

Corporate drivers of innovation importance

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ABSTRACT

This paper contributes to the understanding of the drivers behind MNE competitive advantage in relation to innovation activities at the subsidiary level. Specifically, we study the effects that corporate decisions and networks have on the importance of subsidiary innovations at the MNE level. A model framed in the innovation context is developed by specifically looking at the relationships between headquarters (HQ) involvement in the innovation development project, subsidiary corporate embeddedness, the impact that the innovation has on the developing subsidiary and the actual level of corporate importance of the innovation. Six hypotheses are tested in a sample of 85 innovation projects taking place in 23 MNEs by means of variance-based Structural Equations Modeling (SEM) technique. The results show how the impact generated by the innovation at the developing subsidiary is strongly enhancing the importance of the innovation at both divisional and MNE level. Moreover, HQ involvement in the development of the innovation is influencing the innovation output in terms of impact at the developing subsidiary and, thereafter, on the importance of the innovation at MNE level. In addition, subsidiary corporate embeddedness has an effect on HQ involvement in the innovation development that, indirectly, serves as a mechanism also to increase (decrease) the impact of the innovation on the subsidiary and, therefore, the importance of the innovation for the MNE.

Keywords: Innovation development, headquarters involvement, corporate embeddedness, subsidiary.

INTRODUCTION

Schumpeter (1942) identified the importance of innovations for firms and for society and the study of innovations has received increased attention in the literature during the last 30 years. Today innovations are seen as one of the main sources of economic development and growth (Baumol, 2002) and are considered to be of key strategic importance for multinational enterprises (MNEs) in order to build and sustain competitive advantages thus creating value (Franko, 1989; Hitt et. al., 1996). Three distinct stages can be identified in the MNE innovation process: (1) development of innovations; (2) transfer of innovations and (3) exploitation of innovations. This paper is primarily concerned with the process and structures of innovation development at the subsidiary level and the subsequent effect these specific innovations have on the developing subsidiary as well as their potential effects at the MNE level. Hence, only intra-MNE issues are investigated and discussed.

The current literature describes how firms innovate, increase their innovative behaviour and manage innovation transfer, etc. in order to get some advantage on the market compared to their competitors (e.g. REF). This has mainly been studied in relation to the structure, i.e., organisational capabilities and corporative context of the innovation (Van De Ven, 1986; Bartlett and Ghoshal, 1989; Nonaka, 1994; Lane and Lubatkin, 1998; Hansen, 1999). Less attention has been paid to the innovation process during the development. This study connects both to subsidiary corporate structure and process in relation to specific innovation projects, thus adding to an understudied phenomenon. Specifically, our objectives are to identify what corporate factors influence the impact an innovation has on the developing subsidiary, and what corporate and post innovation development issues make the innovation to be perceived as important intra-MNE.

For this purpose we present a model that explicitly looks at the relationships between HQ involvement in the innovation development project, subsidiary corporate embeddedness, the impact that the innovation has on the developing subsidiary and the corporate importance of the innovation. Innovations that are important at the MNE level become object of corporate transfer later to be exploited at multiple locations. These innovations are adding to the competitive advantage of the MNE besides enhancing the effects at the focal subsidiary level. This relates to the situations when subsidiaries evolve and are being granted mandates to innovate but also when they are recognized as centres of excellence (CoE) (Birkinshaw and Hood, 1998; Birkinshaw, 1996; Holm and Pedersen, 2000). These issues are of great strategic importance both for the focal subsidiary but also for the overall MNE strategy. Hence, this study contributes to the literature by shedding light on corporate drivers of innovation at subsidiary level and by describing the actual impact an innovation has on the subsidiary responsible for the development of the innovation. In addition, a gap in the literature is filled by looking at the relationship existing between innovation effect at subsidiary level and the importance of the innovation at MNE level. This not only adds on to previous studies looking at headquarter-subsidiary relationships, mandates and subsidiary evolution but also to those that deal with the corporate innovation process and creation of MNE competitive advantage. This approach is novel since it captures the relationship between innovation activities at subsidiary and MNE level, it includes factors and measurements specifically related to the innovation project and it investigates an important but understudied phenomenon as well as the underdeveloped construct “innovation importance for the MNE”.

Next follows a literature review while in the successive section the model and hypotheses are formulated. The presentation of the methods and results will be followed by a discussion of

the findings and potential limitations of our study. That section is concluded with some comments on managerial implications and directions for future research.

INNOVATIONS IN MULTINATIONAL ENTERPRISES

In the literature, there is no common definition as of what constitutes an innovation .

However, a common feature can be distinguished as a prominent theme in the studies on innovation: ‘innovativeness is a measure of discontinuity in the status quo in marketing factors and/or technology factors’ (Garcia and Calantone, 2002, p. 118).

Building on the work by Nelson (1993) we define innovation as the getting into practice product designs and manufacturing processes that are new to the firm. Put differently, this means that innovations are the change of a process and/or in the outcome of a process, which in turn is connected to industrial production and/or exchange (Zander, 1991). Empirically, this means that the study of innovations in connection to our definition is conveniently conducted through technological innovations since they consists of features related to how to do things better than the current state of the art (Teece, 1986).

From strategy literature we know that the creation and sustenance of dynamic capabilities in order to continuously innovate is a primary objective for MNEs (Teece et al., 1997) and vital to achieve competitive advantage (Eisenhardt and Martin, 2000). For the MNE, competitive pressures for innovation are often even more intense, since they are competing against actors in many countries and against other large MNEs. Nonetheless, at the same time, they may themselves benefit from the exposure to the variety that multinationality entails (von Hippel, 1988). However, this assumes that innovative activity – i.e. the creation of competitive advantage – can reside in subsidiaries and not only at the headquarter level (Hedlund, 1986;

Ghoshal and Bartlett, 1990; Birkinshaw and Hood, 2001). Thus, the issues of what factors influence subsidiary innovativeness, and how innovations and competence are spread, have emerged as important topics of MNE research (e.g. Ghoshal and Bartlett, 1988).

Part of the explanations behind the degree of subsidiary innovativeness is found in the corporate network and in the overall subsidiary corporate context (Andersson et. al., 2002). A related discussion on the determinants of subsidiary innovation centers on the role of the subsidiary in the MNE itself. For example, Gupta and Govindarajan (1991; 2001) discuss subsidiary roles on the basis of the knowledge in- and outflows. Similarly, research on CoEs considers the recognition and use of subsidiary knowledge in the whole MNE as a key strategic issue (Holm and Pedersen, 2000). The connection between knowledge and innovation is more than apparent since innovations can be considered as bearers of technological knowledge (Teece, 1986). Therefore, in this perspective subsidiary innovation becomes an important factor, since it is of significance for the corporate-wide competence of the MNE. In order to capture the impact of the innovation on the competence base of the entire MNE, the importance of the innovation to the wider corporation is used as a proxy.

Development of Innovations in MNEs

The capabilities and resources of a MNE are dispersed throughout its network of subsidiaries besides from being located at headquarters. These resources and capabilities can be combined in various ways, thus enhancing the competitive advantage of the MNE. More specifically this means, amongst other things, that MNEs, by their multinational scope, have the opportunity to tap into different environments, which may lead to more and newer innovations (Cantwell, 1992; Cantwell and Santangelo, 1999). We conceptualize the innovation development as the process, led by a specific subsidiary (i.e., the developing subsidiary), of transforming an idea

into a completed form that is acceptable to potential adopters, e.g., customers, suppliers, corporate sister units (Van De Ven, 1986).

As already mentioned, the development of innovations and the subsequent transfer of innovations intra-MNE has been identified as a primary strategic issue for MNEs (Bartlett and Ghoshal, 1989; Gupta and Govindarajan, 2000). A subsidiary that has proved itself to be proficient at developing innovations may be assigned a specific mandate or be identified as a centre of excellence (CoE). If the subsidiary is recognized as a CoE in the MNE it will possess capabilities that are valuable for the organizations value creation (Frost et. al., 2002). This is in line with the idea that many subsidiaries have capabilities on which the MNE is dependent (Birkinshaw and Hood, 1998). This means that HQ involvement at the subsidiary level signals that the subsidiary potentially has the role of a CoE and a specific mandate. Thus, HQ involvement in the development of an innovation gives the project an organizational legitimacy and increases its trustworthiness. In addition to that, the positive reputation of the project intra-MNE may increase due to these characteristics that follow from HQ involvement as well as the perceived importance of the specific innovation being developed. Finally, the involvement by HQ during the development phase may have a positive impact on the innovation and by increasing its visibility. The involvement of HQ does also mean that the subsidiary may lose some autonomy and that headquarter control increases. Nonetheless, if a subsidiary has developed an innovation that is important for the MNE, they have control over a critical resource which is a source for power and actual influence compared to the formal power exercised by HQ (Forsgren et. al., 2005). Consequently, this access to a critical resource that is important for the entire MNE increases the subsidiary power and is also one source and reason why subsidiaries seek autonomy (Pfeffer and Salancik, 1978; Pfeffer, 1981; Birkinshaw and Hood, 1998).

The Impact of Innovations on the Developing Subsidiary

The impact an innovation has on the developing subsidiary has to be put in relation to what is already known, i.e., what does the innovation change at the subsidiary. More specifically, the question then becomes how the innovation affects daily operations at the subsidiary level. The development of an innovation may have various effects on the developing subsidiary. First, an innovation could impel market success for the subsidiary. This would mean increased sales and business volume as well as improved overall competitive advantage as an outcome of, for instance, improved market share, positioning and image (e.g. Ettlie et al. 1984; Brown and Eisenhardt, 1995; Hitt et al., 1997; Boone, 2000). Additionally, looking at the internal organization of the subsidiary, a new successful solution could improve the subsidiary's operational efficiency by impacting on the production side, i.e., cost and nature of the production process. An innovation may as well influence new R&D investment decisions. On one side there might be a path dependency and technological trajectory following an important breakthrough and, on the other, the subsidiary may learn and develop routines concerning its development activities (Ettlie et al., 1984; von Hippel, 1984; Hakansson and Waluszewski, 2002; Nerkar and Parachuri, 2005). According to Forsgren and colleagues (2005) generating new competence and being innovative could also mean better positioning for the subsidiary within the MNE. This connects well with the aforementioned CoE phenomenon, as CoEs are providers of competence to their sister subsidiaries, i.e., they become dependent on the CoE (Holm et al, 2000; Frost et al., 2002), constantly improving their positioning and internal advantage. In a nutshell, the impact of the innovation on the developing unit can be conceptualized as an aggregation of effects of that innovation in a diversity of aspects of the developing subsidiary.

MODEL AND HYPOTHESES

We view the development of the innovation and the subsequent effects this specific innovation has on the focal subsidiary developing it and, later, on the importance this innovation achieves in the MNE as a path dependent process. Initially, different internal and external actors can involve themselves during the development process, but potentially also the MNE headquarters. After the development phase, the innovation impacts different functions at the developing subsidiary due to, e.g., exploitation of the innovation. As a consequence of this step, the innovation is evaluated as potentially more or less important for different parts of the MNE. However, the importance of the innovation is not only dependent on the innovations performance after development but is also dependent on the context and dynamics occurring during the development of the innovation.

Subsidiary Corporate Embeddedness

High corporate embeddedness of subsidiaries signifies central roles played by them in the activity structure of corporate relationships. From a HQ and managerial perspective, this may be seen as an important criterion for giving attention. Corporate embeddedness of subsidiaries associates to existing resource dependencies and in- and outflows of knowledge, but also possibly to important innovation activities, which are characteristics that may motivate headquarter managers to pay increased attention to subsidiaries. In consistence with the arguments of Andersson et al. (2007), we argue that the more a subsidiary is embedded in the corporate network, the more likely it is that HQ consider it as strategically important as a competence user or provider to other MNE subsidiaries. Since other subsidiaries and a range of activities are affected by the activities of the embedded subsidiary, we expect HQ to be engaged in key activities conducted at the subsidiary level such as the development of innovations. Therefore we put forward the following hypothesis:

H1: The higher the corporate embeddedness of the subsidiary developing the innovation, the higher the involvement of headquarters in the development of the innovation.

It has been argued that embeddedness is beneficial for greater volume of resources to move between actors (Podolny, 2001). Through relationships, mutual adaptation processes and shared understanding for innovation usage are made more possible (Gulati, 1998). Relational embeddedness is particularly important to entrepreneurial behaviour and in explaining innovation-oriented tasks (Granovetter, 1985; 1992; Moran, 2005). In a MNE context, subsidiary corporate embeddedness connects to the ability of the subsidiary to combine and use resources that stem from corporate counterparts. Another effect of embeddedness associates to the ability of the subsidiary to exercise power over corporate strategic decisions. In other words, sister subsidiaries - to some extent - will depend on the focal subsidiary. The more a subsidiary is corporate embedded, the more it is likely to be involved in intra-organizational resource exchange. Owing to corporate embeddedness, the subsidiary, therefore, has access to intra-organizational channels through which it can exert influence over, for instance, corporate activities and strategic investments. This is a source of subsidiary power which creates dependencies intra-MNE. Concluding, an innovation which draws upon many knowledge sources dispersed throughout the corporate network is likely to have a greater impact at the developing subsidiary since the connected output in terms of, e.g., market impact, efficiency levels and internal influence are likely to be higher. This leads to the following hypothesis being proposed:

H2: The higher the corporate embeddedness of the subsidiary developing the innovation, the higher the impact of the innovation at that subsidiary.

By being embedded in different business networks, the subsidiary will have access to new ideas, knowledge and opportunities (Andersson et. al., 2002). By adapting themselves to other subsidiaries intra-MNE, the developing subsidiary becomes relationally embedded, (Granovetter, 1985; 1992). This relational embeddedness can relate to different activity structures connected to both the production and development of the specific innovation as well as the marketing activity structure. Both these types of relational embeddedness entail a level of embeddedness that, in the end, has consequences for the economic activities of the relationship partners. An innovation developed under these conditions, where the actors in the MNE network have become dependent on each other, is likely to be deemed as important since the economic consequences of the embeddedness are great. Additionally, being embedded also implies that other subsidiaries are aware of the innovation and, indirectly, this also means that the primary actors connected relationships in turn have the opportunity to become aware of the innovation under development. Consequently, this enhances the visibility of the innovation, both internally but most likely also externally. An innovation development project that is recognized by many actors in the MNE network will also be perceived as an important innovation when the project is finished. Moreover, innovation research shows that the importance in an organization of an innovation is associated with cross-functional interaction and involvement. For example, it has been shown that cross-functional interaction is crucial for innovation development and implementation (Dougherty, 1992). The survival of new innovations seems to be dependent on anchoring them inside the corporation (Burgelman, 1983). In a MNE, the resulting corporate significance of an

innovation, to a great extent, depends on interaction among specialized and dispersed subsidiaries, both to garner the requisite competence that is dispersed but also to harness the support and enthusiasm from semi-autonomous actors. Thus, the more a subsidiary engages in relationships with other MNE subsidiaries, the higher its expected impact on the whole MNE and, therefore, more likely it is that the innovation will be regarded as important. Consequently, the following hypothesis is proposed:

H3: The higher the corporate embeddedness of the subsidiary developing the innovation, the higher the importance of the developed innovation for the MNE.

Headquarters Involvement in the Development of Innovations

The involvement of HQ during the development process implies that additional resources in form of time and attention are leveraged to the specific innovation development project. Additionally, the involvement of HQ can also mean monetary resources during the development project which implies that the subsidiary does not have to use their own resources to the same extent. Penrose (1959) defined a broader set of resources than only labor, capital and natural resources. Following this, Wernerfelt (1984) considered resources to be anything that can be a strength or a weakness for a firm and he also divided resources in a tangible and an intangible dimension. It was further concluded that no two firms can possess exactly the same physical, human and organizational resources. Building on this, and following Barney (1991), we classify the available resources for a firm in three main categories; (1) physical capital resources (Williamson, 1975); (2) human capital resources (Becker, 1964) and (3) organizational capital resources (Tomer, 1987). When discussing HQ involvement, we refer to the two later categories of resources that are allocated by HQ due to

their involvement in the innovation development process. Hence, HQ involvement can have positive effects in itself for the subsidiary. Additionally, by involving themselves in the development process, HQ gives the specific innovation an organizational legitimacy and increases its visibility in the MNE. The developing subsidiary can, for instance, gain the position of being a CoE (Holm and Pedersen, 2000). This in turn can have positive effects on the competitive advantage of the developing subsidiary and increase its sales, etc. due to the innovation. Subsequently, in line with this reasoning, the following hypothesis is proposed:

H4: The higher the involvement of headquarters in the development of the innovation, the stronger the impact of the innovation at the developing subsidiary.

An innovation can be seen as more or less important at the business area/division and MNE level based on its expected impact outside the developing unit, i.e., looking beyond its effects at the focal subsidiary level. By participating in the development of a specific innovation, HQ pays the development project attention and organizational legitimacy and, as a corollary, the innovation under development is perceived as increasingly important. HQ is likely to favour innovations developed at subsidiaries with a proven track record of being successful, e.g., CoEs in relation to specific innovation development. Innovations developed at a CoE are likely to be considered important for the MNE. Additionally, by bringing in their competence and specifying requests during the development of a specific innovation HQ, as the overall orchestrator of the MNE network, has the ability to steer the development process taking place at the subsidiary level in different directions so that the finished innovation better fits with the overall demands of other subsidiaries intra-MNE. Also, if HQ has taken important initiatives for the development of the innovation this signals that the project in itself is

something that headquarters are willing to allocate resources to. Finally, if the cooperation with HQ has been frequent during the development this has the consequence of making the innovation development process visible for other subsidiaries intra-MNE and highlights the awareness of the development project. Thus, when HQ has invested resources in the form of their commitment during the developing phase of the innovation it is a natural consequence that the developed innovation ex post is expected to be important for the MNE. Hence, the following hypothesis is proposed:

H5: The higher the involvement of headquarters in the development of the innovation, the higher the importance of the developed innovation for the MNE.

From Subsidiary Level to MNE Level

If a developed innovation has proved itself having a positive impact on the developing subsidiary (e.g., in terms of improved market share), it is likely to have an effect later on how the innovation is perceived in terms of importance for the business area/division and for the MNE as a whole due to its expected impact on sister units once transferred. That is also true if the innovation impact at the developing subsidiary has influenced its positioning within the MNE corporate network. This is particularly relevant since better positioning of the subsidiary allows for influence over sister subsidiaries activities as well as better access of the latter to the focal subsidiary competence and resources. At last, if the innovation has proved itself to contribute to efficiency, this will most certainly increase the attention towards the innovation as something important for the entire MNE, especially if the innovation is transferred. Consequently, the following hypothesis is proposed:

H6: The stronger the impact of the innovation at the developing subsidiary, the higher the importance of the developed innovation for the MNE.

The six hypotheses are summarized in figure 1. In the next section the model is confronted with the empirical data.

*** *Insert Figure 1 around here* ***

METHODS

This research is part of a broader project aiming at substantially increasing our knowledge on a diversity of interrelated issues associated to the development and transfer of innovations in MNEs. In this context, a questionnaire was designed to collect data on a variety of topics related to both processes. It was organized in six main sections, namely: “Unit characteristics”, “Innovations to investigate”, “Innovation characteristics”, “The role of the subsidiary”, “The innovation development process” and “Transfer of innovation-knowledge”. The questionnaire was pre-tested in pilot interviews to international managers in positions related to innovation development and/or transfer. As a result of the pre-test, minor changes were made in order to eliminate ambiguous questions and phrasings as well as to exclude indicators not capturing the constructs for which they were designed.

Specific data about 85 innovations developed in 63 different MNE subsidiaries were collected between 2002 and 2005. These 63 subsidiaries belonged to 23 MNEs in 14 countries dispersed throughout Europe, Asia and the U.S, and a diversity of industries such as manufacturing, telecommunications, transportation, steel, etc. are included in the sample. The

subsidiaries, on average, are experienced, internationalized and profitable and have significant R&D budgets. The number of employees in the subsidiaries ranged from 9 to 6000, with a mean of 589. All this indicates a well distributed sample in terms of industry, size and geographical location. While the MNEs and their respective home countries were selected considering their appropriateness for the study, the innovations in the subsidiaries were identified through snowball sampling. Moreover, the innovations had to have the potential of being transferred and also had to have been completed one to ten years prior to the interview.

The data was collected through face-to-face interviews on site at the subsidiaries where the person deemed most appropriate for answering the questionnaire was interviewed for between two and four hours. The respondents had been involved in the development of the innovation and there usually was one or more of the following categories participating during the interview: R&D managers, project managers or subsidiary CEOs. Typically, more than one interviewer was involved in the interview process. By targeting specific managers with a high experience about innovation processes, a deep understanding of the specific innovations was gained. In addition, our data collection technique offered the possibility to discuss the questions with the respondents. This approach enabled the opportunity to detect inconsistencies in the answers during the interview, hence increasing reliability.

In view of the fact that we were going to collect all data from the same respondents, we tried to avoid and, later, we tested for common method variance bias (Podsakoff et al., 2003). First, the questions and indicators used in this research are, in general, separated in the questionnaire and measured with two different scale intervals (see Table 1). Second, as a post-hoc statistical procedure to check for common method variance, we carried out a Harman's one-factor test. We obtained seven factors with eigenvalues over 1 and explaining between

17.75 and 9.89% of the variance. All above suggests that our study appears not to be biased by this latent problem.

Table 1 goes about here

Measures

The operationalization of our first-order constructs is shown in table 1. Due to the limited development and acceptance of measures for our constructs in the field, most of the items composing our scales were purposely developed for the project to which this research belongs to. From this perspective, they can be considered original and contributing to the establishment of reliable and valid measures on which future studies can be based. All indicators were measured using seven-points Likert scales, that is; the four dimensions capturing the impact of the innovation on the subsidiary range from -3 to +3 while “Corporate importance of the innovation”, “Headquarter involvement in the innovation development process” and “Subsidiary corporate embeddedness” vary from 1 to 7. “Impact of the innovation on the unit” is considered a reflective first-order, formative second-order construct (Jarvis, Mackenzie and Podsakoff, 2003), i.e., among other aspects, the causality is assumed to go from the four first-order dimensions to the construct; these dimensions are defining characteristics of the construct, and they do not have to covary with each other. In contrast, in the seven reflective constructs and dimensions the causality is assumed to go from construct to items; the indicators are manifestations of their constructs, and they are expected to covary with each other.

Finally, we analyzed the data by means of a variance-based Structural Equations Modelling (SEM) technique: Partial Least Square (Wold, 1982). We decided the use of PLS because of

the research objectives and the, to some extent, exploratory nature of the study; the small sample size; the non-normal distribution of our variables, and the inclusion of a second-order formative measure in the model.

RESULTS

Before providing the results for the structural part of the model, we assess the properties of the measurement model. First, we check the loadings, or item reliability, of each indicator used to measure our reflective constructs. Although four of them are below suggested 0.7 acceptance cut-off value (see Table 2), we keep them considering their suitable construct reliability and Average Variance Extracted (AVE) and that our measures are original and in their initial stages of development as scales (Chin, 1998). However, we dropped out two items in the “Subsidiary corporate embeddedness” scale because of (1) very low item reliability (“Marketing and Sales”) and (2) the need to improve AVE values (“Production”). Second, the measures have a high internal consistency measured in terms of composite reliability (Werts et al., 1973), i.e., the constructs are also reliable (see Table 2 column three). Third, the variance of the constructs explained by their respective measures or AVE (see Table 2 column four) is over the .5 threshold (Fornell and Larcker, 1981).

Table 2 goes about here

Four, the constructs are different from each other, i.e., they achieve discriminant validity (see Table 3). All above essentially means that our measurement model is based on reliable and valid measures. Concerning the formative second-order construct “Impact of the innovation on the unit”, we tested multicollinearity as a typical precaution when dealing with formative measures (Mathieson, Peacock and Chin, 2001) and found that its four dimensions are free of

this potential problem. Specifically, tolerance and Variance Inflation Factor (VIF) range, respectively, from .803 to .935 and from 1.082 to 1.245, visibly respecting established acceptance thresholds (Hair et. al., 2006; Pitard and Viel, 1997; Marquardt, 1970). Finally, the significant contribution to the formative measure of the dimensions “Innovation’s corporative impact on the unit” (.680, $p < .001$) and “Innovation’s production efficiency impact on the unit” (.625, $p < .001$) is higher than that coming from the other two dimensions.

Table 3 goes about here

In what concerns the structural model, based on a 500 sub-samples bootstrap, three of the hypothesized relationships are significant ($p < .001$) while the other three are not. In particular, the relationships between “Subsidiary corporate embeddedness” and “Headquarter involvement in the innovation development process” ($\beta = .573$); the latter and “Impact of the innovation on the unit” ($\beta = .469$), and this impact of the innovation on the unit and “Corporate importance of the innovation” ($\beta = .486$) are highly significant (see Table 4). In other words, hypotheses 1, 4 and 6 are supported while no support is found for hypotheses 2, 3 and 5 (see Figure 2). The variance explained of the endogenous variables ranges from .220 to .329, while the Stone-Geisser Q^2 statistic (Geisser, 1975; Stone, 1974) has a positive value for “Corporate importance of the innovation” and a negative one for “Headquarter involvement in the innovation development process”, suggesting that other constructs not included in the model will help to understand what other factors will be relevant to explain the latter construct. We will come back to this issue during the discussion of the findings. Finally, taking together the measurement and the structural model, their Goodness-of-Fit (GoF) value (Tenenhaus et al., 2005) is .425, which means that, overall, the model has a reasonable good

quality (GoF ranges between 0 and 1, the higher the better). These findings are discussed in the next section.

Table 4 goes about here

Insert figure 2 around here

DISCUSSION AND CONCLUDING REMARKS

This study contributes to the body of literature dealing with MNE competitive advantage creation and particularly with innovation development at the subsidiary level. It addresses the question of the corporate drivers behind innovations and its importance for the entire MNE. We specifically add to the current debate on innovation development and transfer by focusing on the impact of the innovation at the developing subsidiary and on the importance at business area and MNE level. Our findings clearly support this relationship by showing the strong influence that innovation has in the subsidiary context and its relevance for the rest of the MNE. Moreover, on a theoretical level, our findings support the importance of more fine-grained and specific analysis of the innovation process at subsidiary level.

Building on previous studies, we have explored how subsidiary corporate embeddedness and HQ involvement in the innovation development process influence the innovation impact at the developing subsidiary first and the innovation (corporate) importance afterwards. Six hypotheses were tested in a SEM model on a data set composed by 85 innovation projects. The results indicate that both corporate embeddedness and MNE headquarters enhance innovation related output. The fact that subsidiary corporate embeddedness has no direct

relationship with the innovation impact at the developing subsidiary is interesting as well as the fact that embeddedness does not affect the innovations importance in the MNE. This implies that embeddedness is of greater value for the development process per se, which has been shown in earlier studies (Andersson et. al., 2002), and not for how the innovation in a later stage is received in the organization. This connects both to how the innovation is received at the subsidiary level as well as to how it is received at the MNE level. What matters is the pivotal role of HQ as they directly influence the impact and conduce the overall effect of embeddedness. This indicates that top management has an important role in the innovation process taking place at subsidiary level and that they are particularly stimulated by the position of the developing subsidiary within the corporate network. HQ involvement in the innovation development, in turn, affects the degree of subsidiary autonomy but also relates to the fact that HQ allocates their involvement to specific innovation transfer projects, i.e., they engage in winner-picking activities at the subsidiary level. A project that is picked as a winner may also be the one that headquarters subsequently decides to be transfer worthy, i.e., a winner-sticking situation.

The impact that the innovation developed has on the developing subsidiary appears in our study to be fundamental for the actual importance of the innovation, both at business area and MNE level. Moreover, HQ and indirect embeddedness effects on the innovation impact are indirectly sustaining the overall level of innovation (corporate) importance. This is contrary to our expectations of a more direct impact of embeddedness and, particularly, HQ involvement in the innovation development project on the actual importance of the innovation. Our data indicate that the concrete results in terms of related output (market performance, efficiency level, internal influence of the subsidiary, etc.) are affecting the level of importance of the innovation in the rest of the MNE.

Hence, by identifying factors related to HQ involvement in the innovation development process, the impact an innovation has on a subsidiary and the importance of an innovation intra-MNE, we delineate structures and processes behind subsidiary evolution (Birkinshaw and Hood, 1998) that have received limited attention in the literature. By doing this we get a better understanding of the innovation development process that is of strategic importance for the MNE and, specifically, for subsidiaries who compete for charters and mandates (Birkinshaw, 1996) and strive to become a CoE (Holm and Pedersen, 2000). We also contribute to the understanding of intangible resource allocation dictated by HQ to subsidiaries in the MNE and when potential winner-picking situations occur. This is later important for innovation transfer and the overall competitive advantage of MNEs.

The hypotheses developed in this paper have been tested with a unique data set created through personal interviews with the top managers, subsidiary manager and personnel involved in different innovation projects in different regions of the world. Our choice to collect data through personal interviews has certainly contributed to obtain high quality information. Still, the study remains subject to certain limitations. First, there is a potential risk for common method bias due to our use of self-reported measures by the respondents. Triangulation in the collection of data is recommended for future empirical efforts. Secondly, we run the risk of sampling bias towards successful innovations. However, our research is aimed at investigating the effects of a developed innovation and not at looking into factors related to the emergence of innovations.

Additionally, further research on alternative drivers of innovation importance may be adopted in future studies and complement this one, which should be seen as a first step toward a better

understanding of the mechanisms that are behind the innovation efforts and value creation at subsidiary level as well as concerning the relationship between innovation at subsidiary level and competitive advantage at MNE level. Of course this framework can be connected to different levels of the management of innovations such as the transfer process, resource allocation and winner-picking transfer projects deemed as transfer worthy but also connected to performance implications both in terms of transfer performance and, finally, subsidiary and MNE performance.

REFERENCES

- Andersson, U. and Forsgren, M. and Holm, U. (2002) 'The Strategic Impact of External Networks: Subsidiary Performance and Competence Development in the Multinational Corporation', *Strategic Management Journal*, 23(11): 979-996.
- Andersson, U., Forsgren, M. and Holm, U. (2007) 'Balancing Subsidiary Influence in the Federative MNC – a Business Network Perspective', *Journal of International Business Studies*, 38(5): 802-818.
- Barney, J. (1991) 'Firm resources and competitive advantage', *Journal of Management*, 17(1): 99-120.
- Bartlett, C.A. and Ghoshal, S. (1989) *Managing Across Borders. The Transnational Solution*. Harvard Business School Press: Boston Massachusetts.
- Baumol, W.J. (2002) *The Free-Market Innovation Machine: Analyzing the Growth Miracle of Capitalism*, Princeton University Press.
- Becker, G.S. (1964) *Human Capital*. New York: Colombia.
- Birkinshaw, J. (1996) 'How Multinational Subsidiary Mandates are Gained and Lost', *Journal of International Business Studies*, 27(3): 467-495.
- Birkinshaw, J and Hood, N. (1998) 'Multinational Subsidiary Evolution: Capability and Charter Change in Foreign-Owned Subsidiary Companies', *Academy of Management Review*, 23(4): 773-795.
- Birkinshaw, J. and Hood, N. (2001) 'Unleash Innovation in Foreign Subsidiaries', *Harvard Business Review*, 79(3): 131-137.
- Boone, J. (2000) 'Competitive Pressure: The Effects on Investments in Product and Process Innovation', *The RAND Journal of Economics*, 31(3): 549-569.
- Brown S.L. and Eisenhardt K.M. (1995) 'Product Development: Past Research, Present Findings, and Future Directions', *Academy of Management Review*, 20(2): 343-378.
- Burgelman, R.A. (1983) 'A Process Model of Internal Corporate Venturing in the Diversified Major Firm', *Administrative Science Quarterly*, 28(2): 223-244.
- Cantwell, J. (1992) *Multinational Investment in Modern Europe: Strategic Interaction in the Integrated Community*. United Kingdom, Edward Elgar.
- Cantwell, J. and Santangelo, G.D. (1999) 'The frontier of international technology networks: Sourcing abroad the most highly tacit capabilities', *Information Economics and Policy*, 11(1): 101-123.

- Chin, W. W. (1998). The partial least squares approach to structural equation modelling. In G.A. Marcoulides (Ed.), *Modern Methods for Business Research*: 295-336. Mahwah, NJ: Lawrence Erlbaum Associates, Publisher.
- Dougherty, D. (1992) 'A practice-centred model of organizational renewal through product innovation', *Strategic Management Journal*, 13(S1): 77-92.
- Eisenhardt, K.M. and Martin, J.A. (2000) 'Dynamic Capabilities: What are they?', *Strategic Management Journal*, 21(10-11): 1105-1121.
- Ettlie, J.E., Bridges, W.P. and O'Keefe, R.D. (1984) 'Organization Strategy and Structural Differences for Radical versus Incremental Innovation', *Management Science*, 30(6): 682-695.
- Franco, L.G. (1989) 'Global Corporate Competition: Who's Winning, Who's Losing, and the R&D Factor as One Reason Why' *Strategic Management Journal*, 10(5): 449-474.
- Frost, T., Birkinshaw, J. and Ensign, P.C. (2002) 'Centre of Excellence in Multinational Corporations', *Strategic Management Journal*, 23(11): 997-1018.
- Fornell, C., and Larcker, D. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18: 39-50.
- Forsgren, M., Holm, U. and Johanson, J. (2005) *Managing the Embedded Multinational*. Edward Elgar Publishing, Cheltenham, UK.
- Garcia, R. and Calantone, R. (2002) 'A critical look at technological innovation typology and innovativeness terminology: a literature review' *The Journal of Product Innovation Management*, 19(2): 110-132.
- Geisser, S. (1975). The Predictive Sample Reuse Method with Applications. *Journal of the American Statistical Association*, 70:320-328.
- Ghoshal, S. and Bartlett, C. (1988) 'Creation, Adoption, and Diffusion of Innovations by Subsidiaries of Multinational Corporations', *Journal of International Business Studies*, 19(3): 365-388.
- Ghoshal, S. and Bartlett, C. (1990) 'The Multinational Corporation as an Interorganizational Network', *The Academy of Management Review*, 15(4): 603-625).
- Granovetter, M.S. (1985) 'Economic Action and Social Structure: The Problem of Embeddedness' *American Journal of Sociology*, 91(3); 481-510.
- Granovetter, M.S. (1992) Problems of explanation in economic sociology. In *Networks and Organizations*, Nohria, N. and Eccels, R.G. (eds). Harvard Business School Press: Boston, MA; 25-56.
- Gulati, R. (1998) 'Alliances and Networks' *Strategic Management Journal*, 19(4); 293-317.

- Gupta, A.K. and Govindarajan, V. (1991) 'Knowledge Flows and the Structure of Control within Multinational Corporations', *Academy of Management Review*, 16(4): 768-792.
- Gupta, A.K. and Govindarajan, V. (2000) 'Knowledge Flows within Multinational Corporations', *Strategic Management Journal*, 21(4): 473-496.
- Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E., and Tatham, R.L. (2006). *Multivariate Data Analysis* (6th ed). Upper Saddle River, New Jersey: Prentice Hall.
- Hakansson, H. and Waluszewski, A. (2002) 'Path dependence: restricting or facilitating technical development', *Journal of Business Research*, 55: 561-570.
- Hansen, M.T. (1999) 'The Search-Transfer Problem: The Role of Weak Ties in Sharing Knowledge across Organization Subunits', *Administrative Science Quarterly*, 44(1): 82-111.
- Hedlund, G. (1986) 'The Hypermodern MNC – a Heterarchy', *Human Resource Management*, 25(1): 9-35.
- Hitt, M.A., Hoskisson, R.E., Johnson, R.A. and Moesel, D.D. (1996) 'The Market for Corporate Control and Firm Innovation' *The Academy of Management Journal*, 39(5): 1084-1119.
- Hitt, M.A., Hoskisson, R.E. and Kim, H. (1997) 'International Diversification: Effects on Innovation and Firm Performance in Product-Diversified Firms', *Academy of Management Journal*, 40(4): 767-798.
- Holm, U. and Pedersen, T. (2000) *The Emergence and Impact of MNC Centres of Excellence: A Subsidiary Perspective*. MacMillan, London.
- Jarvis, C. B., MacKenzie, S. B. and Podsakoff, P. M. (2003). A critical review of construct indicators and measurement model misspecification in marketing and consumer research, *Journal of Consumer Research*, 30(2): 199–218.
- Lane, P.J. and Lubatkin, M. (1998) 'Relative Absorptive Capacity and Interorganizational Learning', *Strategic Management Journal*, 19(5): 461-477.
- Marquardt, D.W. (1970) 'Generalized inverses, ridge regression, biased linear estimation and non-linear estimation', *Technometrics*, 12(3): 591-612.
- Mathieson, K., Peacock, E. and Chin, W. W. (2001). Extending the Technology Acceptance Model: The Influence of Perceived User Resources. *The Data Base for Advances in Information Systems*, 32 (Summer), 86-112.
- Moran, P. (2005) 'Structural vs. Relational Embeddedness: Social Capital and Managerial Performance' *Strategic Management review*, 26; 1129-1151.
- Nelson, R., (1993) *National innovation systems*. , Oxford University Press, Oxford.
- Nerkar, A. and Paruchuri. S. (2005) 'Evolution of R&D capabilities: Role of Knowledge Networks within a Firm', *Management Science*, 51: 771-785

- Nonaka, I. (1994) 'A Dynamic Theory of Organizational Knowledge Creation', *Organization Science*, 5(1): 14-37.
- Penrose, E.T. (1959) *The Theory of the Growth of the Firm*. Basil Blackwell, Oxford.
- Pfeffer, J. (1981) *Power in Organizations*. Marshfield, MA: Pitman.
- Pfeffer, J. and Salancik, G.R. (1978) *The External Control of Organizations: A Resource Dependency Perspective*. Stanford business books. New York: Harper & Row.
- Pitard, A. and Viel, J.F. (1997) 'Some methods to address collinearity among pollutants in epidemiological time series' *Statistics in Medicine*, 16: 527-544.
- Podolny, J.M. (2001) 'Networks as the Pipes and Prisms of the Market', *American Journal of Sociology*, 107(1): 33-60.
- Podsakoff, P.M., MacKenzie, S.B., Lee, J.Y., and Podsakoff, N.P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies, *Journal of Applied Psychology*, 88 (5), 879-903.
- Rogers, E. (1983) *Diffusion of Innovations*, 3rd ed. New York: Free Press.
- Schumpeter, J. (1942) *Capitalism, socialism, and democracy*. NY: Harper.
- Stone, M. (1974). Cross-validatory Choice and Assessment of Statistical Predictions. *Journal of the Royal Statistical Society, Series B*, 36(2): 111-147.
- Teece, D.J. (1986) 'Profiting from technological innovation: implications for integration, collaboration, licensing and public policy', *Research Policy*, 15(6): 285-305.
- Teece, D.J., Pisano, G. and Shuen, A. (1997) 'Dynamic capabilities and strategic management', *Strategic Management Journal*, 18(7): 509-533.
- Tenenhaus M, Esposito Vinzi V, Chatelin Y-M, Lauro C. (2005). PLS path modeling. *Computational Statistics and Data Analysis*, 48, pp. 159-205.
- Tomer, J.F. (1987) *Organizational capital: The path to higher productivity and well-being*. New York: Praeger.
- Van De Ven, A. (1986) 'Central Problems in the Management of Innovation', *Management Science*, 32(5): 590-607.
- Von Hippel, E. (1984) *Generation and Evaluation of Novel Product Concepts via Analysis of Experienced Users*, Marketing Science Institute, Cambridge, Mass.
- Von Hippel, E. (1988) *The Sources of Innovation*. Oxford University Press: New York, Oxford.

Wernerfelt, B. (1984) 'A Resource-Based View of the Firm', *Strategic Management Journal*, 5(2): 171-180.

Werts, C., Linn, R., and Joreskog, K. (1974). Intraclass reliability estimates: Testing structural assumptions. *Educational and Psychological Measurement*, 34: 25-33.

Williamson, O.E. (1975) Markets and hierarchies, analysis and antitrust implications: A study in the economics of internal organization. Free Press: New York.

Wold, H. (1982). Soft Modeling. The Basic Design and Some Extensions in Jöreskog, K.G. and Wold, H.; *Systems Under Indirect Observation*, North Holland: Amsterdam.

Zander, Udo (1991) Exploiting a Technological Edge-Voluntary and Involuntary Dissemination of Technology, Stockholm, Sweden: IIB.

Figure 1

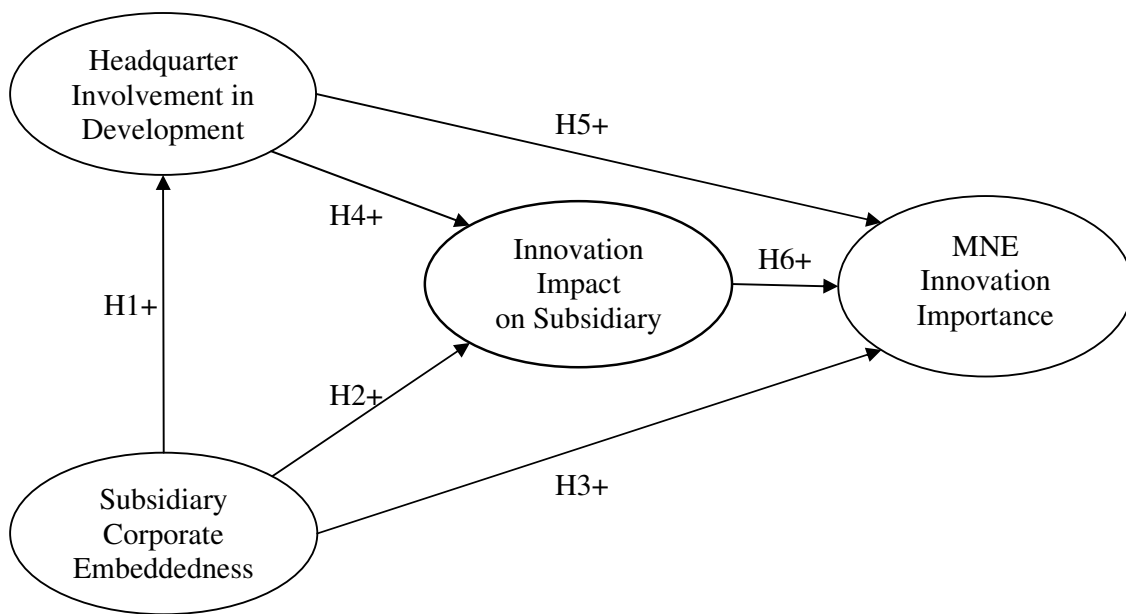
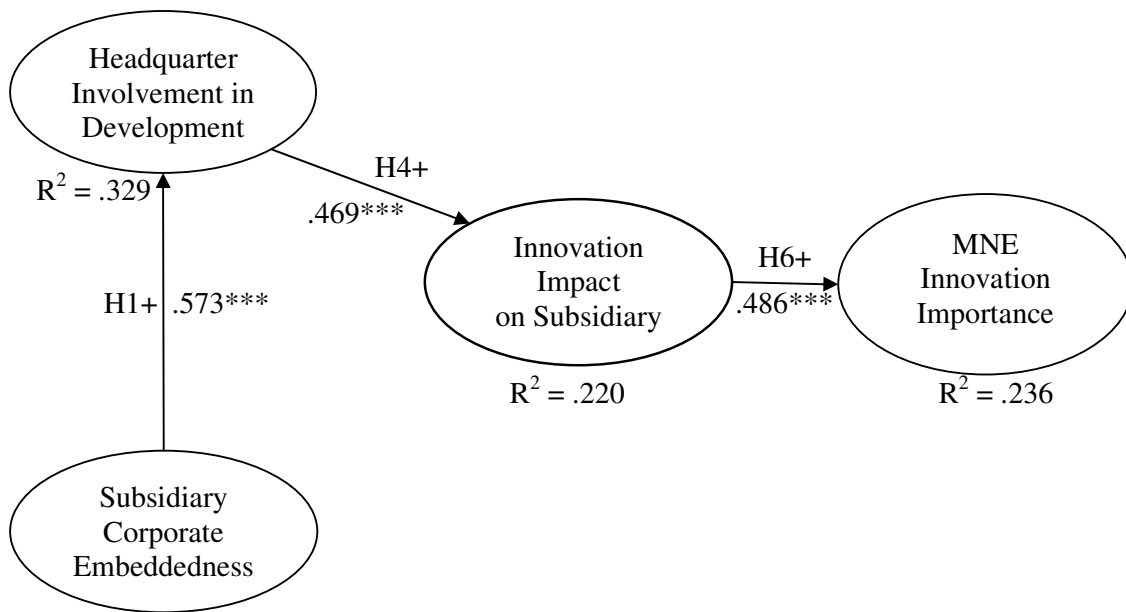


Figure 2



*** $p < .001$ (based on a Student $t_{(499)}$ distribution with one tail).

TABLE 1

OPERATIONALIZATION OF THE FIRST-ORDER LATENT VARIABLES

Construct/ Indicator	Scale	Label
Corporate importance of the innovation		CII
Importance of the innovation to the division/ business area as a whole	1 to 7 ^a	CII1
Importance of the innovation to the MNE as a whole	1 to 7 ^a	CII2
Innovation's market impact on the subsidiary^b		IMI
Competitive advantage on the market	-3 to 3	IMI1
Business volume in your home country market	-3 to 3	IMI2
Innovation's corporate impact on the subsidiary^b		ICI
Advantage within the MNE	-3 to 3	ICI1
Sales to other MNE units	-3 to 3	ICI2
Innovation's production efficiency impact on the subsidiary^b		IPEI
Efficiency in the production process	-3 to 3	IPEI1
Cost per unit in the production process	-3 to 3	IPEI2
Innovation's R&D impact on the subsidiary^b		IRDI
Influence on decisions about investments in your R&D	-3 to 3	IRD1
Cost of development of new products	-3 to 3	IRD2
Headquarter involvement in the innovation development process		HQID
HQ has participated closely in developing this innovation	1 to 7 ^c	HQID1
HQ has brought competence of use for the development of this innovation	1 to 7 ^c	HQID2
HQ has been important through specifying requests	1 to 7 ^c	HQID3
HQ has taken important initiatives for developing the innovation	1 to 7 ^c	HQID4
The cooperation with HQ has been characterized by frequent interaction	1 to 7 ^c	HQID5
Subsidiary corporate embeddedness (organizations within MNE)^d		SCE
Basic research	1 to 7	SCE1
Technical development	1 to 7	SCE2
Production	1 to 7	SCE3
Marketing & sales	1 to 7	SCE4
Purchasing	1 to 7	SCE5
Service	1 to 7	SCE6

^a From 1 = very low to 7 = very high.

^b Evaluate how the innovation has affected your unit (-3 = strong negative effect, 3 = strong positive effect).

^c From 1 = totally disagree to 7 = totally agree.

^d With regard to the innovation, to what extent have your unit's organization made specific adaptations in different activities to fit the counterparts with the most important exchange? (1 = not at all, 7 = very much).

TABLE 2

ITEM AND CONSTRUCT RELIABILITY AND AVERAGE VARIANCE EXTRACTED FOR THE FIRST-ORDER
LATENT VARIABLES

Construct/ Indicator	Item reliability Loading	Construct reliability Composite reliability	Convergent validity Average Variance Extracted (AVE)
Corporate importance of the innovation		.923	.857
Importance of the innovation to the division	.940		
Importance of the innovation to the MNE as a whole	.910		
Innovation's market impact on the subsidiary		.827	.712
Competitive advantage on the market	.985		
Business volume in your home country market	.674		
Innovation's corporative impact on the subsidiary		.755	.628
Advantage within the MNE	.992		
Sales to other MNE units	.521		
Innovation's production efficiency impact on the subsidiary		.814	.687
Efficiency in the production process	.884		
Cost per unit in the production process	.769		
Innovation's R&D impact on the subsidiary			
Influence on decisions about investments in your R&D	.921	.822	.700
Cost of development of new products	.742		
Headquarter involvement in the innovation development process		.911	.673
HQ has participated closely in developing this innovation	.896		
HQ has brought competence of use for the development of this innovation	.858		
HQ has been important through specifying requests	.783		
HQ has taken important initiatives for developing the innovation	.805		
The cooperation with HQ has been characterized by frequent interaction	.750		
Subsidiary corporate embeddedness (organizations within MNE)		.812	.523
Basic research	.744		
Technical development	.843		
Purchasing	.667		
Service	.619		

TABLE 3

CORRELATIONS AND SQUARE ROOT OF THE AVERAGE VARIANCES EXTRACTED (AVE^a).

Construct	CII	HQID	IMI	ICI	IPEI	IRDI	SCE
CII	.926						
HQID	.351	.820					
IMI	.170	.151	.844				
ICI	.378	.438	.287	.792			
IPEI	.363	.263	-.142	.158	.829		
IRDI	.118	.270	.297	.424	.030	.837	
SCE	.207	.573	.104	.243	.230	.218	.723

^a Diagonal values in bold are the square root of the variance shared between the reflective constructs and their measures. In order to achieve discriminant validity diagonal elements must be larger than off-diagonal.

TABLE 4

ENDOGENOUS VARIABLES: DIRECT, INDIRECT AND TOTAL EFFECTS, EXPLAINED VARIANCES AND STONE-GEISSER Q^2 TEST.

Effects on endogenous variables	Direct effect	t value (bootstrap)	Variance explained	Stone-Geisser Q^2
Effects on headquarter involvement in the innovation development H ₁ : Subsidiary corporate embeddedness	.573***	(7.454)	.329 .329	-.037
Effects on impact of the innovation on the subsidiary H ₄ : HQ involvement in the innovation development	.469***	(5.083)	.220 .220	n.a.
Effects on corporate importance of the innovation H ₆ : Impact of the innovation on the subsidiary	.486***	(5.449)	.236 .236	.001

*** $p < 0.001$ (based on a Student $t_{(499)}$ distribution with one tail).

n.a.: Not applicable to formative constructs.