EFFECTS OF HQs INVOLVEMENT ON INNOVATION PROCESSES AT UNIT LEVEL

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Abstract

This paper contributes to the ongoing debate about the HQs role in the modern MNC. Specifically, by distinguishing between innovation development and transfer, we test for the relationships that HQs involvement has with the impact of the innovation on the developing unit and with the performance of the innovation transfer process to sister units. We argue that HQs involvement in the transfer process is determined by its previous involvement in the development process and by the impact of the innovation on the developing unit. Six hypotheses drawn on the literature are tested by means of partial least squares (PLS) technique in a sample of 71 innovation projects taking place in 23 MNCs. The results show how HQs involvement in the development of the innovation is beneficial for its impact on the developing unit, while their involvement in the transfer is detrimental for the transfer performance. The study concludes with the implications for managers and guidelines for future research.

Key words: HQs involvement; Innovation; Innovation development; Innovation transfer; Innovation transfer performance.

INTRODUCTION

Innovation is without any doubt a core component of large MNCs competitive advantage (e.g. Ghoshal & Bartlett, 1988; Doz et al., 2001). The MNC itself is recognized as an important source of innovation and competence and a vehicle for innovation transfer between countries and regional centers. Consequently, it has become a major topic of discussion in international business (e.g. Bartlett & Ghoshal, 1990; Hedlund & Rolander, 1990; Kogut & Zander, 1993, Cantwell & Mudambi, 2004). By internally transferring an innovation, a MNC can employ it on a larger scale and the profit from it can be lied. Thus, the corporate capabilities to develop, encourage and internally transfer innovations constitute the essence of the modern MNC and are the basis of its competitive strength (Ghoshal & Bartlett, 1990; Kogut & Zander, 1992; Doz et al., 2001; Forsgren et al, 2005).

In this new context, MNC units have gained the new role of controllers of strategic assets and sources of innovation and competence for the whole MNC (e.g., Birkinshaw and Hood, 1998; Pearce, 1999; Andersson & Forsgren, 2000; Rugman & Verbeke, 2001; Andersson et al., 2007). Accordingly, HQs roles have changed from decision-making and resource center, to active counterpart focusing on and taking part in units' development and corporate network coordination (e.g. Poppo, 2003; Ambos & Schelegelmilch, 2007). These changes, however, pose a series of organizational and managerial questions and much is still to be understood about the effects that HQs involvement has on innovation activities at unit level. In fact, previous studies about control, centralization and HQs involvement in innovation development, have been mostly looking at the HQs direct influence on the unit performance (e.g. Gatignon & Andreson, 1988, Andersson & Forsgren, 1996), and not much has been done about their impact on the innovation itself and its implications. As to the interunit innovation transfer, scholars have been focusing on the outcome of transferring innovation and competence, i.e., unit performance and MNC competitive advantage (e.g. Holm et al., 2005), but the performance of the process per se has been rather neglected.

Moreover, although the general feeling that innovating and transferring competence throughout the corporate network is a positive and rewarding practice for firms, this should not be interpreted as a suggestion to develop and transfer innovations as much as possible,

because being innovative and leveraging innovations is definitely not easy or cost free (e.g. Andersson and Forsgren, 2000; Zander and Sölvell, 2002). Innovation development and transfer activities need to be carefully evaluated and targeted to reach innovation objectives while maintaining adequate efficiency levels (e.g. Person, 2006; Postrel, 2002; Renko, 2001; Demarest, 1997).

In line with the rationale above, this paper aims to investigate the effects that HQs involvement has on innovation development and transfer at unit level. Particularly, we emphasize the existing links between the HQs involvement in the innovation development process, the effect of this involvement on the developing unit (i.e., the unit engaged in the development), and the HQs further involvement in the transfer process. We argue that a HQs higher involvement in the development will make them more aware of, and familiar with, the innovation and more interested in its further development and exploitation and, as a result, willing to participate also in the transfer process. In addition, the more successful the innovation at the developer site is, the higher the HQs interest in further spreading the innovation to other units.

Our main findings show that HQs involvement in units' innovation activities has important implications. Specifically, while in the innovation development HQs involvement enhances the innovation effects on the developing unit, in the innovation transfer process, their involvement is detrimental in terms of performance. This situation represents, therefore, a critical paradox about the overall HQs involvement in the innovation process, which poses new challenges to top management decision making. We find also that the more involved HQs in the development process and the stronger the innovation impact on the subsidiary, the higher HQs involvement in the transfer. This sheds light on the link between the processes of development and transfer of innovation, point rather ignored by the literature in general and particularly if related to control and structural implications.

The contribution of this paper is fourfold. First, to the best of our knowledge, this is the first attempt to empirically connect the processes of innovation development and transfer at unit level in MNC. Earlier research has often studied the process of innovation development independently from innovation transfer and many were the calls for further analysis of the two processes together (e.g. Holm & Pedersen, 2000; Andersson et al.,

2002; Ciabuschi & Forsgren, 2006). Second, it shows that innovation development and transfer are considered extremely interrelated processes by HQs, i.e., when they get involved in the innovation development it will be very likely that they get also involved in the transfer. Third, it suggests that HQs have to balance the higher impact on the developing unit of their involvement in the innovation development, with a lower performance in the specific transfer process if they continue to be involved in the latter. This apparent trade-off, however, can be favorably solved by HQs if they become more selective and get mainly involved in transferring those innovations with an already demonstrated high impact on the developing unit. Fourth, it reveals that giving more support to adopting units can be an alternative strategy to enhance transfer process performance, i.e., to contain transfer cost while increasing satisfaction with the process.

In the next section we present the literature review, while in the successive the model and hypothesis are formulated. The presentation of the methods and results will be followed by a discussion, and the paper concludes with some comments on managerial implications and future research issues.

LITERATURE REVIEW AND THEORETHICAL BACKGROUND

In the next paragraphs and sub-sections we define what concept of innovation we are referring to in this study; deal with a general classification of innovations, remark their role as a key elements for MNCs competitive advantage, and review the literature addressing innovation development at unit level and interunit innovation transfer. Innovation is an extensive and elusive concept (for an overview see Tidd et al., 2001). In this paper we broadly define innovation as getting into practice product designs and manufacturing processes that are new to the firm (Nelson, 1993). In other words, innovation refers to a change in a process and in the outcome of a process, related to industrial production and/or exchange (Zander, 1991).

Innovations can be classified along many dimensions. The most common typology distinguishes among product, process, and service innovations (Brown & Eisenhardt, 1995). Another important aspect for further distinction is the extent to which they rely on existing competencies or change current products or processes (e.g. Anderson & Tushman,

1990). Accordingly, at one extreme there are incremental innovations, while at the other one there are radical ones (e.g. Ettlie et al., 1984; Freeman, 1994; Brown & Eisenhardt, 1995). Innovations present also other important characteristics by which they can be identified. For example, a product or process can be more or less complex, presenting different amounts of components or sub-processes: it can have different proportion in hardware and software parts; it can be a standalone element or a well integrated component, and it might require different amounts of costs and investments (e.g. Ettlie et al., 1984; Brown & Eisenhardt, 1995).

Innovation and the management of its process are recognized to be core elements in shaping the MNCs competitive advantage (e.g. Bartlett and Ghoshal, 1989; Kogut and Zander, 1992; Doz et al 2001). The innovation process at unit level is composed by the processes of innovation development, in which a unit develop a new solution from an idea or a detected problem, and innovation transfer, aimed at exploiting the solution in many markets by different units (Forsgren et al 2005).

Innovation development

We conceptualize innovation development as the process of transforming an idea into a completed form that is acceptable to potential adopters, i.e., external actors (e.g. customers, suppliers, competitors, etc.), the focal unit, and its sister units. Since the ability to innovate is reputedly important in achieving strategic competitiveness (Conner, 1991; Eisenhardt and Martin, 2000), business research has naturally devoted much effort to study the managerial side of processes that may lead to innovation, and in particular, to investigate specific factors that may enhance or impede innovativeness (e.g. Ghoshal & Bartlett, 1988, Kanter, 1988, Brown & Eisenhardt, 1995).

Reviews of success factors and strategies favoring innovativeness comprehend: good internal and external communication; effective linkages with external knowledge sources; dealing with innovation as a company-wide task; high-quality production; careful planning and control systems; strong market orientation; top-management commitment, and long-term commitment to major projects (Ghoshal & Bartlett, 1988; Rothwell, 1994; Brown & Eisenhardt, 1995; Tsai & Ghoshal, 1998). Some scholars have particularly stressed the

importance of the external environment as influential to innovation development (e.g. von Hippel, 1988, 1994; Berrera & Cantwell, 1995; Forsgren et al., 1997, 2000, 2005; Andersson et al., 2002; Frost, 2001; Sölvell & Birkinshaw, 2000). The degree of a unit's market embeddedness and the dynamics of its specific relationships with local actors, in terms of, for instance, commitment, trust, and closeness, are critical and can both hinder and enhance the ability to innovate (Håkansson & Snehota, 1995; Holm & Pedersen, 2000; Frost et al., 2002). All these different studies and perspectives indicate factors that potentially may influence innovation at unit level. Thus, depending on what (or who) is influencing the development process, the innovation will result different and, most important, it will have a different impact on the developing unit.

Innovation impact on the developing unit

After identifying the different factors which may influence innovation development, now we turn on the effects that this development may have on the developing unit. First, an innovation could impel market success for the unit. 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 & Eisenhardt, 1995; Hitt et al., 1997; Boone, 2000). Additionally, a new successful solution may contribute to the unit's business also outside its local market and, it could foster its internationalization. Such process has been described by Forsgren et al. (1992) as "internationalization of the second degree". Looking at the internal organization of the unit, a new solution could improve the unit'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 unit may learn and develop routines concerning its development activities (Ettlie et al., 1984; von Hippel, 1984; Hakansson & Waluszewski, 2002; Atul & Srikanth, 2005).

According to Forsgren (2005) being innovative for a unit could mean also better positioning within the MNC in terms of visibility, advantage and influence towards sister units. Take for instance the CoEs phenomenon. Frost et al. (2002) describes a CoE as a unit

that holds a special role within the organization, recognized to withhold competence of excellent level. Moreover, a CoE is also a provider of competence to the sister units, i.e., sister units become dependent on the CoE (Holm et al, 2000; Frost et al., 2002). This is an example of effects in terms of corporate positioning and advantage of the developing unit, derived by the innovation success.

Being innovative may have strong positive implications for the developing unit and at the same time it can be beneficial for the whole corporation. That is why interunit innovation transfer is highly important for MNCs and, increasingly, a main concern for the top management.

Interunit innovation transfer

Within the conceptualization of the MNC as a system incorporating several dispersed centers of competence (Hedlund, 1986; Bartlett & Ghoshal, 1989; Ghoshal & Nohria, 1997; Holm & Pedersen, 2000) we define "interunit innovation transfer" as specific, purposeful, directed projects delimited in time and effort, with the explicit goal of making available for usage the transferred innovation to the recipient unit (see Szulanski et al., 2004).

The larger, more diversified, and more extended an organization is, the greater is its potential to leverage innovations. By the same token, however, the greater are also the potential barriers to interunit innovation transfer (Zander & Kogut, 1995; Andersson et al., 2001, 2002). That is why, in the last years, research efforts have focused on detecting and analyzing transfer barriers and on understanding possible improvements (e.g. Simonin, 1999; Szulanski 1996; Szulanski & Jensen 2006).

Studies on innovation transfer have consistently confirmed that the characteristics of the innovation may make an innovation more or less easily transferred (e.g., Von Hippen, 1994; Simonin, 2004; Szulanski & Jensen, 2006). Innovations tend to be "sticky" (Von Hippel, 1994), and scholars have shown, for instance, how the less complex and tacit the innovation is, the easier is to transfer it (e.g. Teece, 1977; Kogut & Zander, 1992, 1993; Szulanski, 1996). Other critical aspects for the transfer process are the relationship and motivation of the involved parties, i.e. sender and receivers units (Szulanski, 1996, 2000; Osterloh & Frey, 2000; Husted & Michailova, 2002). Osterloh and Frey (2000) show for

example how a common problem, desire to show expert status, presence of incentives and formal requirements can enhance the transfer. The unit external embeddedness is another barrier to the transfer process. Anderson et al. (2001, 2002) argue that externally embedded units are potentially more innovative, but may concurrently be less able to internally transfer newly generated competence.

However, internal dynamics and integration mechanisms positively influence interunit transfer of competence and innovation and contrast the negative influence coming from external embeddedness. For example, Ghoshal and Bartlett (1990) demonstrate that normative integration is positively associated with innovation transfer and adoption, and Birkinshaw and Hood (2001) and Björkman et al. (2004), showed how HQs through specific practices potentially may foster knowledge transfer between units. Typical factors include HQ control, evaluation, and incentive systems (e.g. Doz & Prahalad, 1981; Roth & O'Donnell, 1996; Björkman et al., 2004), corporate culture, values, and organizational identity (Tsai & Ghoshal, 1998; Barner-Rasmussen, 2003), and routines existing between sister units (Nelson & Winter, 1982; Grant 1996b). Nevertheless, all these factors have to be properly managed to foster the transfer process. Further investigation is warranted since results are not univocal.

Overall, innovation transfer is supposed to enhance the overall performance of the organization, i.e., the competitive advantage of the MNC. However, deducing competitive advantage directly from innovation and competence transfer may be rather difficult as the number of influencing factors is, as explained, high.

Innovation transfer performance

Outcomes of innovation transfer can be analyzed in different ways and at different points in time. This provides different aspects of what is the innovation transfer related performance. Thus, there is a performance aspect directly related to the actual process of innovation transfer as highlighted by few previous studies (e.g. Szulanski, 1996; Zander & Kogut, 1995; Kostova, 1999). Another fruitful way to look at innovation transfer (and its performance) is to differentiate according to the different processes, i.e., the transfer process vs. the process of competitive advantage creation, and in relation to the different

units, i.e., the sender and the receiver (and the whole MNC). As a result it is possible to examine the performance related to the different processes and from the perspective of the different units. We focus on the innovation transfer performance from the sender perspective.

Transfer performance is important since the transfer of an innovation requires commitment from the involved parties and it may entail substantial costs (e.g. Szulanski, 1996; Teece, 1977; Zander & Kogut, 1995). Transfer costs may accrue from different sources and they should not outweigh the transfer benefits, i.e., increased unit/MNC performance related to the transferred innovation. Additionally, a good transfer performance should entail satisfaction of the involved parties (Kostova, 1999, Leonard-Barton & Sinha, 1993). This means that not only the sender but also the receiver is influencing the transfer process performance. For instance, the receiver may be not particularly motivated, have not enough resources available or a weak absorptive capacity. These and other factors will determine the success of the adoption from the receiver side and, therefore, influence the overall transfer performance. Here, the distinction between the performance of the mere transfer and the success of adoption is critical: if an innovation is transferred it does not necessarily mean that it is successfully adopted and used by the receiver (Kostova & Roth, 2002). This distinction is relevant to stress the fact that the transfer process is not an unilateral process and its performance is influenced by both the sender and the receiver(s).

HQs involvement - Model and hypotheses

The question of the relevance of HQs involvement in the unit level activities is a central one in international management. Authors such as Von Hippel (1988, 1994), Ghoshal and Bartlett (1990) and Birkinshaw (2001) agree on the fact that HQs may be very influential in the management of innovation development and transfer. In this section we distinguish between the HQs involvement in the innovation development and in the innovation transfer processes. We explore their relationship and the way they affect the impact of the innovation in the developing unit and transfer performance. The relationships between the

constructs of the model and the related hypotheses that we are going to develop are summarized in Figure 1.

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

HQs involvement in the development

Organizational factors such as top-management support and commitment, control and incentive systems, shared values and internal communication may all influence the innovation process (Ghoshal & Bartlett, 1988, Rothwell, 1994; Brown & Eisenhardt 1995, Tsai & Ghoshal, 1998). HQs involvement can guarantee higher innovation legitimacy, more structure and guidance for the unit (Quinn, 1985), and also larger resource allocation since higher HQs involvement and investments increase overall commitment to the project (Birkinshaw et al., 1998). Through these means, the HQs input into the innovation development process can lead to improved results for the unit (Poppo, 2003). Furthermore, we argue that when the expectations concerning a project are high, HQs would get closer to the unit and support the process. Consequently, also the return for the unit is expected to be higher and, likely, affect more activities and functions of the developing unit, also depending on the type of innovation. These multiplicity of return can be visible in terms of, for instance, more sales in the current markets, international expansion, more sales to sister units, increased production efficiency, and/or gained importance in R&D decisions (e.g. Forsgren et al., 1992; Hitt et al., 1997; Tsai, 2001; Andersson 2001). Literature has been examining these aspects often singularly although the necessity to study them together and grasp the overall effect. Therefore, we formulate the following hypothesis:

H_1: *The higher the HQs involvement in the innovation development process, the higher the innovation impact on the developing unit.*

A second important aspect is that when HQs are involved in the development, they gain knowledge of both the innovation and its context, which means that they can (and most probably want to) be of further help also during the transfer process. Therefore we argue

that the more involved HQs are in the development the more they have the possibility and motivation to be involved in the transfer as well. This leads to the formulation of our second hypothesis.

H_2: *The higher the HQs involvement in the innovation development process, the higher their involvement also in the innovation transfer process.*

Another aspect that was underlined in the previous discussion on innovation development and innovation transfer was that it is often problematic to transfer an innovation and that there is the necessity to select the innovations worth transferring (Szulansky, 1996; Subramaniam & Venkatarman, 2001). If an innovation has already shown its positive impact at the developing unit it will be quite natural that the HQs desire its further transfer and from there the benefit of multiple adoption and exploitation of the same innovation at many sites (Kogut & Zander, 1993; Zander & Kogut 1995, Doz et al 2001). That is why we foresee that a noteworthy impact of the innovation in the developing unit site will further push the HQs to be involved also in the transfer. In other words, we expect more involvement of HQs in the transfer processes of those innovations that have already demonstrated a significant impact in the developing unit. Therefore we formulate the hypothesis below:

H_3: *The higher the innovation impact on the developing unit, the higher the HQs involvement in the innovation transfer process.*

HQs involvement in the transfer

Also within the transfer process, the HQs may be more or less directly involved and, therefore, influence and drive the transfer of an innovation from one unit to another. On one side, top-management may design specific mechanisms within the organization to attempt to influence internal technology transfers. Incentive and evaluation systems can elicit wanted behaviour at unit level (for example, see Eisenhardt, 1989; Galbraith & Merrill, 1991; O´Donnell, 2000). Evidence have also shown the expected effects of incentive

systems on unit knowledge flow levels (Gupta & Govindarajan, 2000) although some studies present more ambiguous results (Szulanski, 1996). On the other side HQs can also participate more directly and actively in the transfer process. In general, there seems to exist some support for the importance of managerial involvement in implementation activities (e.g. Wedley & Ferrie, 1978; Nutt, 1986). By actively participating in the transfer process, HQs attempt to create a positive feeling towards the implementation and thus facilitate its diffusion in the organization. However, when HQ is involved in specific transfer projects, the process efficiency may decrease as project visibility, prestige and reporting requirements may increase (e.g. Björkman et al. 2004; Birkinshaw et al. 2007) and this would add to the costs required to carry out the process. Subsidiary managers may also perceive increased control due to the HQs direct involvement in the transfer. Hence working environment and consequently the process may get hampered. As a result, also the satisfaction with the innovation transfer process can be eroded. We expect HQs to accept these inefficiencies, affecting only the transfer process itself, in their hope of reproducing the already demonstrated increased performance of the receiving unit. On these bases we set forward our fourth hypothesis:

H_4: *HQs involvement in the innovation transfer negatively affects transfer process performance.*

A related aspect (as also depicted for instance by Szulanski, 1996) is that when dealing with the concept of innovation transfer we need to distinguish the success of the transfer process from the sender perspective (corresponding to the moment when the innovation is fully available at the receiver side) from what is the innovation adoption at the receiver site (which is the result of the efforts to absorb and implement the innovation in the new unit). The process of adoption may well require substantial resource commitment, understanding (i.e., absorptive capacity), and motivation from the receiver side. The involvement of the HQs in the transfer process is potentially fruitful to the adoption as HQs may support with relevant resource commitment, for instance in terms of technology, expertise and directions, and would grant also in this case legitimacy and priority to the process (e.g. Birkinshaw et al., 2007). To ensure effective transfer, headquarters can attempt to

strengthen the climate for implementation in cases of receiver resistance. On the other hand, some research has instead indicated that HQ involvement may become de-motivating (e.g. Weick, 1979). Also in this case we set forward a hypothesis without any sign prediction.

H_5: *The HQs involvement in the innovation transfer process negatively affects the innovation adoption process success.*

Concluding, we argue that if the transfer efforts meet an easy, fast and problem-free adoption by the receiving unit, the transfer performance will be enhanced as well, i.e., the transfer process becomes easier, less expensive and overall more satisfactory also from the sender side (Ghoshal & Bartlett, 1988; Simonin, 1999; Szulanski & Jensen, 2006). We formulate this relationship between the transfer and the adoption as follows in this last hypothesis.

H_6: *The higher the innovation adoption process success the higher the innovation transfer process performance.*

METHODOLOGY

In this section the sample, questionnaire, variables operationalization and data analysis technique are presented.

Sample

Since this research focuses on innovation development and transfer at subsidiary level, our unit of analysis is, therefore, the innovation. In order to build our sample, we targeted 63 business units belonging to 32 divisions in 23 MNC and 15 countries. These MNC, and business units were selected mainly based on their accessibility. We pursued, however, innovations developed in advanced economies in order to get a more homogeneous sample in terms of their economic context. Among the 15 countries where the innovations were

developed (see Table 1) are Sweden (38.8%), Taiwan (18.8%), Italy (8.2%), France (7.1%) and the United Kingdom (7.1%). In total, we studied 85 innovations. Since 14 of them had not been transferred yet to other units within the corporation, we use a final sample of 71 in our empirical analysis. These 71 innovations belong to 52 business units which, according to their mean values, are large (close to 637 employees and 231.94 million Euro); experienced (more than 47 years old); with significant R&D budgets (over 9 million Euro); internally and externally embedded (32.65% of sales and 21.85% of purchases to/ from other MNC units); internationalized (48.14% foreign sales), and profitable (operating profit around 20.55 million Euro).

("Table 1 goes about here")

Following our previous definitions, our sample of 71 innovations can be classified as, on the one hand, affecting mainly product (73.2%), production process (40.8%) and core technology (23.9%). On the other hand, and based on the extent to which they rely on existing competencies, they are mainly incremental.

Questionnaire and data collection methods

This research is part of a larger project on development and transfer of innovations in multinational companies. The project has a variety of objectives which required the collection of data about a diversity of aspects associated with the innovations, such as the units in which they were developed and, more in depth, the interrelated innovation development and transfer processes. Accordingly, the questionnaire is structured in six main sections, namely, 'Unit characteristics', 'Innovations to investigate', 'Innovation characteristics', 'The role of your unit', 'The development process' and 'Transfer of innovation-knowledge'.

Before the questionnaire was administered, we performed a qualitative pre-test with several international managers belonging to different MNC. In order to improve face validity, we carried out pilot interviews with MNC managers involved in innovation projects already developed and transferred to other corporate units. We amended

ambiguous questions and enhanced the applicability of indicators. To gain access to companies a formal letter was sent asking to participate to the project. Few days later phone calls were made to follow up and when successful agreements were taken for a first meeting. The ojective of the first meeting was to get acquainted and present the poroject. This was aslo the time when innovation projects and potential respondents within the company were identified. Generally an email was sent to the people selected in this way asking for their participation as respondents. Thus, in a second stage, we administered the questionnaire through face-to-face interviews to managers and engineers in charge of innovation projects and/or extensively involved in the innovation development and/or transfer process. The interaction between interviewers and respondents that the data collection technique provided, allowed us and the interviewees to fully understand questions and answers. The field work was carried out between 2002 and 2005 by nine of the researchers participating in the project who visited the 15 countries where the units were located. Interviews took between two and four hours as sometimes interviews were complemented with a visit to the facilities and a practical demonstration of the innovation in focus. The language used in all cases was English since the managers had proficiency in this idiom.

Given that the research design involved the collection of data on all variables from the same respondents, we were concerned about a possible common method variance bias (Lindell and Whitney 2001; Podsakoff et al. 2003). We consider limited the influence of this potential problem in this study since the questions and indicators that we use are, in general, separated in the questionnaire and measured with two different scale intervals, limiting the possibility of respondents' bias in their answers. In addition, we performed a Harman's one-factor test as a post hoc statistical procedure to check for common method variance. The assumption of this test is that if a large amount of common method bias is present, either a single factor will emerge from the test or a "general" factor will account for the covariance in the independent and criterion variables (Podsakoff & Organ, 1986). We obtained seven factors with eigenvalues over 1 and explaining between 26.1 and 4.6% of the variance. All above suggests that our set of indicators appears free of this potential problem.

Measures

Considering the lack of established scales and measures dealing with innovation development and transfer processes, our measures, which were specifically designed for the project to which this research belongs to, can be considered an operative contribution of this study. Theoretical considerations and past research guided, however, the design of the items as much as possible. The operationalization of the nine first order latent variables in the model is summarized in Table 2. All of them are considered reflective variables and were measured either in 1 to 7 or -3 to 3 seven-points Likert scales.

Previous research shows how HQs through specific practices may foster innovation and knowledge transfer (e.g. Birkinshaw & Hood, 2001; Björkman et al. 2004). Typical factors include also HQ control, evaluation, and incentive systems (e.g. Doz & Prahalad, 1981; Roth & O'Donnell, 1996; Björkman et al., 2004). In our study 'HQ involvement in the innovation development process was measured by five out of the initial seven items in the scale. The items 'The innovation has been developed within the facilities of the HQ-organization' and 'HQ has fully supported your interest in developing this innovation' were dropped due to their low item reliability. 'HQ involvement in the innovation transfer process was operationalized by means of five out of the six items initially considered. Only 'The HQ have taken the complete responsibility for the transfer of this innovation to this counterpart' did not achieve high item reliability scores and was not retained. Innovation transfer process performance was measured by two reflective indicators related with satisfaction with the performance of the innovation transfer process and the other with the comparison of expected and incurred cost of the innovation transfer. The latest can be considered an indirect measurement of satisfaction. The comparison would result in positive values of satisfaction when the cost is lower than expected. Accordingly, this item was recoded in order to vary in the same way than the direct measure of satisfaction with transfer performance. Adoption process performance was operationalized by two items capturing the easiness and speed of adoption. Transfer performance and adoption success are two key aspects of the actual process of innovation transfer (as examined in previous studies, e.g. Leonard-Barton & Sinha, 1993; Zander & Kogut, 1995; Szulanski, 1996; Kostova, 1999).

("Table 2 goes about here")

'Impact of the innovation on the unit' is a reflective first-order, formative second-order construct (Jarvis, Mackenzie and Podsakoff, 2003) since its dimensions are assumed to cause the latent second-order construct rather than to reflect its changes. In addition, we do not expect a similar contribution to the impact of the innovation of the different aspects or dimensions of the unit (market, corporate, efficiency, etc.). It was created in two stages. First one, an exploratory factor analysis with varimax rotation on the 17 items initially developed to measure this question suggested the retention of five dimensions with more than one indicator. These theory-based five dimensions accounted for the impact of the innovation in the unit in terms of: market domestically (e.g. Ettlie et al., 1984; Hitt et al., 1997; Boone, 2000) and foreign as new successful solutions may contribute to the unit's business also outside its local market and even foster internationalization (Forsgren et al., 1992); production cost and R&D (Ettlie et al., 1984; von Hippel, 1984; Hakansson & Waluszewski, 2002; Atul & Srikanth, 2005); and at last corporate effect, as being innovative for a unit could mean also better positioning within the MNC in terms of visibility, advantage and influence towards sister units (Forsgren, 2005). 'Innovation's market impact on the unit', 'Innovation's corporative impact on the unit' and 'Innovation's production efficiency impact on the unit' loosed one of their initial three indicators due their low individual item reliability. Latent variable scores were used as indicators of the second order formative construct 'Innovation impact on the unit' for computational purposes.

Data analysis technique

The data analysis technique used was Partial Least Squares (PLS) (Wold, 1982). The main reasons for the selection of this Structural Equations Modeling (SEM) technique were related to booth the research design and the characteristics of the sample. More specifically, the research objectives, its exploratory nature and the use of a second order formative construct on the one hand, and, the small sample size and non-normal distribution of the variables on the other, supported its employment. The software used for testing the hypothesized model was PLS Graph 3.0 (Chin, 1998).

RESULTS

Table 3 presents the estimated values for the measurement model. Its second column shows the indicators' reliability values. To this end, PLS compute individual loadings, i.e., simple correlations between the items and their constructs. All values except two ('sales' and 'fbusi') are over the accepted threshold (0.70). Nevertheless, 'sales' and 'fbusi' have a significant t value (3.011 and 2.640 respectively) at 99% confidence level and their construct's Average Variance Extracted (AVE) at 0.633 and 0.704 correspondingly is quite above the suggested 0.5 lower bond. Besides the 'fbusi' loading (0.691) is very close to the suggested threshold. Furthermore, in some specific situations such as initial steps in the development of a scale loadings between 0.5 and 0.6 can be acceptable (Chin, 1998). However, in order to make a final decision, an alternative model including only the ICI1 indicator reflecting the 'MNC impact' construct was tested. Given that it showed similar results for the measurement and structural model than the two items construct solution it was the later which was finally decided to keep as a more reliable operationalization.

("Table 3 goes about here")

As for the second order formative construct (innovation impact on the unit), we tested multicolinearity as an aspect to be checked when working with formative measures (Mathieson, Peacock and Chin 2001). Variance inflation factor (VIF) (1.159, 1.193, 1.301, 1.122, 1.322), tolerance (0.863, 0.838, .0.768, 0.892 and 0.752), condition indices and variance proportions estimates showed no presence of this potential problem among its first order constructs' latent variable scores. The PLS output shows that the significant weights for 'MNC impact' and 'cost impact' (0.692 and 0.369 respectively) contribute more to the construct than 'market impact', 'international impact' and 'R&D impact' (0.059, 0.210 and 0.006 in that order). This finding will be discussed in next section.

Column three in Table 3 presents constructs reliability. PLS provides the composite reliability (Werts et al., 1974). All values are over suggested reliability bounds, ranging between 0.760 for "MNC impact" and 0.921 for HQs involvement in innovation

development. In order to measure convergent validity, we examined AVE's values (Fornell and Larcker, 1981). They were all over the 0.5 acceptance limit. This statistic provides a measure of the construct variance that is due to its indicators (and therefore, also to the measurement error). Table 4 uses the AVE's square root in order to test the reflective constructs discriminant validity, i.e., to what extent the constructs are different from each other. It shows that this requirement is largely accomplished by all the constructs employed. In brief, the measurement model showed good metric properties in our measures, including item and construct reliability and convergent and discriminant validity.

("Table 4 goes about here")

In table 5 the structural part of the model is described in three main columns: Effects on endogenous variables (direct, indirect and total), variance explained (see also Figure 2), and Stone-Geisser Q^2. Firstly, based on the results from 500 sub-samples using the PLS bootstrap re-sampling technique, it can be stated that all hypothesized relationships are significant, with paths (β) absolute values varying from 0.201 to 0.619. Two out of the five tested linkages are significant at 99.9% confidence level, another two at 99% and one at 95%. Secondly, variance explained ranges from 0.287 to 0.422 for the endogenous variables. The R^2 statistic informs on the quantity of construct variance that is explained by the model. Thirdly, Stone-Geisser Q^2 measures the predictive relevance of the dependent reflective constructs. They were estimated using a "blindfolding" technique with omission distance fixed at 10. The procedure involves omitting one case at a time, re-estimating the model parameters based on the remaining cases, and predicting the omitted case values on the basis of the remaining parameters (Sellin, 1989). The cross-validated redundancies Q^2 over cero imply that the model has predictive relevance. Finally, a global goodness of fit (GoF) criteria developed by Tenenhaus et al. (2005) was estimated to assess the quality of the measurement and structural models. GoF ranges between 0 and 1 and its 0.501 value for the proposed model indicates its satisfactory overall quality.

("Table 5 goes about here")

DISCUSSION AND CONCLUSIONS

This paper provides valuable insights into the role of MNC HQs in the management of innovation at unit level. We offer an accurate description of the effects that HQs involvement in both innovation development and transfer processes has on, respectively, the developing unit and the specific performance of the transfer to sister units. Results show an important role to plaied by HQs in both processes and, in particular, in leveraging the impact of the innovation in the developing unit. However, a negative performance associated to their involvement in the specific process of transfer is also confirmed. All our hypotheses except one were verified in the test and the main results that we discuss now are summarized in the Figure 2.

***** Insert Figure 2 here ****

HQs involvement in the development is shown to contribute to the impact of the innovation on the developing unit (H_1). Specifically, the positive effects that the innovation has on the unit in terms of performance in the market, internal production efficiency and R&D activities, and advantage of the unit within the corporation are enhanced. This result is in line with previous research (e.g. Ettlie et al., 1984; Brown & Eisenhardt, 1995; Hitt et al., 1997) and it can be explained by the fact that HQs may provide additional resources, as well as own competence and technology, to be employed in the innovation development process.

Our hypotheses (H_2 and H_3) concerning the overall relationship between the development process and the transfer process in terms of HQs continuous involvement have been also verified. First, it is proven the strong link existing between previous HQs involvement in the development process and their further involvement in the transfer (H_2). In other words if the HQs have been already involved in the development it is likely they will be involved in the transfer as well. This is quite natural path dependent behavior from HQs concerning the specific innovation project and HQs follow up their investments done during the development (e.g. in terms of time, resources and competence). However, this could also mean that HQs perceive the innovation process as a whole and they do not

distinguish between development and transfer as clearly as units are instead doing. Second, it is confirmed that the positive impact of the innovation on the developing unit triggers HQs involvement in the transfer process (H_3). HQs decision to get close to the transfer project can be explained by the HQs vision of higher returns from the innovation once transferred to many other units. In this sense HQs may be protecting the investments done in the development, the future profits from worldwide exploitation, against potential transfer failure and competition.

We argued for a negative sign for the impact of HQs involvement on the specific performance of the transfer process (H_4) based on the higher costs and lower subsidiary satisfaction associated to this corporative involvement. The literature had already suggested this negative relationship (e.g. Teece, 1977; Kogut & Zander, 1995; Szulanski, 1996; Cummings & Teng, 2003) explained, for instance, by the more cautious behavior of the units when the HQs is close to them (Oserloh & Frey, 2000). Units might even feel less motivated to transfer as they feel controlled and steered. The cost of transfer increases as it could be easily that the HQs are giving particular instructions and requirements to the unit. Although the negative relationship indicates that HQs are actually hindering transfer performance, we have to insist that this is a process-specific performance linked to the transfer and for the time that this lasts. In other words, HQs will try to make sure that the innovation is transferred to other units, and therefore, that it renders the benefits associated to its implementation in the receiving units. This process is costly but, likely, seen as an investment by the HQs, which will try to compensate it with a higher return and performance in the receiving unit. This higher performance was already demonstrated in the developing unit, i.e., the HQs can be confident that once implemented the impact on the receiving unit will be significant.

The hypothesis concerning HQs involvement influence on the adoption process success (H_5) was also made, but results fail to establish any link. This leaves open the question of the actual possibility to influence receivers, since it seems that direct involvement in the innovation transfer process is not the best mechanism to stimulate the adoption. In contrast to this and previous finding on HQs involvement effect on transfer process performance, results do show that the latter is enhanced by a successful adoption (H_6). This situation, in line with previous studies (e.g. Szulanski, 1996), points to the fact

that transferring is not only dependent on the sender but also on the receiver, who has to be ready to invest in the relationship and quickly adopt the innovation. Many are the factors that may intervene in the adoption such as the receiver absorptive capacity, previous cooperation between the parts and strong motivation (e.g. Persson 2006). All these aspects can influence the easiness of adoption. Therefore, besides what concerns the HQs role, our results add also to the more general debate on innovation transfer by focusing specifically on transfer process performance and by distinguishing between the transfer and adoption processes. In fact, an important point emerging is that transfer should not be seen as an isolated unidirectional process, and that units adopting the innovation may impact significantly transfer performance.

Summing up, what this study tells us concerning HQs role in the innovation process occurring at unit level is that there is a significant beneficial effect of HQs involvement in the development process in terms of the increased impact of the innovation in the unit, and a harmful influence on the specific performance associated to the transfer process. This situation represents a clear "paradox" concerning the role of the HQs in the modern MNC. It suggest that HQs managers should be more selective, i.e., they can continue supporting innovation development activities of innovations with a significant impact in the subsidiary while they should allow unit managers an increased role in the transfer of non critic innovations. These unit managers are expected to be in a better position to transfer knowledge with satisfactory performance. At the same time, HQs may be more effective by focusing in designing mechanisms and incentives provoking receivers' actions considering that adoption success supports transfer performance.

Concluding, the negative effect on transfer performance generated by HQs involvement need to be accounted for. The increased effect on the developing unit of HQs involvement in the development is expected to balance that negative contribution. In other words, HQs appear ready to accept a decreasing performance during the specific transfer process to be able though to get completed transfers and replication of the positive innovation effects (showed on the developing unit) also on other units.

IMPLICATIONS AND FUTURE RESEARCH AVENUES

This study deals with the HQs influence on the innovation process taking place at unit level. Specifically, by distinguishing between innovation development and transfer, we test for the relationships that HQs involvement has with the innovation impact on the developing unit and with the innovation transfer performance to sister units. Six hypotheses drawn on the relevant literature are tested by means of partial least squares (PLS) technique in a sample of 71 innovation projects taking place in 23 MNCs.

Managerial implications from our results are manifold. The first is that HQs should scrutiny better the innovation projects in order to distinguish key innovations having a strong potential impact in their subsidiaries from innovations with a limited potential impact. They will benefit from an improved performance if they get more involved in important innovations while limiting their direct engagement in the transfer of “marginal” innovations. In this way, they will get a better balance from the negative effect associated to their involvement in the transfer while keep multiplying the effect of the transfer in the receiving units. The second one is that their involvement in the transfer process should be more motivated by the expected impact of the innovation in the receiving unit than by the “inertia” to continue involved in innovations transfers merely because they already participated in their development. In other words, our findings appear to point to the fact that HQs tend to perceive the innovation process and their involvement within it as a long term project, encompassing both development and transfer. However, it is also showed how HQs involvement has different impact on both processes, and particularly that it hinders transfer process performance. Therefore we argue that it might be wise for the HQs to rethink their involvement at unit level by separating the development process from the transfer process in their decision framework. This is though not a suggestion to divide the innovation process in smaller processes but it is a claim that managing the innovation process does not necessarily mean adopting the same style and level of involvement throughout the whole process. At each different step of the innovation journey, the HQs need to reconsider their role, otherwise, instead of contributing to the shaping of competitive advantage, HQs risk to deteriorate it. The HQs paradox emerging when examining their involvement during both development and transfer suggests that HQs should not be involved in the transfer process if the specific performance of the transfer process is an important aspect of the whole process. However, if innovation is considered

as an ongoing and long term process, performance that could be lost during the transfer process will be offset in the long term by increased overall MNC performance. The reasons would be both the higher completion of transfers when the HQs are involved and the superior performance of the subsidiaries receiving the innovations. Therefore top management needs to analyze ex-ante their performance targets related to innovation transfer and on this basis decide if getting involved.

Future research can also capitalize on the positive effect of sister units' successful adoption on the transfer performance since the transfer process is not an unidirectional process and receivers are an integral and influential part of the process. This is certainly a research issue that deserves more attention and, therefore, studies exploring the relationship between transfer and adoption are necessary. In addition, future research on knowledge transfer should focus increasingly on the different aspects of transfer success (e.g. Haas & Hansen, 2005). A natural development from this study is, for instance, the investigation of the impact of the transferred innovation on the receiving unit (as done in this paper for the developing unit). Another path to pursue is also the development of overall measurement of performance related to innovation development and transfer practice.

Among the limitations of this study is its cross-sectional nature which inhibits the possibility of making causal inferences between the different exogenous and dependent constructs tested in our model. Second, although our sample is unique and among the richest ever used to study innovation transfer and development in business units, we can not ague in favor of its representativeness. The international validity of the findings should, therefore, be assessed by carrying out studies with representative samples from these and other advanced economies. Finally, the present sample is based towards successful innovations, i.e., failure is undersampled (Denrell, 2003) since the respondents selected, in general, innovations developed and already transferred by their units.

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APPENDIX

Figure 1: Head Quarters' innovation development and transfer involvement model

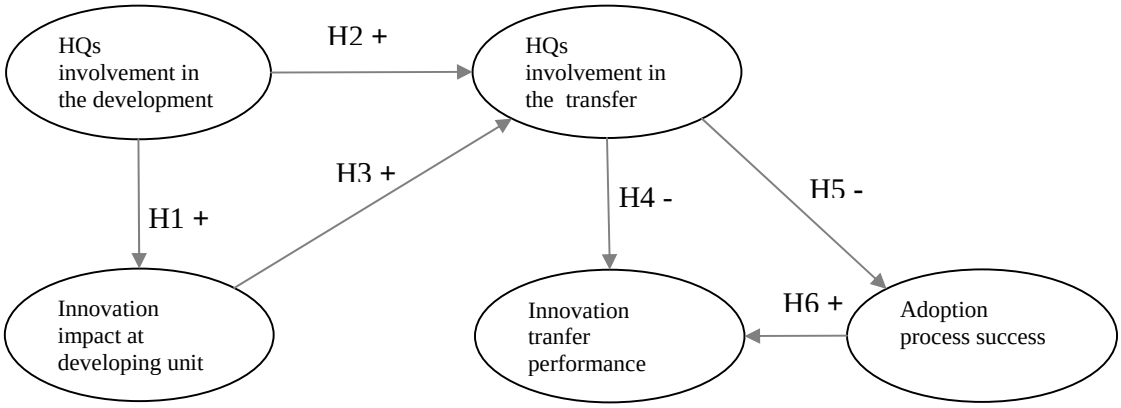

Figure 2. Results

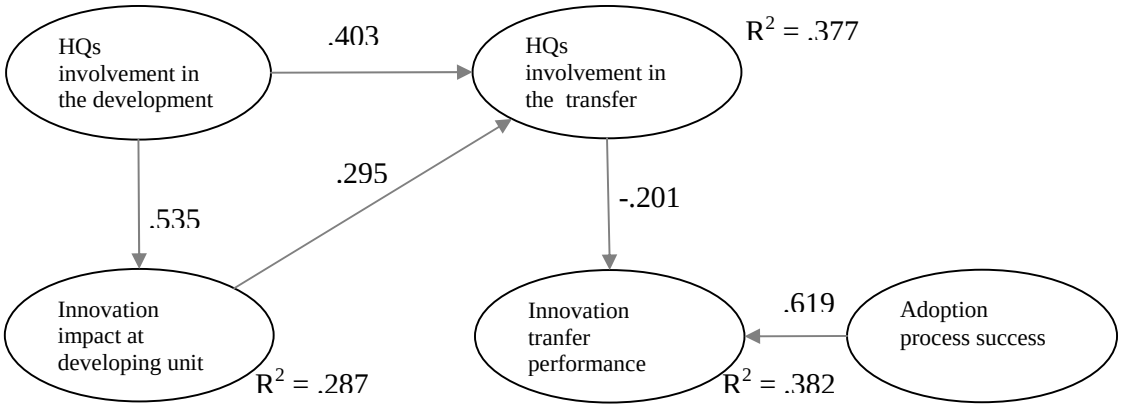

Table 1. Country of origin of the innovations

Country	Frequency	Percentage
Austria	1	1.2
Belgium	3	3.5
Cz Republic	1	1.2
Denmark	1	1.2
Finland	3	3.5
France	6	7.1
GB	5	5.9
Germany	3	3.5
Italy	7	8.2
Netherlands	1	1.2
Switzerland	1	1.2
Sweden	33	38.8
Taiwan	16	18.8
United Kingdom	1	1.2
USA	3	3.5
Total	85	100.0

Table 2: First order latent variables operationalization.

Construct/ Indicator	Scale	Label
HQ involvement in the innovation development process		**HQID**
HQ has participated closely in developing this innovation	1 to 7	HQID1
HQ has brought competence of use for the development of this innovation	1 to 7	HQID2
HQ has been important through specifying request	1 to 7	HQID3
HQ has taken important initiatives for developing the innovation	1 to 7	HQID4
The cooperation with HQ has been characterized by frequent interaction	1 to 7	HQID5
HQ involvement in the innovation transfer process		**HQIT**
The HQ have formally instructed you to share this innovation with the counterpart	1 to 7	HQIT1
The HQ have themselves been heavily involved in conducting the actual transfer process with the counterpart	1 to 7	HQIT2
The HQ have taken the complete responsibility for the transfer of this innovation to the counterpart	1 to 7	HQIT3
The transfer of the innovation is driven by a requirement from the HQ	1 to 7	HQIT4
The transfer of the innovation is driven by HQ evaluation system	1 to 7	HQIT5
Innovation's market impact on the unit		**IMI**
Competitive advantage on the market	-3 to 3	IMI1
Business volume in your home country market	-3 to 3	IMI2
Innovation's international impact on the unit		**III**
Business volume in your foreign markets	-3 to 3	III1
Entry into new foreign markets	-3 to 3	III2
Innovation's corporative impact on the unit		**ICI**
Advantage within the MNC	-3 to 3	ICI1
Sales to other MNC units	-3 to 3	ICI2
Innovation's production efficiency impact on the unit		**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 unit		**IRDI**
Influence on decisions about investments in your R&D	-3 to 3	IRD1
Cost of development of new products	-3 to 3	IRD2
Innovation transfer process performance		**ITPP**
The performance of the innovation transfer process was very satisfactory	1 to 7	ITPP1
The actual costs of innovation transfer were much higher than expected (reverse coded)	1 to 7	ITPP2
Adoption process success		**APS**
The innovation has been very easy to adopt by this counterpart	1 to 7	APS1
The counterpart adopted the innovation very quickly	1 to 7	APS2

Table 3. Item and construct reliability and average variance extracted for first order constructs.

Construct/ Indicator	Item reliability Loading	Construct reliability Composed reliability	Convergent validity Average Variance Extracted (AVE)
HQs involvement in the innovation development process		.921	.699
HQID1	.904		
HQID2	.850		
HQID3	.842		
HQID4	.808		
HQID5	.771		
HQs involvement in the innovation transfer process		.884	.604
HQIT1	.792		
HQIT2	.814		
HQIT3	.813		
HQIT4	.750		
HQIT5	.711		
Market impact		.852	.744
IMI1	.941		
IMI2	.776		
International impact		.823	.704
III1	.691		
III2	.965		
Corporative impact		.760	.633
ICI1	.991		
ICI2	.534		
Production efficiency		.817	.691
IPEI1	.836		
IPEI2	.827		
Innovation's R&D impact on the unit		.833	.716
IRD1	.922		
IRD2	.763		
Innovation transfer process performance		.810	.682
ITPP1	.895		
ITPP2	.750		
Adoption process success		.881	.788
APS1	.867		
APS2	.908		

Table 4. Latent variables: Means, standard deviations, correlations and square root of the average variances extracted (AVE[a]).

Construct	HQIID	HQIIT	ITPP	APP	MI	III	MNCI	CI	RDI
HQIID	**.836**								
HQIIT	.561	**.777**							
ITPP	-.158	-.197	**.826**						
APP	-.006	.007	.618	**.888**					
MI	.122	.101	.034	.157	**.862**				
III	.299	.161	-.316	-.264	.230	**.839**			
MNCI	.513	.439	-.068	.012	.216	.267	**.796**		
CI	.257	.394	-.071	-.021	-.143	.215	.220	**.831**	
RDI	.286	.149	-.149	.000	.264	.332	.428	.087	**.846**

[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 5: Endogenous variables: Direct, indirect and total effects, explained variances and Stone-Geisser Q^2 test.

Effects on endogenous variables	Direct effect	t value (bootstrap)	Indirect effects	Total effects	Variance explained	Stone-Geisser Q^2
Effects on innovation impact					.287	n.a.
H1: HQ involvement in development	.535***	(6.227)	-	.535	.287	
Effects on HQ involvement in transfer					.377	.120
H2: HQ involvement in development	.403**	(2.684)	.158	.561	.226	
H3: Innovation impact	.295**	(2.169)	-	.295	.151	
Effects on transfer process performance					.422	.166
H4: HQ involvement in transfer	-.201*	(1.923)	-	-.201	.040	
H6: Adoption process success	.619***	(11.067)	-	.619	.382	

*** p < 0.5; ** p < 0.01; *** p < .001 (based on a Student $t_{(499)}$ distribution with one tail).**

n.a.: Not applicable to formative constructs