knowledge, the less likely that extra-unit knowledge will be of relevance for the recipient unit because there is, relatively speaking, less to be learned (Schulz, 2003: 454). A recurrent inflow of innovations can be inferred from the subsidiaries own lack of capabilities to develop solutions to business-related problems and opportunities in the market that the subsidiary could potentially act upon. By viewing innovation transfer within MNCs as the solution to a problem as perceived by the recipient, when a subsidiary possesses the ability to develop new capabilities and mobilise them properly, it can be assumed to reduce the need for inflow of knowledge and innovations from other MNC units.

In addition, research has suggested that the number of functions that a subsidiary performs, e.g., research and development, manufacturing, and marketing and sales, etc., allows the subsidiary to be more self-contained with respect to various functional resources and to thereby experience lower resource dependence vis-à-vis the rest of the MNC network (Ghoshal and Bartlett, 1990). Hence we can expect a lower level of innovation inflow from other corporate units to such subsidiaries (cf. Harzing & Noorderhaven, 2006). These arguments are broadly consistent with the concept of “relative advantage” (Rogers, 1995: 15) in association with the diffusion of innovations and implies that the greater the perceived relative advantage of an innovation, the more rapid its rate of adoption will be. For example, contingencies in the subsidiaries’ local markets make some innovations “unsuitable” for use in particular locations or there may be a misfit between a received innovation and the subsidiary’s business operations. This would imply that other MNC units’ innovations are not relevant for exploitation in certain locations. In such instances, locally developed innovations, e.g., to suit specific counterparts in the local market, are more relevant to the subsidiary’s operations than innovations transferred from peer units operating in distant contexts.

**H1a.** A subsidiary’s own capability development activity is negatively associated with a high frequency of innovation inflows.

However, there are arguments in favour of the opposite association. As suggested by Monteiro et al. (2008) and in line with the absorptive capacity argument (Cohen & Levinthal, 1990; Lane & Lubatkin, 1998), the greater the capabilities of the subsidiary, the more motivated it will be to acquire knowledge from other MNC units and the more able it will be to access and put external knowledge to use. It can be expected that greater capability development within the



subsidiary works in favour of its ability “to recognize the value of new, external knowledge, assimilate it, and apply it to commercial ends” (Cohen & Levinthal, 1990: 128). In an empirical investigation, Monteiro et al. (2008) found that units that perceive their capabilities as high are more heavily engaged in knowledge inflows from other MNC units than subsidiaries that rate their capabilities lower. In a study on intra-organisational flows of knowledge in MNCs, Schulz (2003: 444) suggests that “the volume of local-knowledge bases plays an important role for inflows of knowledge because it can make extra-unit knowledge more relevant for the focal unit and help the subunit recognize that relevance”. In line with this reasoning, the greater the capabilities of the subsidiary and the more the subsidiary engages in capability development, within a variety of functional areas, the greater its ability to identify significant innovations residing within other MNC units. Accordingly, the following hypothesis can be formulated:

**H1b.** A subsidiary’s own capability development is positively associated with a high frequency of innovation inflows.

### *3.2. The subsidiary’s corporate context*

It is generally acknowledged that the transfer of knowledge is easier to accomplish within organisations as opposed between organisations (Kogut & Zander, 1992; Grant, 1996). Within the literature on knowledge transfer, several scholars have highlighted the importance of the characteristics of the corporate context (Kostova, 1999; Szulanski, 1996). One important aspect of the subsidiaries corporate context is the type of integration in the corporation (Forsgren, Holm & Johanson, 2005), and the existence of linkages and relationships, especially the characteristics of the linkages and relationships between a focal subsidiary and different units within the MNC (Hansen & Løvås, 2004). Intra-organisational relationships create awareness of the knowledge

residing within other corporate counterparts (Schulz, 2003) resulting in efforts to acquire knowledge from the counterparts that possess the resources that are needed. This awareness can be assumed to be contingent on the extent to which the subsidiary is an integral part of the organisation in terms of its type and level of integration in the corporation (Forsgren et al., 2005; Schulz, 2003; Tsai & Ghoshal, 1998). It is also possible that, as the subsidiary is more likely to search for a solution in those units it has a stronger relationship with (Hansen & Løvås, 2004), the recipient subsidiary will turn to those units that it is already aware of and has close relationships with.

### *3.2.1. Corporate social integration*

The informal and social dimensions of intra-organisational relationships have often been discussed in research on the creation (Tsai & Ghoshal, 1998) and transfer of knowledge within organisations (Hansen, 1999; Hansen & Lovås, 2004; Inkpen & Tsang, 2005). Social networks characterised by strong ties are argued to promote trust between participating members and the sharing of fine-grained information and problem-solving arrangements (Hansen, 1999; Uzzi, 1996). According to Liebeskind, Lumerman, Zucker and Brewer (1996), social relationships also result in an improvement of the reliability of knowledge exchange. The social capital of relations within firms assists the exchange and combination of knowledge (Nahapiet & Ghoshal, 1998). Organisational members can thus learn from working in the relationships and groups to which they are committed, as they become custom to the organisational beliefs, behaviours, rules and procedures that constitute the organisation (e.g., March, 1991). According to several scholars studying the role of subsidiaries in MNCs (e.g., Bartlett & Ghoshal, 1988; Birkinshaw, 1997; Birkinshaw & Hood, 1998; Gupta & Govindarajan, 1991, 1994), highly integrated subsidiaries, referring to their involvement in both the creation and transfer of knowledge within the MNC, are

characterised by having strong ties to other organisational members, being highly socialised within the organisation, engaging in informal communication and having high levels of normative integration. Inter-unit communication facilitates the transfer of best practices (Szulanski, 1996) and innovation diffusion among MNC subsidiaries (Bartlett & Ghoshal, 1988). A subsidiary that in this way is socially integrated within the corporation becomes familiar to the organisation and its members. Hence, the familiarity that is created through strong ties to other corporate counterparts will “raise the awareness of knowledge seekers about potential availability of relevant knowledge in other units, and it can make providers of knowledge more aware of the relevance of their knowledge to the operations performed in other units” (Schulz, 2003: 447). It can be argued that subsidiaries in their interactions in relationships within the MNC become more or less socially integrated in the corporation in terms of high levels of trust among the participants, a shared understanding of the organisational strategic intent and corporate values and informal communication, etc. As a subsidiary updates its understanding of the units it is interacting with, this positively affects their probability of interacting again in the future, which is “creating a dynamic self- reinforcing system, and with time units may be locked in to a limited set of units with which they interact” (Borgatti & Cross, 2003: 442). Consequently, we can assume that a high level of social integration between the subsidiary and its sister units will not only give rise to an increased awareness of the relevance of knowledge residing in other parts of the organisation, but will also make the transfer process easier.

**H2.** A high level of corporate social integration is positively associated with a high frequency of innovation inflows.

### *3.2.2. Subsidiary technical embeddedness*

The notion of technical embeddedness has been investigated in inter-organisational settings (cf. Andersson et al., 2002) and refers to interdependencies between firms that arise from mutual adaptation in various development processes and close cooperation in business relationships. In an intra-organisational context, subsidiaries can to varying degrees be engaged in technical development with different corporate counterparts, e.g., sister subsidiaries in other locations or with corporate HQ. Research has suggested that through cooperative problem-solving activities and interaction within inter-unit linkages, different units within an organisation can learn from each other (Ghoshal et al., 1994; Hansen, 1999; Leonard-Barton & Sinha, 1993; Tsai, 2001). A high degree of technical embeddedness with corporate counterparts enables the subsidiary to develop absorptive capacity that is required to understand and value the importance of external knowledge and for the subsidiary's ability to assimilate new knowledge (cf. Cohen & Levinthal, 1990). As a result of the adaptations and technical collaborations that take place in such corporate relationships, a high degree of technical embeddedness would imply that the knowledge held by the counterparts in the relationship has a greater level of similarity or is more related to the activities of each of the counterparts. The higher the technical embeddedness of the subsidiary, the more related the new knowledge, and thus more relevant and easy to assimilate (cf. Schulz, 2003). As a result, there will be a greater inflow of innovations to subsidiaries that exhibit high degrees of technical embeddedness with corporate counterparts.

**H3.** A high level of technical embeddedness with a) MNC HQ and b) sister subsidiaries is positively associated with a high frequency of innovation inflows.

### *3.2.3. Innovation reciprocation*

It has been found that flows of knowledge among MNC subunits can be predicted by the degree to which the subsidiaries actively engage in knowledge sharing with other subsidiaries (Schulz, 2001, 2003). When a subsidiary shares knowledge with peer units, the other subsidiaries not only realise that the knowledge held by the subsidiary can be of use to them but also simultaneously become aware of the potential usefulness of the knowledge that they themselves hold for the focal subsidiary. Schulz (2003: 447) suggests that “outflows of knowledge from a focal subunit to other subunits should lead to intensified inflows of knowledge from those subunits”. The expectation of equal contribution has been found to be one determinant of knowledge exchanges (Kim & Mauborgne, 1991). It is also plausible that subsidiaries that engage in sharing their knowledge with other subsidiaries are more “visible” within the internal network so that other subsidiaries keep them in mind when engaging in the transfer of knowledge internally. It has been shown that subsidiaries that rate their capabilities highly or are rated highly by peers or corporate HQ are more likely to engage in knowledge flows than for subsidiaries where this is not the case (Monteiro et al., 2008). Therefore, it could also be argued that a subsidiary that is experienced with transferring knowledge and innovations to different corporate counterparts is relatively more likely to search for and to absorb innovations from those corporate units to which it already transfers knowledge. From its previous transfer engagement it will most likely have experienced both the benefits and problems associated with knowledge transfer which can make it better equipped to handle the transfer process than subunits that have not as actively taken part in knowledge sharing.

Schrader (1991) has proposed that reciprocity is a fundamental rule governing information trading and empirical studies on the transfer of information (see also von Hippel, 1987; Rogers, 1982) show that information transfer takes place within exchange relationships grounded in

reciprocity. If the transfer of innovations constitutes exchange relationships, then the benefit of providing knowledge depends on the degree to which giving help increases the chance of receiving help. This in turn depends on the value of the provided knowledge to the receiver in that the more important the knowledge is to the receiver, the stronger the obligation to reciprocate and the greater the future benefit for the knowledge provider.

**H4.** Innovation reciprocation to other corporate counterparts is positively associated with a high frequency of innovation inflows.

### *3.3. The subsidiary's external business environment*

The characteristics of the business environment constitute a potent influence on the choice of strategy pursued by the firm (e.g., Porter, 1980). Similarly, MNC subsidiaries face different local business environments that may put pressure on them to respond to the idiosyncrasies of their local markets. This includes the development innovations and solutions that respond to the needs of the various market counterparts with which the subsidiaries interact. The ability to mobilise and leverage knowledge and resources that are dispersed between units within the MNC network is an imperative for maintaining competitive advantage and tapping into “the [...] potential of pockets of technology, capabilities, and market understanding scattered around the world” (Doz et al., 2001: 25) is becoming increasingly important and can potentially allow firms to leverage innovations on a global basis.

In particular in dynamic and competitive environments that are prone to rapid change, new innovations are a strategic imperative in order to remain competitive (e.g., D’Aveni, 1994). In view of the fact that a focal subsidiary’s own resources may not be immediately adjusted to the development of innovations, the transfer of innovations from other MNC units could be a

possible alternative whereby the subsidiary can attend quickly adapt to the needs of its external counterparts the local market. According to Holm et al. (2005: 205), “knowledge transfer [within MNCs] ... create advantages for receiving units, bolstering their competitive performance in their respective marketplaces”. Hence, it is reasonable to assume that different factors in the subsidiary’s external environment can explain why some subsidiaries require a greater need for innovations than others. Being an active recipient of corporate innovations may be one way of dealing with environmental uncertainty and continuously seeking to alter the structure of competition (D’Aveni, 1994), since the inflow of innovations from corporate other counterparts can be considered “a potential source of competitive advantage against other players in the local market” (Gupta & Govindarajan, 2000: 480). By adopting innovations that have been developed and used by other units within the MNC, the recipient subsidiary’s ability to challenge rival firms’ operations increases. In line with the suggestion by Dosi (1988) that innovations can serve as solutions to problems, we posit that a recurrent innovation inflow should be considered as an alternative to the subsidiary’s own innovation development, which can be especially important in the situations where the subsidiary must react rapidly to changes and competitive pressure in the local business environment (Porter, 1980, 1990) as well as specific business relationship requirements (Holm, Holmström & Sharma, 2005; Nohria & Ghoshal, 1997) that affect the subsidiary’s operations in the local market.

### *3.3.1. Environmental dynamics*

Dynamic organisational environments creates pressure on firms to increase their innovative activity and the adoption of innovations is one way through which the firm increases its ability to adapt to changes in the environment (Damanpour & Gopalakrishnan, 1998). Companies that fail to improve products and processes will in due time experience difficulties to keep up with

competition and even challenges of surviving. Contingency theorists and scholars within strategic management (Chandler, 1962; D'Aveni, 1994; Lawrence & Lorsch, 1967; Porter, 1980) have long emphasised that the characteristics of the firm's environment influences the strategy pursued by the firm. The environment has also been recognised as an important contextual factor influencing innovation (Tornatzky & Fleischer, 1990) and in particular in environments characterised by change and unpredictability, innovations constitute a strategic imperative (Damanpour & Gopalakrishnan, 1998). Subsidiaries that are exposed to environments characterised by rapid technological change are under pressure to address these changes and to become more efficient, e.g., by developing or adopting new innovations (Damanpour & Gopalakrishnan, 1998). Since it may be potentially problematic and in particular time-consuming for the subsidiary to allocate resources to develop internal competencies for the generation of own innovations, an alternative means by which MNC subsidiaries can address rapid changes in their local business environments is to engage in greater inflow of innovations from intra-MNC counterparts. This way, recipient subsidiaries can utilise the transferred innovations as a means of penetrating and competing in their local markets (cf. Gupta & Govindarajan, 2000). By acquiring innovations from other MNC units, the subsidiary can more quickly respond to environmental demands and pursue new business opportunities (cf. Zahra & Covin, 1994)

**H5.** A high level of environmental dynamics in the subsidiary's business environment is positively associated with a high frequency of innovation inflows.

### *3.3.2 Business network embeddedness*

It has been found that a great deal of technological development is done in conjunction with important business partners, such as customers and suppliers. As firms engage in collaboration



with different business counterparts in the local market, they become increasingly interdependent and adapted to each others business operations, i.e. adjustments are made to suit each counterpart's business operations (Håkansson, 1987, 1989). The more a subsidiary adapts its activities to those of other actors in the network, the more the subsidiary's activities are aligned with those present of the local market (Forsgren et al., 2005). It can thus be assumed that innovations that have been developed by other MNC subsidiaries located in other business contexts will be less appropriate in the focal subsidiary's local context (Andersson et al., 2002; Forsgren, Johanson & Sharma, 2000) since the specifics of each subsidiary's market may be unique to that market and even unsuitable in another subsidiary's market. It can be assumed that the greater the embeddedness of a focal subsidiary's business network, the more locally oriented the subsidiary's operations will be, and therefore also its innovations, since organisational subunits develop knowledge within the context in which they operate (Inkpen & Dinur, 1998). In line with the suggestion of Schulz (2003), it can be inferred that, because of the need to respond to local contingencies, the innovations that stem from other subsidiaries may be less applicable to a focal subsidiary's context, which will impact on the extent of innovation inflow to the focal subsidiary. Accordingly, we posit that when the embeddedness of a subsidiary's external business network is high, the subsidiary will to a lesser extent turn to the MNC network for innovations. Furthermore, the greater the subsidiary's embeddedness in local business relationships, the greater its ability to develop competencies and to innovate specifically in line with the requirements of local counterparts (Andersson, Forsgren & Holm, 2001; Andersson et al., 2002) which could also imply that the innovations that are developed within these relationships puts the subsidiary in a more independent position vis-à-vis the rest of the corporation, which in turn decreases the subsidiary's need to acquire innovations from various internal sources (i.e., intra-MNC innovation transfer).

**H6.** A high level of relationship embeddedness in the subsidiary's local business network is negatively associated with a high frequency of innovation inflows.

## **4. Methods**

### *4.1. Data collection*

The data used in this study related to Swedish subsidiaries of foreign corporations. A list of foreign subsidiaries was acquired from the Ekonomisk Litteratur data register. The selection criteria were that the subsidiary was part of a company with activities in more than one country and that the corporate HQ was located outside Sweden. In order to collect data a four-page long questionnaire was developed and pre-tested on several occasions on researchers and executive MBA students. Prior to collecting data, the questionnaire was tested on practitioners in three companies within the telecommunications, forestry and pharmaceuticals industries. These pre-tests led to some revisions of the questionnaire and clarification of some of the questionnaire items. The questionnaire was addressed to subsidiary managers and included a cover letter stating the purpose of the study and explaining the different topics covered in the questionnaire. The data collection focused on product, process and marketing innovations received by the Swedish subsidiaries, defined as "a significant change of a product/process technology/marketing procedure used by the subsidiary". The respondents were asked to evaluate a number of measurable indicators relating to the variables investigated in this study. Respondents were further asked to focus on one innovation that had been received during this period, which was then studied for each receiving subsidiary. The questionnaire was sent to 1516 subsidiaries and the data collection process resulted in 376 usable questionnaires, which corresponds to a response rate of 25 percent. Of the questionnaires received, over 65 percent were completed by the subsidiary CEO. The remaining respondents primarily belonged to the senior management tier,

including marketing and sales managers, financial managers, and R&D managers. The response rate obtained for the survey is comparable to other mail surveys conducted within the field of international business (e.g., Holm and Pedersen, 2000) and, according to Baruch (1999), can be considered acceptable for top management surveys. Using a test of non-response bias, no significant differences between responding and non-responding groups (cf. Armstrong & Overton, 1977) were found regarding sales volume and number of employees and the average proportion of missing values for individual questions is low, about two percent.

For the purpose of the present analysis, we focus on subsidiaries that perform marketing, sales and production activities. The rationale for this is that MNC subsidiaries that perform all three activities in their local market could potentially have received any of the three innovation types that were the focus of the study (i.e., product innovations, process innovations and marketing innovations). In other words, the subsample contains subsidiaries that are comparable in the sense that they could all potentially be recipients of the three types of innovations. Out of the 376 subsidiaries, 190 subsidiaries had received one or several product, process or marketing innovations from other corporate units during the period 2000 to 2005. The sample includes MNC subsidiaries in service and manufacturing industries. The 190 subsidiaries belonged to MNCs with HQ located in 15 different countries including Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, Norway, Switzerland, the United Kingdom and the United States. The majority of the subsidiaries in the sample had been established through mergers or acquisitions (about 83 percent) while the rest were green-field establishments (about 17 percent). The number of years during which the subsidiary had been part of the MNC averaged 13 years. The average subsidiary size, in terms of employees was 433 (S.D. 2117), with an average business volume of approximately 125 M USD. Foreign sales

accounted for approximately 31 percent, and on average, about five percent of the subsidiaries' employees were operating outside Sweden.

#### 4.2. *Operationalisation of variables*

The dependent variable used in the analysis is the frequency of innovation inflow. This variable was measured by asking respondents to indicate the number of innovations that have been transferred to the subsidiary from other corporate between the years 2000 and 2005. The frequency was measured on a scale from 0, corresponding to the subsidiary not having received any innovations from other corporate units during the specified period, to 6, corresponding to more than five innovations during the period 2000 to 2005. The respondents were asked to indicate the number of innovations received for each category (product innovation, process innovation and marketing innovation) and the variable is computed as the average number of innovations (in all three categories) received during the period 2000 to 2005.

Of the independent variables, *subsidiary capability development* measures the extent to which the subsidiary conducts research and development activities. The respondent was asked to indicate whether the subsidiary performs basic research, product development, process development and marketing development activities (1=yes, 0=no). Each activity was measured as a dichotomous variable and for each subsidiary the total number of "yes" responses was included in the measurement of subsidiary capability (i.e., ranging from 0 to 4). Subsidiary capability development is calculated as the mean of these four R&D activities.

*Corporate social integration* aims at measuring the social dimensions of a focal subsidiary's relationships with corporate HQ. The variable includes measures of the extent of mutual trust (Kostova & Roth, 2002), informal communication and common goals (Bartlett and Ghoshal, 1989; Nohria & Ghoshal, 1994) with regard to its relationship with corporate HQ. The

indicators were estimated on a seven-point Likert scale ranging from 1 (very low) to 7 (very high) and reliability was high ( $\alpha=0.789$ ).

The independent variable *subsidiary technical embeddedness* measures the subsidiary's relationships with MNC HQ and with other sister subsidiaries with regards to the degree of specific technical adaptation, cooperation in product development and cooperation in process development (cf. Andersson et al., 2002). The indicators were measured on a seven-point Likert scale ranging from 1 (very low) to 7 (very high). Reliability was high for both technical embeddedness with HQ ( $\alpha=0.818$ ) and technical embeddedness with sister subsidiaries ( $\alpha=0.836$ ).

The variable *innovation reciprocation*, i.e., the extent to which the focal subsidiary is involved in mutual innovation transfer with corporate counterparts, was operationalised in the same manner as the dependent variable. Respondents were asked to indicate the number of innovations that have been transferred from the subsidiary to other corporate units during the same period, i.e., between 2000 and 2005. A similar way of measuring has been used by Schulz (2001, 2003) and Monteiro et al. (2008). As with the dependent variable, the average number of innovations sent in the past five years was computed, ranging from 0 (i.e., the focal subsidiary had not transferred any innovations to other corporate units) and 6 (i.e., more than five innovations transferred to other corporate units). Similar to the dependent variable, the average value of the three innovation categories was used.

The variable *environmental dynamics* measures the extent to which the subsidiary's surrounding business environment can be characterised as encompassing change. The respondents were asked to assess the extent to which competitors engage in development activities with regards to products, processes and marketing operations. All indicators were

estimated on a seven-point Likert scale ranging from 1 (very low) to 7 (very high). The construct had very high reliability ( $\alpha=0.888$ ).

The last variable *business network embeddedness* reflects the characteristics of the subsidiary's local business network (i.e., the relationships to and among customers, suppliers and competitors in the local market) in terms of specific technical adaptation, cooperation in product and process development, interdependence and mutual trust (cf. Andersson et al., 2002). The indicators were measured on a seven-point Likert scale ranging from 1 (very low) to 7 (very high), and reliability was high ( $\alpha=0.779$ ).

The questionnaire items used when constructing the dependent and independent variables are reproduced in Appendix 2.

A number of control variables were also included in the analysis. First, we included *subsidiary size* as a control variable (cf. Monteiro et al. 2008) since it can be argued that larger subsidiaries possess more resources to allocate to knowledge and innovation transfer activities compared to smaller ones. Size has been argued to be a proxy for the resources that a subsidiary has (cf. Barkema & Vermeulen, 1998) which could affect a subsidiary's ability to assimilate new innovations that have been developed and transferred from other units within the MNC. Furthermore, we included a control variable for *subsidiary age*. It could be argued that subsidiaries that have been part of the corporation for a longer period of time are more frequently recipients of corporate innovations than more recently established or acquired units, since there may be established routines for transferring knowledge and innovations between the focal subsidiary and other counterparts within the MNC network. As a last control variable, we included a measure of the innovation recipient subsidiary's *geographic distance from HQ*. Distance between a focal subsidiary and corporate HQ can be assumed to affect information about which innovations are available and where among different subsidiaries and with the MNC

HQ. Thus, it will affect which subsidiaries that receive innovations and also the frequency of innovation inflow. It can therefore be assumed that subsidiaries that are geographically distant to the MNC HQ may be more peripheral with regard to innovation flows within the MNC. In order to measure geographical distance (we only included a measure of the distance between the recipient subsidiary in Sweden and the MNC HQ), the home countries of the MNCs in the sample were grouped according to increasing geographic distance from Sweden. The variable included in the analysis ranges from the group of countries with the closest geographic distance to Sweden, i.e. the Nordic countries (which serve as the base case) to countries with increasingly greater geographic distance to Sweden (1 for other European countries and 2 for countries in the rest of the world) for each subsidiary in the sample.

In order to ascertain convergent and discriminant validity, we performed confirmatory factor analyses of the constructs used. Factor loadings varied between 0.659 and 0.922 and corresponded to their hypothesised latent constructs. Further, all inter-item correlations for the different constructs were significant (varying between  $r=0.252$  and  $r=0.755$ , all at  $p < 0.01$ ).

The correlation matrix, including the means and standard deviations of all the variables, can be found in Appendix 1. As shown in the matrix, correlations between individual constructs was moderate, with the highest bi-variate correlation observed between technical embeddedness with HQ and corporate socialisation ( $r=0.408$ ,  $p < 0.01$ ). This suggests that multicollinearity should not pose any important problems in analysing the data (commonly used cut-offs for multicollinearity are 0.8–0.9, see, e.g., Hair, Black, Babin, Anderson & Tatham, 2006). As an additional check for the existence of multicollinearity, the VIF values indicate that this should not be a problem (the highest VIF value is 1.3).

Since all data were collected from a single respondent, the potential problem of common method bias should be acknowledged. As a post hoc test for the existence of common method

bias, we conducted Harman's one factor test. A principal components factor analysis of all the items used in the analysis produced eight factors that together accounted for 72.7 percent of the variance, of which the first factor only accounted for a minority of the variance, 17.6. percent. Since multiple factors were extracted and none of the factors accounted for a majority of the variance explained, common method bias does not appear to be a significant problem in the analysis of the data.

## **5. Results**

To test the hypothesised relationships influencing the frequency of innovation inflow, we ran two models using OLS regression. The results of the analyses are shown in Table 1. In model 1 we included only the control variables: subsidiary mode of establishment, subsidiary age within the MNC and geographic distance to MNC HQ. The  $R^2$  of this model is 0.104 (adjusted  $R^2$  is 0.090) and the F-value was 7.207 significant at  $p < 0.001$ . In the second model we entered the independent variables together with the control variables. This model has an  $R^2$  of 0.338 (adjusted  $R^2$  is 0.299), with an F-value of 8.719, significant at  $p < 0.001$ .

---Insert Table 1 about here---

From the results we can conclude that a subsidiary's own capability development in research and development activities decreases the amount of innovation inflow from other corporate counterparts, which is in line with hypothesis 1a. The alternative hypothesis, proposing a positive association, is therefore rejected. Turning to the variables relating to the intra-organisational network, we find no support for hypothesis 2, stating a positive effect of corporate social integration on innovation inflow. Thus, intra-organisational relationships based on trust,



common goals and interdependence, etc., do not explain why certain subsidiaries become frequent recipients of innovations from other corporate units. Hypothesis 3 predicts a positive relationship between the degree to which a subsidiary is technically embedded within the corporate network and the propensity with which it received innovation inflow. This hypothesis is partly supported in the empirical analysis since technical embeddedness with HQ has a positive impact ( $p < 0.01$ ). However, technical embeddedness with sister subsidiaries does not have the same effect. Innovation reciprocation is a strong predictor of innovation inflow ( $p < 0.001$ ), as proposed in hypothesis 4.

Finally, concerning the variables relating to the subsidiary's external environment, the results indicate that of the factors investigated here, only environmental dynamics has a significant impact on the frequency of innovation inflow ( $p < 0.05$ ). Thus, hypothesis 5 receives support, whereas hypothesis 6, considering the impact of business network embeddedness on innovation inflow, is not supported. All in all, four of the tested hypotheses receive support (hypotheses 1a, 3, 4 and 5) whereas the other two (hypotheses 2 and 6) are not supported.

Of the control variables, only subsidiary age has a significant association with recurrent innovation inflows, which, as suggested earlier, may be a result of the existence of channels for the transfer of innovations that develop over time among the units of an MNC. This, however, need not be a reflection of a perceived need to receive innovations from other MNC counterparts but a reflection of the existence of the mechanisms for such transfers to occur.

## **6. Concluding discussion**

In this paper we set out to shed further light on why some subsidiaries within the MNC network become recurrent recipients of innovations from other counterparts in the MNC. The empirical results support the suggestion that innovation inflows to MNC subsidiaries can be viewed as a

problem-solving activity, or in the words of Monteiro et al. (2008), a demand-driven process. In order to investigate the issue of recurrent innovation inflow, we have examined factors relating to the focal subsidiary itself, to the extent to which the subsidiary is integrated within the MNC, and the impact that the external environment in which the subsidiary operates on potential innovation inflows into that subsidiary. Whereas Monteiro et al. (2008) focus on the internal capabilities of the subsidiary and intra-MNC communication to determine knowledge flows within the MNC, we add another important dimension by also investigating factors relating to the external environment in which the subsidiary is situated that may affect knowledge transfer.

An interesting finding of the study, which should be considered in light of the findings of Monteiro et al. (2008), is that when a subsidiary is active in capability development within a number of different functions it is less dependent on and thus will not search for innovations among other corporate units. Although very recent research has suggested that capable units are more likely to experience knowledge inflows since they may be more motivated to engage in knowledge transfer activities (e.g., Monteiro et al., 2008), the results of this study suggests the opposite effect. This could indicate that high capability subsidiaries do not search for innovative solutions among peer units since it is possible that they perceive themselves to have sufficient capabilities in order to fulfil their goals and respond to the requirements of the counterparts that they interact with and those of the local market.

The findings of the hypotheses relating to the subsidiary's corporate context (hypotheses 2, 3 and 4) show that, in line with the results of previous studies (i.e., Schulz, 2001, 2003; Monteiro et al., 2008), innovation reciprocation is a significant predictor of innovation inflows to MNC subsidiaries. Thus, frequent innovation inflow to a subsidiary is strongly associated with that subsidiary also sharing its innovations with other counterparts in the MNC. This suggests that subsidiaries that are active as sources of innovations for other MNC units are also more

likely to search for innovation from those units with which the already experience knowledge exchange. The technical embeddedness has also some predictive power of innovation inflow, but only when considering the focal subsidiary's relationship with corporate HQ. The results show that with regard to recurrent innovation inflow, it is the relationship with the MNC HQ concerning technical issues that is the important driver. Collaboration with sister subsidiaries concerning technical development has no significant impact on the frequency of innovation inflow. The results suggest that the extent to which a subsidiary's identifies with, e.g., the MNC's strategies and long-term goals, does not have the predictive power that could be expected regarding the frequency of innovation inflows. No support is found for a relationship between the existence of "softer" mechanisms of integration within the MNC and recurrent innovation inflow.

A very interesting finding of this study is the impact of the subsidiary's external business environment on innovation inflows to a focal subsidiary. The results indicate that as subsidiaries are exposed to an environment characterised by, e.g., continuous technological development, they are under pressure to react according to such a situation (Damanpour & Gopalakrishnan, 1998). Considering innovation inflow as a problemistic search activity, engaging in recurrent innovation inflows can, accordingly, be viewed as a possible solution to respond to such changes in the local business environment. Business network embeddedness, on the other hand, is unrelated to recurrent innovation inflow. This might indicate that a perceived pressure of the subsidiary has to be initiated, such as ongoing changes in the business environment, in order for the subsidiary to turn to the exploitation of existing corporate innovations.

### *6.1. Further research*

To the best of our knowledge, not much research attention has been given to the importance of the external business environment on intra-organisational knowledge flows. This could be the

result of the perspective adopted in extant research, in which intra-organisational knowledge transfer is viewed as a process encompassing a sender and a receiver that takes place within the context of these actors, and the problems encountered by these counterparts. Hence, previous research has taken as a starting point the importance of the existence of channels and other means for accomplishing such flows. By applying a new theoretical and empirical approach in which intra-MNC knowledge transfer is viewed as a problem-solving activity (cf. Monteiro et al., 2008), it can be assumed that the external business environment should receive a more prominent role in research on knowledge transfer. Although we are aware of the rather crude measures used in this paper to assess the impact of subsidiary's business environment on innovation inflows, it highlights a need to further investigate the relationship between the characteristics of the business environment and intra-organisational knowledge flows.

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**Table 1.** Results of OLS regression analysis.

Independent variables	Dependent variable <b>Innovation inflow</b>	
	Model 1	Model 2
Subsidiary capability development ( <i>H1</i> )	---	-0.150 (-2.190)*
<i>Subsidiary corporate context</i>		
Corporate social integration ( <i>H2</i> )	---	0.083 (1.200)
Technical embeddedness with HQ ( <i>H3a</i> )	---	0.206 (2.896)**
Technical embeddedness with sister subsidiaries ( <i>H3b</i> )		0.063 (0.940)
Innovation reciprocation ( <i>H4</i> )	---	0.393 (5.629)***
<i>External business environments</i>		
Environmental dynamics ( <i>H5</i> )	---	0.124 (1.956)*
Business network embeddedness ( <i>H6</i> )	---	-0.049 (-0.734)
<i>Control variables</i>		
Subsidiary size (number of employees)	0.175 (2.497)*	0.079 (1.184)
Subsidiary age in MNC (years)	0.170 (2.444)*	0.137 (2.167)*
Geographic distance to HQ	0.178 (2.545)*	0.105 (1.611)
R <sup>2</sup>	0.104	0.338
Adjusted R <sup>2</sup>	0.090	0.299
F-value	7.207***	8.719***

\* p < 0.05    \*\* p < 0.01    \*\*\* p < 0.001

Two-tailed tests.

**Appendix 1.** Correlation matrix of variables.

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10
1 Innovation inflow	1.70	1.68	---									
2 Subsidiary capability development	1.89	1.33	0.015	---								
3 Corporate social integration	4.93	1.44	0.258**	0.028	---							
4 Technical embeddedness (HQ)	2.89	1.81	0.327**	-0.076	0.408**	---						
5 Technical embeddedness (sister units)	2.89	1.75	0.200**	0.155*	0.145*	0.158**	---					
6 Innovation reciprocation	1.19	1.52	0.418**	0.355**	0.152*	0.125	0.228**	---				
7 Environmental dynamics	4.10	1.33	0.163*	0.030	-0.029	0.029	0.081	-0.012	---			
8 Business network embeddedness	3.82	1.07	0.104	-0.122	0.148*	0.240**	0.172*	0.062	0.037	---		
9 Subsidiary size	433	2117	0.205**	0.152*	0.136	0.129	0.149*	0.250**	-0.020	0.178*	---	
10 Subsidiary age	13.4	14.9	0.182*	0.077	0.119	0.057	-0.024	0.045	0.085	0.008	0.028	---
11 Geographic distance to HQ	0.92	0.72	0.210**	-0.010	0.047	0.121	0.169*	0.042	0.165*	0.085	0.141	0.038

\*p < 0.05 \*\*p < 0.01  
Two-tailed tests.

## **Appendix 2.** Operationalisation of the dependent and independent variables

### **Innovation inflow**

“How many innovations (in each category) have been transferred to the subsidiary from other MNC units during the period 2000-2005 (on a seven-point Likert scale, where 0=no innovations, 1=one innovation, 2=two innovations, 3=three innovations, 4=four innovations, 5=five innovations, and 6=more than five innovations)?”

- Product innovations
- Process innovations
- Marketing innovations

The variable innovation inflow is measured as the average number of innovations received (in all categories) by a subsidiary in the period 2000-2005.

### **Subsidiary capability development**

“Indicate which activities are undertaken by the subsidiary”:

- Basic research (1=yes, 0=no)
- Product development (1=yes, 0=no)
- Process development (1=yes, 0=no)
- Marketing development (1=yes, 0=no).

The total number of “yes” responses to the four alternatives was included in the measurement of subsidiary capability (i.e., subsidiary capability development ranges from 0 to 4). Subsidiary capability development is calculated as the mean of these four activities.

### **Corporate social integration**

“Describe the following aspects in the Swedish subsidiary’s relationship to MNC headquarters (HQ)”:

- Mutual trust
- Informal communication
- Common goals

The items were measured on a seven-point Likert scale ranging from 1 (very low) to 7 (very high) and Cronbach’s alpha was 0.789.

### **Technical embeddedness with HQ**

“Describe the following aspects in the Swedish subsidiary’s relationship to MNC headquarters (HQ)”:

- Specific technical adaptation
- Cooperation in product development
- Cooperation in process development

The items were measured on a seven-point Likert scale ranging from 1 (very low) to 7 (very high) and Cronbach’s alpha was 0.818.

**Technical embeddedness with sister units**

“Describe the following aspects in the Swedish subsidiary’s relationships to sister subsidiaries”:

- Specific technical adaptation
- Cooperation in product development
- Cooperation in process development

The items were measured on a seven-point Likert scale ranging from 1 (very low) to 7 (very high) and Cronbach’s alpha was 0.836.

**Innovation reciprocation**

“How many innovations (in each category) have been transferred from the subsidiary to other MNC units during the period 2000-2005 (on a seven-point Likert scale, where 0=no innovations, 1=one innovation, 2=two innovations, 3=three innovations, 4=four innovations, 5=five innovations, and 6=more than five innovations)?”

- Product innovations
- Process innovations
- Marketing innovations

The variable innovation reciprocation is measured as the average number of innovations transferred (in all categories) from a subsidiary to other MNC units in the period 2000-2005.

**Environmental dynamics**

“What degree of dynamism prevails in the subsidiary’s business environment?”

- Product development by competitors
- Process development by competitors
- Marketing development by competitors

The items were measured on a seven-point Likert scale ranging from 1 (very low) to 7 (very high) and Cronbach’s alpha was 0.888.

**Business network embeddedness**

“Describe the following aspects in the subsidiary’s business network, i.e. relationships to and between different customers, suppliers and competitors”:

- Specific technical adaptation
- Cooperation in product development
- Cooperation in process development
- Interdependence
- Mutual trust

The items were measured on a seven-point Likert scale ranging from 1 (very low) to 7 (very high) and Cronbach’s alpha was 0.779.