Reverse Knowledge Transfer in Multinational Corporations

A meta-analytic review and assessment of the factors affecting the extent of knowledge leverage from the foreign subsidiary to the headquarters

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Abstract

Research on reverse knowledge transfer (i.e. from the foreign subsidiary to the headquarters) in multinational corporations is burgeoning, however, the understanding of numerous of its determinants remains rather unclear. Despite the growing inquiry of conceptual and qualitative reviews of the reverse knowledge transfer literature, no study has attempted to review prior research in order to reconcile the fragmented findings. For this purpose the method of meta-analysis is used in the current paper which estimates the impact of 12 different factors on the extent of reverse knowledge transfer based on empirical data from all studies in 13 journals between the period of 2000 - 2014. The findings indicate that the rich communication between the focal sub-unit and its parent firm, subsidiary high level of innovativeness as well as high capabilities, its dual embeddedness, size and willingness to share its competencies with the headquarters along with MNC’s entry mode as a greenfield subsidiary have a positive impact on the degree of reverse knowledge transfer, while evidence shows that subsidiary autonomy, its age and cultural distance as well as knowledge codification does not affect the extent of knowledge leverage from the daughter to the parent firm. However, the role of corporate socialization mechanisms on reverse knowledge transfer still remains unclear.
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Introduction

Multinational corporations (MNCs) have been increasingly gaining attention by researchers for the last several decades (Hedlund, 1986; Kogut, 1989; Ghoshal & Bartlett, 1990). In order to enhance and/or protect their competitive advantage in the current globalized world, companies are required to grow internationally, consequently becoming more diverse inter-organizational (Ghoshal and Bartlett, 1990) or differentiated network (Nohria and Ghoshal, 1997), with subsidiaries dispersed around the globe. In the recent literature, MNCs are perceived as a multi-center organizations, i.e. the MNC network, in which daughter firms are interconnected to the headquarters as well as to peer subsidiaries (Hendlund, 1986; Gupta and Govindarajan, 1991; Birkinshaw and Hood, 1998; Doz, Santos and Williamson, 2001).

The growing complexity of corporations raised awareness among scholars in understanding knowledge, since knowledge ranks first in the hierarchy of strategically relevant resources (Grant, 1996). Knowledge is one of the most crucial factors in differentiating companies from their rivals and in developing competitive advantage (Kogut & Zander, 2003; Ciabuschi et al., 2011). Thus, it is an inevitable part of a company’s existence and performance.

However, the traditional role of the parent firm as a main source of knowledge and competencies is altering (Ambos et al., 2006). Its competitive advantage resides in numerous countries, not only one as it was previously believed (Hedlund, 1986), hence, prosperous will be that enterprise which possesses the ability to sense and mobilize unexploited pockets of knowledge which are dispersed around the world (Doz, Santos and Williamson, 2001). In other words, headquarters are not the sole generator of knowledge (Mudambi and Navarra, 2004) but rather they act as a receiver of competencies from their internationally scattered subsidiaries (Ambos et al., 2006). Because during the years subsidiaries have grown in size and created their own unique resources as well as specialized capabilities (Birkinshaw and Hood, 1998), which makes them an essential part of the corporation’s knowledge creation, respectively, competitive advantage.

Previous research has indicated that knowledge, generated at the subsidiary, itself is not beneficial to the MNC but it has to be internally transferred to the rest of the corporation in order to contribute to the MNC’s competitive advantage (Doz, Santos and Williamson, 2001). The process of knowledge transfer, however, while worthwhile, is often quite costly and sticky (Teece, 1977; Leonard-Barton, 1988; Szulanski, 1996; Kostova, 1999; Simonin, 1999; Gupta
and Govidarajan, 2000), i.e. there are numerous factors that facilitate or hinder the process (e.g. absorptive capacity, casual ambiguity, communication channels etc.)

Despite the recognition of knowledge creation at the subsidiary level, more research has been conducted regarding the knowledge transfer between peer-subunits within an MNC (called lateral knowledge transfer) (Ghoshal, Korine and Szulanski, 1994; Nohria and Ghoshal, 1997), rather than the knowledge leverage from a focal subsidiary to its parent firm, called reverse knowledge transfer (RKT). The focus on RKT is important since it may considerably contribute to the MNC’s competitive advantage (Ambos et al., 2006). For instance, Table 1 shows the extent to which subsidiaries have engaged in reverse knowledge transfer in Ambos et al.’s study (2006), indicating that knowledge created at the sub-unit is quite beneficial to the headquarters’ operations.

However, as RKT is part of the knowledge transfer within the MNC, its extent is also influenced by numerous determinants. And while findings indicate consensus regarding the effect of some factors on the degree of RKT, the impact of others remains rather unclear.

Therefore, conducting a meta-analysis, which synthesizes and analyzes the various data presenting the relationship between different factors and the degree of RKT in order to define which of them positively/negatively affect its extent and which of them have no influence at all, becomes interesting and sensible.

**Table 1: Amount of transferred knowledge compared to HQ’s benefit**

<table>
<thead>
<tr>
<th></th>
<th>Market data on customers</th>
<th>Market data on competitors</th>
<th>Marketing know-how</th>
<th>Distribution know-how</th>
<th>Technology know-how</th>
<th>Purchasing know-how</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflows</td>
<td>4.33</td>
<td>4.04</td>
<td>5.11</td>
<td>5.04</td>
<td>5.52</td>
<td>4.80</td>
</tr>
<tr>
<td>Benefit</td>
<td>4.20</td>
<td>4.53</td>
<td>3.98</td>
<td>3.74</td>
<td>3.82</td>
<td>3.21</td>
</tr>
</tbody>
</table>

1=not at all; 7=a very great deal; N=294 reverse knowledge transfers.

Study purpose

The purpose of the research is to aggregate and consolidate the various empirical data available in the academic literature that investigates the possible association between twelve factors and reverse knowledge transfer after which to conclude based on the analyses which factors have a positive impact, which negatively affect and which of them do not have any influence on the extent of RKT. The study depicts dimensions of multinational corporations, knowledge transfer as well as reverse knowledge transfer in MNCs and factors affecting the degree of the latter one. The research paper may be used for further studies in the same academic area; also, it may serve as an inspiration for deeper analysis regarding the impact of the factors under investigation in the current inquiry on other characteristics of RKT such as speed, quality, frequency etc.

Study setting

The study is set by conducting a meta-analysis synthesizing data from all studies in 13 journal between the period of 2000 - 2014 with a population of 3,352 firms that have examined a possible relationship between particular factors and reverse knowledge transfer. Meta-analysis is especially appropriate when empirical findings present diverging results. Firstly, it provides the basis for empirical generalizations across multiple studies by estimating the mean values and range of effects for relationships (Hunter and Schmidt, 2004), thus it enables the researcher to estimate the true relationships between study variables (Dalton et al., 1999). Furthermore, a generation of a more comprehensive list of attributes as well as assessment of their relative impacts on the degree of reverse knowledge transfer could be conducted by using meta-analytic evidence.

Research question

The study aims to answer to following research question: **Which factors do have an impact on the extent of reverse knowledge transfer in multinational corporations?**
Structure

The thesis consists of seven chapters including key elements of the study. In the first chapter, an introduction to the research was given, which outlined thoughts and perspectives as well as explanation of the research question development. The second chapter will deal with theoretical part of the paper by introducing important literature on the topic. This part will discuss concepts of the multinational corporation, its main characteristics and evolution throughout the years; importance of knowledge for and its transfer within the MNC as well as reverse knowledge transfer in multinational enterprises. The third chapter will present and describe the developed hypotheses concerning the potential relationships between the various factors and the extent of RKT. In chapter four, the author will introduce the theory of science, research design and methods and the main characteristics of the meta-analysis. Later in the same chapter data collection and data analysis methods will be presented along with short explanation of the included variables. The chapter will be closed with the critical explanation of the study limitations. Chapter five will present the results of the meta-analysis followed by chapter six where the results will be discussed in details. The final chapter seven will conclude the results and provide an answer to the research question as well as suggestions for future research.
Literature review

This chapter will present the main literature on multinational corporations, namely how they have evolved throughout the years along with a description of their main characteristics which will contribute to the deeper understanding of the topic under research. Furthermore, the chapter provides an insight of how essential the knowledge is to corporations, following by an explanation of the importance of knowledge transfer within the enterprises as well as its hampers and facilitators. The chapter will be closed with an introduction and investigation of the main topic of the current paper – reverse knowledge transfer in multinational corporations.

Multinational corporations – evolution, definition and main characteristics

Multinational corporations (MNCs), also called multinational enterprises (MNE) and multinational companies, gained an increasing interest in the late 1980s by researchers due to a change in the research focus from the dyadic headquarters-subsidiary relationship in MNCs to the coordination tasks of managing a network of established subsidiaries and analysis of the competitive advantage that occurs in this network (Kogut, 1989; Ghoshal & Bartlett, 1990). In the early 1980s and before that the majority of then existing MNCs had started to function on a national basis and only gradually developed international ties. Foreign business was initially only marginal, more so for companies from large nations than for those with small “home markets.” Internalization was often based on monopolistic advantages which could be exploited by internalizing transactions within the firm” (Hedlund, 1986, p. 12). Hedlund (1986) also states that the role of the subsidiary in this period is operational rather than strategic. All kinds of knowledge as well as money for investment are sent from the center, i.e. the headquarters (HQ) to the periphery, i.e. the MNC’s subsidiaries, where the latter ones are tightly controlled by the parent firm.

However, as time goes by, foreign business becomes dominant for some MNCs instead of marginal, thus the subsidiaries gain more activities while the management becomes more host-country oriented. In other words, the subunits become operationally independent with possibility to take strategic decisions responding to their market’s operations. The role of the HQ is more calculative rather than controlling the substance of decisions. Hence, Hedlund (1986) introduces to a new type of MNCs – the heterarchical MNC (the hypermodern MNC).
The prime strategic goals of the heterarchical MNC is to exploit competitive advantages derived from the home country as well as advantages that are globally spread within the MNC units.

The main idea of the heterarchical MNC is that competitive advantage resides in numerous countries, not only one. New products and ideas can be created in many different national entities and later be exploited globally. As a consequence, the subsidiary is given increased freedom. Strategies for the integration of the various units within the corporate body is not only characterized by normative control mechanisms such as corporate culture, management style etc., but widely shared awareness of central goals and strategies also become critical.

Therefore, since late 1980s the MNC is viewed more as an interorganizational grouping (or network) rather than as a unitary organization (Ghoshal & Bartlett, 1990). Using the network perspective, Gupta and Govindarajan (1991) describe the MNC as a network of capital, product and knowledge transactions between the units that are located in different countries.

To sum up, an MNC is an economic organization that evolves from its national origins and expands across borders as well as it is a social community whose competitive advantage is defined by its productive knowledge (Kogut & Zander, 2003). It consists of “a groups of geographically dispersed and goal-disparate organizations that include its headquarters and the different national subsidiaries. Such an entity can be conceptualized as an interorganizational network that is embedded in an external network consisting of all other organizations such as customers, suppliers, regulators and so on, with which the different units of the multinational must interact” (Ghoshal & Bartlett, 1990, p. 603).

Headquarters (HQ, also a parent firm) is defined as a corporate center of an MNC whose main function is to operate, administer, manage, service, and/or support the activities of the other enterprise’s units (Census, 1996; Davis and Henderson, 2008). A subsidiary (also a daughter firm) is an “operational unit controlled by the MNC and situated outside the home country.” (Birkinshaw, Hood and Jonsson, 1998, p. 224). It can perform a single activity such as manufacturing as well as an entire value chain of operations (Birkinshaw and Hood, 1998).

The shift in the way the MNC is defined as a network instead of unitary organization is caused by the growing role that different subsidiaries play in the former one, called a subsidiary evolution (Birkinshaw & Hood, 1998). In contradiction to the initial academic research on MNCs arguing that subsidiaries are initially created by the parent firm with certain goals and objectives as well as ownership-specific advantages were developed at the corporate
headquarters and leveraged overseas via the transfer of technology to a network of foreign subsidiaries (Dunning; 1981; Vernon, 1966), the research made in the 1990s states that the headquarters was no longer the main source of competitive advantage (Mudambi & Navarra, 2004). During the years subsidiaries grew in size and developed their own unique resources and specialized capabilities (Birkinshaw & Hood, 1998), making them an important part of the MNC’s creation of knowledge, respectively, competitive advantage. This means that subsidiaries have expanded their role within the MNCs from traditional downstream activities (e.g. service, sales and assembly) to upstream activities (e.g. R&D, support activities, strategic marketing, component production etc.) (Gupta & Govindarajan, 1991; Cantwell, 1995; Bartlett & Ghoshal, 1998; Mudambi & Navarra, 2004).

To sum up, if one MNC would like to remain competitive in the international market, then something more than efficient central management and flexible operations is needed. They need to possess “a transnational capability – an ability to manage across boundaries” (Bartlett and Ghoshal, 1988). One of the activities the MNC should ensure is to gain the input of subsidiaries into its management processes. Ambos et al. (2006) adds that the knowledge that is created by their subsidiaries can help the headquarters to improve and coordinate a global strategy, refine processes in their own or other units in the network, or provide a missing link for the development of a new product.

In addition, Doz, Santos and Williamson (2001) state that the challenge for the MNEs is not to create an efficient network of sales, product and service subsidiaries through which to penetrate markets all over the world, but rather to “innovate by learning from the world” (p. 1). Thus, prosperous will be those MNCs that crate value by sensing and mobilizing unexploited pockets of knowledge that are dispersed around the world. The authors name these corporations metanational, i.e. competitive advantage will neither come from HQ’s home country, nor from a set of national subsidiaries. On the contrary, a competitive advantage will be created by identifying, mobilizing and leveraging to the market scattered knowledge in terms of technology, capabilities and market intelligence. This will enable them to generate newer and better competencies than any enterprise’s headquarters, national subsidiary or center of excellence working by itself as well as their rivals. Besides, those multinationals that rely on generating knowledge only at or near central headquarters will find it insufficient to prosper in contrast to a competitor generating knowledge at diverse locations across the globe. However, MNCs’ subsidiaries are inevitable players in the process of identifying, mobilizing and leveraging knowledge scattered around the world (Doz, Santos and Williamson, 2001).
A subsidiary may become an essential part of an MNC’s competitive advantage by its critical linkages with key actors in their local environments, more specifically linkages with the host government as well as local customers, suppliers, investors etc. Moreover, many foreign subsidiaries contribute more revenues and control more resources than the parent company, if the former one is based in a larger country than its HQ (Ghoshal & Bartlett, 1990) or in the main area where the industry knowledge is situated (Doz, Santos & Williamson, 2001). According to Almeida and Phene (2004), the most innovative subsidiaries, i.e. the ones that generate newer and better competencies, are those that have a greater knowledge exchanges with the host country as well as they are located in more diverse host environments.

However, as it has become clear by now and will be discussed in more details later on, in order to serve as a competitive advantage for the MNC, the newly created competence should be transferred within the corporation. The best way to do it is via internal organizational mechanisms rather than external market mechanisms (Kogut and Zander, 1993).

In the modern world there are subsidiaries that generate a lot of new knowledge, whereas there are units that haven’t created any competencies at all. The main factor having an impact on subsidiary knowledge generation is the different role assigned to each subsidiary by the MNC.

Numerous typologies of subsidiary roles could be found in the academic literature due to the fact that they have been categorized along various dimensions. Therefore, the author of this paper finds it significant to summarize, compare and present some of the typologies in Table 2, where as a base is used subsidiary locus of responsibilities and mandates (Birkinshaw & Hood, 1998).

However, not only subsidiaries are assigned a role in terms of their locus of responsibilities and mandates (Birkinshaw & Hood, 1998), but they also compete with each other in order to gain, retain and enhance their roles within the MNC (Birkinshaw, 1996; Mudambi & Navarra, 2004). This means that subsidiaries intend to have an impact on diverse functional areas within the enterprise, thus, actively forming the MNC strategy to a great extent (Andersson, Forsgren & Holm, 2007; Bartlett & Ghoshal, 1989; Birkinshaw & Hood, 1998; Burgelman, 1983; Galunic & Eisenhardt, 1996). Therefore, by applying the resource dependence view, Forsgren, Holm and Johanson (1995) argue that subsidiaries that have successfully embedded themselves in beneficial areas and have proven themselves to be important sources of competitive advantage contribute more to the MNC’s success and/or survival. Thereby, they gain power within the organization which they exercise over other units within the MNC. In other words, the
Table 2 – Typology of subsidiary roles

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<th>Author(s)</th>
<th>Typology of subsidiary roles¹</th>
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<tr>
<td></td>
<td>Subsidiaries adapting products to local market needs</td>
</tr>
<tr>
<td>Ghoshal (1986)</td>
<td>Implementer</td>
</tr>
<tr>
<td>D’Cruz (1986)</td>
<td>Branch Plant</td>
</tr>
<tr>
<td>Gupta and Govindarajan (1991)</td>
<td>Local innovator, Implementor</td>
</tr>
<tr>
<td>Roth &amp; Morrison (1992)</td>
<td></td>
</tr>
<tr>
<td>Kuemmerle (1999)</td>
<td></td>
</tr>
<tr>
<td>Ambos and Reitsperger (2004)</td>
<td>Global Development Unit, Local Adaptor</td>
</tr>
<tr>
<td>Cantwell &amp; Mudambi (2005)</td>
<td>competence-exploiting</td>
</tr>
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¹ subsidiary roles in terms of knowledge (Ambos and Schlegelmilch, 2007; Rabbiosi, 2011)

A subsidiary is able to obtain intra-organizational power through its influence over MNC’s decisions, structures and outcomes when the enterprise is dependent on the particular subsidiary’s critical, non-substitutable competencies which enable the organization to improve its performance and easily adapt to its environment (Mudambi, Pedersen and Andersson, 2014; Pfeffer & Salancik, 1978).

In conclusion, it is important to mention that a corporation may enter a foreign market through the following modes:

- Joint venture – it is a newly created entity by partners of distinct national origins who contribute resources to its establishment (Pak et al., 2009). It is very likely that many
differences may exist between the organizations such as cultural, technological, linguistic, institutional, spatial etc. (Javidan, Stahl, Brodbeck, & Wilderom, 2005; Perez-Nordtvedt et al., 2008; Park et al. 2015);

- Strategic alliance – it is an inter-corporate agreement between two or more independent companies which focus resources on a mutually beneficial activity (Owen and Yawson, 2015). They do not establish a new entity (like in a joint venture) for their purpose but rather collaborate while remaining autonomous, distinct and apart (Todeva and Knoke, 2005);

- A greenfield subsidiary - it is a newly created unit inside the boundaries of the MNC. The organizational characteristics of the parent company such as language, cultures and routines have been implemented in the greenfield subsidiary since its foundation.

- An acquired subsidiary - it is an existing company that is a new entrant to the MNC and has already well-established cultures, routines and patterns of behavior. Therefore, it is very likely that this type of subsidiary will inherit knowledge integration mechanisms which have been into operation before their acquisition (Anand, 2011; Mudambi et al., 2014).

- A combination between greenfield and acquired subsidiaries – in this situation, the MNC enters the foreign location through a greenfield subsidiary which is followed after some period by acquisition of one or several local firms. By entering the host market by greenfield unit, the MNC is able to identify new and promising acquisition candidates and technologies for future purposes (Blomkvist et al., 2014).

It is vital to make this distinction because, as it is going to be discussed in a following section in more details, the different entry modes determine subsidiary roles in and knowledge transfer within the MNC network. However, since the scope of this paper is on fully- or majority-owned subsidiaries, only greenfield and acquired units will be further researched. Because of its complex structure the combination between greenfield and acquired subsidiaries entry mode also won’t be included in the current research. But first, the author will explain why knowledge is so essential to the MNC.
Importance of knowledge to the MNC

Knowledge is one of the most crucial factors in differentiating companies from their rivals and in developing competitive advantage (Ciabuschi et al., 2011). Its importance is noted back in the 1960s and 1970s by Hymer (1960), Caves (1971), Buckley and Casson (1976) and others emphasizing that MNCs create values based on the internalization of their gained knowledge and form their knowledge “assets” such as patents, trade secrets and others. However, today there is a common understanding of an MNC as “an international network that creates, accesses, integrates and applies knowledge in multiple locations” (Almeida et al. 2002, p. 148). A primary strategy aim for a company is to generate and maintain capabilities in order to continuously create knowledge (Teece et al., 1997). Thus, knowledge is inevitable part of a company’s existence and performance.

Previous research has shown that the ability of an MNC to mobilize and develop knowledge has become a key source of competitive advantage (Kogut and Zander, 1993; Argote and Ingram, 2000; Doz et al., 2001). MNC’s internal knowledge sharing and integration has been pointed as a primary reason for the development of new products (Hansen, 1999), the realization and usage of innovations in various units (Tsai and Ghoshal, 1998; Tsai, 2001), or for the transferring of best practices in different areas (Szulanski, 1996; Kostova and Roth, 2002) – these are all examples of how vital knowledge is for the development and retaining of competitive advantage (Mäkelä, Andersson & Seppälä, 2012).

It could be difficult to define as well as to transfer knowledge because it is embedded in corporate routines, standard operating procedures and in the technology itself, which form the sources of tacit knowledge (discussed later in this chapter) that can be a provider of competitive advantage for a firm (Birkinshaw et al. 2002; Huber, 1991; Pinch & Bijker, 1987; Chen & Lovvorn, 2011). Therefore, very few researchers have given a definition of knowledge. One of them is Julia Lieveskind (1996) who defines knowledge as “information whose validity has been established through tests of proof. Knowledge can therefore be distinguished from opinion, speculation, beliefs, or other types of unproven information.” (1996, p. 94).

The author of the current paper adopts a broad definition of knowledge which includes marketing know-how; distribution know-how; packaging design/technology; product designs; process designs; purchasing know-how; management systems and practices (Gupta and Govindarajan, 2000); financial resources (Yang et al., 2008); knowledge about country’s basic
conditions (e.g. legal and/or tax systems) as well as country’s market conditions (e.g. client data and preferences) and competitor details (Strube and Berg, 2011; Reiche, 2011).

There exist two types of knowledge which can be defined as:

- **Explicit** – it is what is written or recorded, thus it can be codified, e.g. documents, blueprints, manuals, databases, patents etc. (all kind of hard data) which makes it relatively easy to be geographically dispersed (e.g. via information systems);
- **Tacit** – knowledge that cannot be codified. Usually this type of knowledge is possessed by particular individuals/employees; therefore, it is very difficult to be leveraged. However, it can be transferred via more interpersonal and less structured processes (e.g. face-to-face conversations, teamwork, mentoring etc.).

In the academic literature, it is assumed that tacit knowledge is more valuable for creating competitive advantage than explicit knowledge because much of the specialized knowledge of a firm exists in a non-tradable, tacit form (Gupta & Govindarajan, 2000). Due to its nature, tacit knowledge is particularly essential for creating competitive advantage. By applying the resource-based view, Barney (1991) states that organizational knowledge, i.e. tacit knowledge, has the potential to provide continuous competitive advantage to the extent that is valuable, rare and hard to imitate by rivals.

Dhanaraj et al. (2004) argues that “whereas explicit knowledge provides the building blocks, tacit knowledge provides the glue and integrating mechanism in learning” (p. 430). In other words, tacit knowledge not only explains how the different elements when combined work together (Polanyi, 1969), but also provides meaning and better perception to explicit knowledge (Dhanaraj et al., 2004). Thus, it could be concluded that “explicit knowledge is about knowing what is the innovation”, whereas tacit knowledge is about “knowing how to put it successfully into practice” (Park et al., 2015, p. 92). Because tacit knowledge is highly specialized as well as embedded in organizational practices, routines and processes (Nelson & Winter, 1982), it makes it more difficult to identify and absorb, thus more difficult to imitate by competitors compared to explicit knowledge, i.e. tacit knowledge brings more value to the MNC’s competitive advantage.

As it has been clarified by now, knowledge can be created at the headquarters as well as at the different subsidiaries if the latter ones have enough power within the MNC and resources to do
so. The extent to which a subsidiary will create new knowledge depends on several factors, some of which are:

- the more research-intense a subsidiary is, the greater knowledge output it will produce (Mudambi & Navarra, 2004);
- the greater the subsidiary knowledge inflow, the greater its knowledge output (Gupta & Govindarajan, 2000);
- the entry mode of the subsidiary determines its knowledge output. It is suggested that acquisitions have greater knowledge output than greenfield subsidiaries (Cantwell & Mudambi, 2001; Blomkvist et al., 2014).

Furthermore, new knowledge that is connected to the existent knowledge of an MNC may bring more value than any other knowledge. Schulz (2003) states that knowledge has the potential to alter another when the former one is more related to or could be linked with the latter one. In other words, the more the new knowledge available to the enterprise is related to its current knowledge, the higher its capacity to obtain, retain and integrate it (Gupta and Govindarajan, 2000; Yang, et al., 2008).

However, new knowledge created at the different subsidiaries can boost the MNC competitive advantage but also sometimes hinder the corporation’s performance. Mudambi and Navarra (2004) state that a subsidiary that has created a vital knowledge which could improve the overall performance of the enterprise may not be willing to share it within the network in order to have an independency from the headquarters, the right to take decisions and retain relative power within the corporation. In other words, vital knowledge in terms of specialized capabilities and competencies may not only bring value the MNC, but it may also have a negative impact on its performance due to internal competition among the subsidiaries as well as between a subsidiary and the headquarters.

All in all, in order to survive and/or develop its competencies, a firm needs to transfer and acquire new knowledge. Evidence regarding the competitive benefits of internal knowledge transfer within the MNC is accumulating (e.g. Bartlett and Ghoshal, 1989; Gupta and Govindarajan, 2000; Schulz, 2001). As a consequence, knowledge transfer within the corporation units has emerged as an underlying topic in organization and strategy research.
Knowledge transfer within the MNC

MNCs can create knowledge in one location but they can also exploit it in others, which leads to internal transfer of knowledge by the enterprise. Thereby, in order to improve their competitive advantage, MNCs have to be able to facilitate and manage its internal knowledge transfer (Minbaeva et al., 2014). Hence, a lot of researchers have focused on organizing and structuring the MNCs in order to smoothen their internal flow and knowledge leverage (e.g. Bartlett & Goshal, 1989, Gupta & Govindarajan, 2000, and others).

According to Szulanski (1996), “The word ‘transfer’ is used rather than ‘diffusion’ to emphasize that the movement of knowledge within the organization is a distinct experience, not a gradual process of dissemination, and depends on the characteristics of everyone involved.” (1996, p. 28).

In addition, knowledge transfer should also be differentiated with knowledge “flows” (Ciabuschi et al., 2011). It is assumed by the researchers that the more knowledge that flows within the organization, the better (Gupta & Govindarajan, 2000, Björkman et al., 2004), while very few inquiries have been conducted regarding whether or not these flows benefit the corporation (Haas and Hansen, 2005). After all, there is a possibility that if too costly and/or fail to accomplish what they aimed for, knowledge transfers may harm the enterprise (Ciabuschi et al., 2011). Moreover, previous research shows that knowledge transfer often leads to considerable resource costs (Teece, 1977); demands changes in organizational and technological structures of the receiver (Leonard-Barton, 1988); is not easily carried out (Kostova, 1999), and is frequently incomplete (Argote and Ingram, 2000).

Knowledge transfer (KT) could be defined as “a process in which an organization re-creates a complex, casually ambiguous set of routines in new settings and keeps the routines functioning. These routines appear in the form of know-how, R&D, managerial techniques and so on” (Yang et al., 2008, p. 884). In addition, Foss and Pedersen (2002) explain that “transfer of knowledge does not imply a ‘full’ replication of knowledge in a new location. Indeed, transfer of knowledge is often associated with modification of the existing knowledge to the specific context.” (p. 54). Thus, the transferred competencies are not the fundamental one, but only some applications of them which contribute to the solution of specific problems. Moreover, Minbaeva et al. (2014) point out that the key element in knowledge transfer is not the knowledge itself,
but the extent to which the receiver adopts the potentially beneficial knowledge and its utilization in the latter one’s operations.

The author of this paper defines knowledge transfer as a process of knowledge sharing, in terms of selected competencies, taking place in a specific time between particular and distinct parties, i.e. senders and receivers (Szulanski et al. 2004, Ciabuschi et al., 2011). In this way, the researcher implies that KT is purposeful and do not represent involuntary diffusions.

Knowledge that could be transferred, according to Gupta and Govindarajan (2000), is expertise or external market information of strategic value. The expertise that could be transferred refer to input processes such as purchasing skills, throughput processes such as product and process designs etc., or output processes such as marketing know-how, distribution expertise etc. The external market information transfer could be globally valuable information about key customers, suppliers or competitors. Notwithstanding, researchers such as Ciabuschi et al. (2011), Schulz (2001) and others consider innovations in order to identify the transferred knowledge, i.e. technological knowledge, where “innovation refers to a change in a process or in the outcome of a process, related to industrial production and/or exchange” (Ciabuschi et al., 2011 p. 132).

The process of KT has four stages (Szulanski, 1996):

1) Initiation – a unit has a need and potential solution to this need is found in another unit, thus decision to transfer is made;
2) Implementation – the knowledge is transferred via transfer-specific social ties between the sender and the recipient, meanwhile it is often changed to suit the awaited needs of the recipient;
3) Ramp-up – the knowledge is transferred to and used by the recipient who has the opportunity to solve any unexpected problems caused during its initial adaptation;
4) Integration – the target unit experiences satisfactory results with the transferred competence after which gradually routinizes and institutionalizes it.

However, common findings point that knowledge transfer is worthwhile but at the same time quite costly and problematic (Teece 1977; Szulanski 1996; Simonin 1999, Gupta and Govindarajan, 2000 and others). Knowledge, especially the tacit one, does not necessarily flow easily within the MNC (Cantwell & Santangelo, 1999; Birkinshaw & Hood, 1998). Stickiness may appear during the transfer process, making it difficult to leverage the knowledge
(Szulanski, 1996). It hinders KT from being successfully obtained, retained and integrated into the recipient’s unit. Szulanski (1996) determines the three most important origins of stickiness:

- absorptive capacity – the recipient’s knowledge capability before the transfer;
- casual ambiguity – the recipient’s depth of knowledge;
- the quality of the relationship – if the relationship between the source and the recipient is not well-established, then it will affect the recipient’s ability to gain the knowledge when needed.

Other factors that can act either as a barrier or as a facilitator for KT are:

- Value of source unit’s knowledge stock – holder’s knowledge asset would have greater attractiveness for the rest of the MNC if it has a great value (e.g. if it is non-duplicative and relevant) (Gupta and Govindarajan, 2000).
- Motivational disposition of the source unit – the willingness of the knowledge holder to share the new knowledge (Gupta & Govindarajan, 2000).
- Existence and richness of transmission channels – as stated by Ghoshal and Bartlett (1988), a knowledge flow cannot be leveraged if there do not exist any transmission channels. A crucial role for the facilitating of knowledge transfer in this part play the communication links such as informality, openness and density of communications (Daft & Lengel, 1986; Gupta and Govindarajan, 1991; Jablin, 1979; Tushman, 1977).
- Motivational disposition of the target unit - a main role in this part play the social capital of the MNC because of the fact that managers may block any information due to power struggles within the organization or non-acceptance of knowledge that has not been created in their unit (Gupta and Govindarajan, 2000).
- Absorptive capacity of the recipient’s unit – individuals may differ in their “ability to recognize new information, assimilate it, and apply it to commercial ends” (Cohen & Levinthal, 1990, p. 128). Therefore, in order one KT to have greater effect, the interacting parties (i.e. individuals) should share common understanding and subcultural language as well as to resemble each other in terms of personal and social characteristics (Rogers, 1995).
- Knowledge codification – the more codifiable the knowledge is, the easier it is to be transferred. By contrast, tacit knowledge is more difficult to transfer due to its embeddedness in individuals, tasks, tools etc. (Zander and Kogut, 1995; Schulz, 2001, Minbaeva, 2007)
Corporate social mechanisms – regular meetings, visits and personnel exchanges as well as joint business practices contributes to the development of trust and motivation to engage in knowledge transfer (Gupta and Govindarajan, 2000; Hansen, 2002; Minbaeva, 2007).

Decentralization of the MNC – the corporation’s units become more dependent on mutual adjustment to coordinative activities, leading to enlarging of the communication channels, respectively improves the quality and quantity of KT (Wijk et al., 2008)

Mudambi and Navarra (2004) present in their work different knowledge flows that can occur in an MNC (see Figure 1). They view the different knowledge flows via the source-target perspective (Mudambi, 2002) which implies that each knowledge flow occurs between a target (recipient) and a source along a channel (Gupta & Govindarajan, 2000). It is important to indicate that the individuals in the company carry out the knowledge transfer but due to the aesthetics of the current research question, the units of analysis in this paper are both the headquarters and the subsidiary by paying more attention to the latter one. However, Mudambi and Navarra (2004) determine the four knowledge flows as follows:

- Flow 1 – from the subsidiary to the headquarters (reverse knowledge transfer). This type of flows composes the basis of the MNC’s network leverage. Via the usage of these flows, the parent company is able to exploit local competencies and be a knowledge integrator.

- Flow 2 – from location to the subsidiary – in order to gain valuable knowledge through these flows, the subsidiary competence, such as evaluating, filtering and selecting information, as well as its absorptive capacity, such as adapting those inflows that fit to the firm-specific requirements, become very essential.

- Flow 3 – from subsidiary to location – or so called spillovers, relating to outflows from the subsidiary.

- Flow 4 – from the headquarters to the subsidiary (conventional knowledge transfer). High levels of these flows enable the subsidiary to exploit knowledge that has been created by the parent company.
Even though Mudambi and Navarra (2004) have mentioned that knowledge transfer could occur from other units to the subsidiary in Flow 4, they mainly take into consideration conventional knowledge transfer. However, the author of this paper believes that a fifth, separate, flow should be distinguished and that is namely the flow from one focal subsidiary to another of the same MNC, i.e. lateral knowledge transfer. High levels of knowledge inflows from peer-subsidiaries enable the focal subsidiary to combine it with its existent knowledge assets and to generate new knowledge that could be beneficial to the MNC (Schulz, 2001; Schulz, 2003; Noorderhaven and Harzing, 2009) and these transfers does not necessarily happen with the notion of the HQ. However, the main subject of the current study is reverse knowledge transfer, i.e. from the subsidiary to the headquarters, hence its main characteristics will be presented in the following section.
Reverse knowledge transfer in MNCs

In contrast to the more traditional “forward” transfer, i.e. from the parent company to the subsidiary, reverse knowledge transfer, i.e. from the subsidiary to the parent company, is a new interest of research that gains popularity at the beginning of 21st century (e.g. Frost, 1998; Hákason & Nobel, 2000, 2001; Zhou & Frost, 2003), thus, there are not many studies that have investigated this phenomenon through different angles. And while more and more researchers become interested in analyzing this subject, there still exist a lot of hypotheses that need to be tested.

The home-based supremacy assumption is recognized by fewer and fewer companies due to the fact that knowledge creation becomes more diffused (as previously discussed). In order an MNC to maintain a competitive advantage, the competencies gained by the subsidiaries’ domestic knowledge of sources has to be dispersed and exploited within the MNE. Even though the interaction and knowledge exchange between subsidiaries and their local environments have been recognized, researchers (such as Ghoshal, Korine & Szulanski, 1994; Nohria & Ghoshal, 1997 and others) have paid more attention to the lateral knowledge transfer (between the subsidiaries in the MNC network) rather than RKT, which has rarely been considered (Ambos, 2006). The focus on reverse knowledge transfer is important since it may contribute to a great extent to the creation of the company’s competitive advantage (Ambos et al., 2006). Moreover, Zhou and Frost (2003, p. 4) state that RKT is “a realistic and perhaps even necessary ‘stepping stone’ in the evolution of the multinational toward a true distributed innovation network, one that may not necessarily involve a coordinating center.”

Reverse knowledge transfer (RKT) is the transfer of knowledge that has been developed at the subsidiary of an MNC and is leveraged to the headquarters. These transfers are much more difficult than conventional transfers because the subsidiary motivation to share its knowledge is not enough but the headquarters should also be interested in it. The parent firm would only be interested in transfers if they bring any benefit to it (Gupta & Govindarajan, 2000; Kogut & Zander, 1993; McDonald et al., 2005; Yang et al., 2008).

Thus, opposite to the conventional transfer that could be seen as a teaching process, reverse transfer is a persuading process because subsidiaries have to persuade their headquarters that its knowledge can be beneficial for the parent’s needs (Yang et al., 2008). Ambos et al. (2006)
support this statement by arguing that RKT requires the headquarters to be committed to learn from its subsidiaries and to desire to recognize the potential benefits of subsidiary knowledge. However, Mudambi et al. (2014) reminds that subsidiaries should also have a willingness to share its knowledge with the headquarters in order a RKT to occur which is determined by the benefits the former one gains when engaging in vertical knowledge outflow. The main benefit for the subsidiary when engaging in RKT is that its influence within the MNC increases. In other words, because the subsidiary has access to knowledge that is not available to the parent firm, it can gain more autonomy, which means less control from the headquarters, higher ability to take independent actions (Andersson and Forsgren, 1996; Mudambi, 1999, Andersson et al., 2007) and ability to have an impact on strategic issues beyond its own local operations (Andersson et al., 2007).

As it has been mentioned earlier, the benefits for the headquarters that engages in RKT can help the parent firm to “fine-tune and coordinate global strategy, improve processes in their own or other units in the network, or simply provide the missing link in the quest to develop a new product” (Ambos et al. 2006, p. 269). Because competences derived from home countries are no longer sufficient to sustain a corporation’s competitive advantage with the only exception that the home base continues to be the only “crucible” of new competencies, technologies and leading customers (Doz and Santos, 1997, p.4).

However, the knowledge transfer from a focal subsidiary to its parent firm is not an easy process and, as it has been noted for the knowledge transfer within the MNC, there are numerous components that determine its extent. Thus, a closer examination of the various factors is presented in the following chapter.
Hypothesis development

In this chapter, the author of the paper will present the hypotheses regarding the various factors that have an impact, both positive and negative, on the reverse knowledge transfer. While researchers seem to agree upon the relationship between some of the variables and RKT, other factors are presented by diverging empirical data which makes unclear what impact they have on the degree of knowledge transfer from the subsidiary to its parent firm. This could be explained by the newness of RKT in the academic literature, thus it is still a subject of current and future analyses, as well as the complex characteristics of the phenomenon that determine its extent.

Knowledge characteristics

Knowledge characteristics is an important factor that has to be taken into consideration during a knowledge transfer due to its impact on the extent of efficiency and effectiveness of the leveraged knowledge (Zander and Kogut, 1995; Minbaeva, 2007).

Knowledge codification

As it has been mentioned previously, there are two types of knowledge – explicit and tacit. Explicit knowledge is codifiable, thus easier and quicker to acquire, whereas tacit knowledge is absorbed by closely observing the holder of the knowledge or via interactions with the latter one (Dhanaraj et al., 2004) which makes it harder to leverage. However, knowledge in terms of technologies have different levels of articulability and codification. Some of their features can be well understood and documented, making the product and processes based on them easily transferred to other units. Some of their properties may be successfully applied without being well understood or documented. This low level of articulability makes the imitation of beneficial R&D outcomes difficult for the competitors, on the other hand, it may hinder a voluntary transfer within the MNC by increasing the transfer costs (Zander, 1994). Despite the difficulties of transferring tacit knowledge within the corporation, Rabbiosi (2011), with a population of 280 companies, finds evidence that tacit knowledge is more likely to be
transferred to the HQ. Monteiro et al. (2008) also finds support in favor of tacit knowledge, whereas Schulz (2001) and Crespo et al. (2014) statistically prove that the more explicit the knowledge is, the higher the knowledge transfer from the subsidiary to the HQ.

**Hypothesis 1:** The more codifiable the new knowledge created by the focal subsidiary, the greater the extent of RKT.

**Organizational characteristics**

Organizational characteristics have a crucial role in knowledge transfer in such a way that formal structure and systems as well as other features of organizational contexts affect the effectiveness of knowledge transfer (Foss & Pedersen, 2002; Gupta & Govindarajan, 1991; McCann & Mudambi, 2005).

**Subsidiary entry mode**

As it was mentioned earlier, an MNC may enter a foreign country via one of the following modes – acquisitions, greenfield operations, combination of both greenfield and acquisition, joint ventures or strategic alliances. However, since the focus of this study is on fully- or majority-owned subsidiaries, only the acquisition and greenfield entry modes are examined.

According to the academic literature, an MNC will establish a subsidiary through an acquisition if its knowledge does not overlap with the existing corporate know-how and at the same time the subsidiary possesses the required know-how which will help the MNC to succeed in a host market (Hennart and Park, 1993). Therefore, the acquired subsidiary is expected to have more knowledge stock that is less duplicative within the MNC compared to greenfield subsidiaries. Moreover, findings indicate that acquired subsidiaries are more likely to contribute to the MNC growth via entry into new technologies (Blomkvist et al., 2014), nevertheless, Gupta and Govindarajan (2000) find no support for their hypothesis that the acquired subsidiary will leverage more knowledge to the HQ than the greenfield.

By contrast, Mudambi et al. (2014) state that the greenfield subsidiary is a newly created unit by and within the MNC, since its establishment its language, culture and routines resembles the
corporation ones, whereas acquired subsidiaries are already established companies with their well-established culture, routines and patterns of behavior, that newly enter the MNC corporate body. Due to the presence of similar and shared socialization mechanisms and routines between the greenfield units and the parent company which have a positive impact on knowledge transfer (Ghoshal et al., 1994; Gupta and Govindarajan, 2000; Noorderhaven and Harzing, 2009), a greenfield subsidiary will share more knowledge with the parent company than the acquired one, since the latter one requires more resources to internally embed into the MNC network (Mudambi et al., 2014; Borini et al., 2012).

Hypothesis 2: Greenfield subsidiaries are positively associated to the extent of RKT.

Subsidiary role and innovativeness

Another organizational structure that has an impact on RKT is the acquisition motives of the parent company which defines the role of the acquired subsidiary (Yang et al., 2008). As mentioned in the literature review, there are several terms for the different subsidiary roles (see Table 2, p. 12), namely competence-creating versus competence-exploiting subsidiaries. Yang et al. (2008) state that competence-exploiting subsidiaries are expected to leverage and integrate knowledge from the HQ to their local markets, whereas competence-creating subsidiaries are expected to create knowledge that is new to the MNC in terms of new products, practices, technologies and skills (McDonald et al., 2005; Papanastassiou & Pearce, 1997; Pearce, 1999).

In other words, the leverage of knowledge from a foreign subsidiary to its HQ occurs when the former one has a stock of knowledge that is vital for the MNC. Therefore, a subsidiary that has high levels of innovativeness will have more knowledge in stock that can be diffused to the HQ, i.e. there will be high levels of RKT (Gupta and Govindarajan, 2000; Borini et al., 2012; Najafi-Tavani et al., 2014).

According to Mudambi et al. (2014) when subsidiary innovativeness increases, its probability to attract the HQ’s attention rises up, hence, RKT increases. On the other hand, if subsidiary’s innovativeness reaches really high levels, its own interests increase enormously, too, which leads to declining of the extent of RKT. Mudambi et al. (2014) also point out that subsidiaries with very high innovativeness will engage less in RKT due to resource allocation issues. In
other words, those subsidiaries that have high levels of innovativeness will mainly allocate resources towards knowledge development issues. To achieve and maintain transmission channels for innovation, subsidiaries have to redirect resources necessary for RKT. Hence, subsidiaries with high degree of knowledge generation are expected to engage less in RKT. In addition, Yang et al. (2008) do not find support to their hypothesis that competence-creating subsidiaries will transfer more knowledge to the HQ. Whereas, subsidiaries with lower degrees of innovation are expected to divert resources mainly towards RKT issues instead of generating new knowledge, and establishing of numerous communication channels required for a successful knowledge diffusion. Furthermore, if a subsidiary’s innovativeness is very low, it does not benefit anything if it decides to hold the knowledge only to itself, thus, it is most likely that the subsidiary will engage in RKT. Its ability, however, to attract the parent firm’s attention is also quite low, respectively low levels of RKT will occur. Additionally, Schulz (2001) states that units that do not generate new competencies are less likely to have large knowledge outflows.

*Hypothesis 3:* The higher the subsidiary innovativeness, the higher the degree of RKT.

**Subsidiary autonomy**

According to Gupta and Govindarajan (1991) and Birkinshaw, Hood & Jonsson (1998), if a subsidiary is expected to develop local knowledge, they need an autonomous initiative. Furthermore, Foss and Pedersen (2002) state that new subsidiary knowledge can be created: internally; based on knowledge inputs from external partners such as suppliers or customers; or based on knowledge inputs from a local cluster. Therefore, if the focal subsidiary is strongly controlled, it won’t be able to exploit these possibilities of generating new knowledge and learning from the local environment (Nobel & Birkinshaw, 1998). If the subsidiary possesses high autonomy, it would be more likely to discover local market specifics and develop new knowledge (Barlett & Ghoshal, 1989) which could benefit the rest of the MNC. Hence, Strube and Berg (2011) as well as Schulz (2001) find a positive impact of the high level of autonomy on RKT.

By contrast, Noorderhaven and Harzing (2009) argue that the greater autonomy a subsidiary has, the less motivation it has to share knowledge to other corporate units because, according
to them, more autonomy means less hierarchical coordination. Harzing and Noorderhaven (2006), Crespo et al. (2014) and Gupta and Govindarajan (2000) present results indicating that a subsidiary autonomy is negatively related to knowledge flows to and from the parent company.

**Hypothesis 4:** The greater autonomy the focal subsidiary possess, the lower the extent of knowledge transfer from the former one to the HQ.

**Subsidiary capabilities**

If a focal subsidiary has knowledge that is valuable for the rest of the MNC’s units, then it is expected to have a high level of knowledge outflow. In other words, if a subsidiary has certain capabilities (such as operational, organizational, technological and marketing activities) that are stronger than those present in the other units of the MNC, the level of knowledge transfer from that subsidiary will be higher. By contrast, if a subsidiary has weak capabilities, it will act more like knowledge receiver rather than knowledge sender (Foss and Pedersen, 2002; Noorderhaven and Harzing, 2009).

In addition, Monteiro et al. (2008) state that the recipient of the subsidiary knowledge (either the parent firm or a peer subsidiary) perceives the particular subsidiary to possess high capabilities, thus sees it as a potentially being able to address the problems it faces and attempting to solve them. They find a positive and significant association of the high rating of the focal subsidiary’s capabilities by the parent firm with the high level of RKT.

**Hypothesis 5:** The higher the capabilities of the focal subsidiary, the higher the degree of RKT.

**Subsidiary age and size**

Prior research indicates that the extent of subsidiary innovativeness is determined by its embeddedness into the local environment (Andersson et al., 2002; Hakanson & Nobel, 2001). However, this process requires times and many efforts. Thus, the subsidiary age plays a crucial
role in reverse knowledge transfer. In other words, older subsidiaries are more capable to generate and leverage new knowledge to the parent firm (Minbaeva et al. 2003) than new subsidiaries due to increase of its external embeddedness and access to new knowledge and ideas. Moreover, as a subsidiary becomes older, its internal embeddedness with the HQ becomes stronger which facilitates RKT (Zander, 1999, Borini et al., 2012; Noorderhaven and Harzing, 2009). Others scholars, however, suggest that old firms become inefficient in responding to changes in the external environment as their age grows (Barron, West & Hannan, 1994; Ranger-Moore, 1997) as well as they suffer from organizational inertia (i.e. the company remains in its pace constantly) (Leonard-Barton, 1992; Autio, Sapienza and Almeida, 2000), thus the older the subsidiary, the lower the extent of RKT. While Montneiro et al. (2008) and Borini et al. (2012) find a strong positive and statistically significant relationship between subsidiary age and the extent of RKT, Hákanson and Nobel (2001) find a negative one.

Additionally, Gupta and Govindarajan (2000) argue that larger subsidiaries have a greater pool of resources for developing new knowledge, thus the larger size of the subsidiary should have a positive effect on offering new non-duplicative knowledge to the HQ. Larger subsidiaries are also more likely to have strong capabilities. (Crespo et al., 2014; Hákanson and Nobel, 2001; Monteiro et al., 2008; Noorderhaven and Harzing, 2009). However, Schulz (2001), Yang et al. (2008) and Barnard (2011) present empirical data showing no relationship between the two variables.

**Hypothesis 6**: The older the subsidiary is, the greater the extent of RKT.

**Hypothesis 7**: The larger the subsidiary is, the higher the degree of its vertical knowledge outflow.

**Network characteristics**

Network characteristics are associated with social resources embedded in relationships such as value systems, social ties and trusting relationships (Tsai and Ghoshal, 1998). Previous research indicates that social relations among actors play an essential role in facilitating knowledge transfer (Adler and Kwon, 2002).
Subsidiary’s internal and external embeddedness

Subsidiaries that generate much new knowledge also transfer a lot of knowledge to the other units. In contrast, units that do not hold and develop new knowledge are less likely to have large knowledge outflows (Schulz, 2001). One of the most essential factors that positively influence subsidiaries to generate new knowledge is the extent of their external embeddedness (Andersson et al. 2005; Frost et al. 2002; Håkanson and Nobel 2001). External embeddedness is defined as the closeness or strength of interactions between a company and its local external actors such as local customers, suppliers, universities, government etc. (Håkanson and Nobel 2001; Z. Najafi-Tavani et al., 2012).

However, there is a contradiction regarding the impact of external embeddedness on the extent of knowledge leverage from the focal subsidiary to the HQ. On the one hand, external embeddedness could have a positive impact on RKT due to subsidiary’s ability to identify, absorb and combine new knowledge during its communication with local actors which will contribute to the existing product and/or services or creating new ones (Håkanson and Nobel, 2001; Andersson et al. 2007). Thus, highly embedded subsidiaries, transfer more knowledge to their parent company. On the other hand, external embeddedness could negatively influence RKT due to the daughter firm’s highly integration into the local environment which causes conflicts between the former one and the HQ, therefore, the subsidiary loses its willingness to share knowledge. Moreover, being highly embedded into the local environment, the subsidiary may create knowledge that is context-specific and not applicable to other parts of the MNC (Andersson et al., 2002). Thus, the more embedded the subsidiary is in the host country, the lower its willingness to participate in RKT. However, while Schulz (2001) and Håkanson and Nobel (2001) find a positive relation between the subsidiary external embeddedness, Monteiro et al. (2008) as well as Najafi-Tavani et al. (2012) find a negative significant effect on RKT.

Another factor that facilitates the exchange of resources and the process of knowledge transfer is the internal embeddedness of the sub-unit, i.e. inter-unit relationships (Eriksson et al., 1999; Yamin and Andersson, 2011; Reagans and McEvily, 2003). MNC units with embedded relationships are more capable of leveraging highly tacit knowledge (Hansen 1999; Uzzi 1996). According to the incentive-based perspective, the closer the relationship between the
knowledge sender and receiver, the greater the willingness of the person possessing the knowledge to transfer it. Therefore, the greater the internal embeddedness of the focal subsidiary with the HQ, the greater the extent of RKT. Schulz (2001) and Borini et al. (2012) find a positive relation between the two variables, the latter one stating that the greater integration between the focal subsidiary and the HQ, the greater the extent of RKT. Integration within the MNC is related to sharing values between the different MNC units, helping the HQ understand its subsidiaries and vice versa.

By contrast, Najafi-Tavani et al. (2012) could not find an association of internal embeddedness with the degree of RKT. In fact, their results show a positive relation between the two variables, nevertheless, it is not significant, thus their hypothesis is rejected.

Some researchers, as Frost (1998), state that a successful knowledge leverage requires “dual embeddedness”, i.e. both internal and external embeddedness of the subsidiary. In other words, the focal subsidiary develops more valuable knowledge when it is highly embedded into the local environment, however, the high integration of the former one within the MNC network increases the likelihood that this knowledge will be successfully diffused to the rest of the corporation. Håkanson and Nobel’s results (2001) support the positive effect of dual embeddedness on RKT, however, it is only weakly significant.

_Hypothesis 8:_ Subsidiary dual embeddedness will be positively related to the degree of outflow from the focal subsidiary to the HQ.

**Communication and transmission channels**

Knowledge flows cannot take place without the existence of transmission channels (Ghoshal & Bartlett, 1988), therefore, the richer the communication between the subsidiary and its HQ (such as density of communication, openness, informality etc.), the higher RKT. Monteiro et al. (2008) argue that individuals are more likely to contact other people whom they know or at least know their colleagues. When the communication between the units is frequent, it allows the parties to get familiar with the other units’ operations as well as identify and retrieve relevant knowledge from each other. Hence, frequency in communication within the corporate network helps to reduce the barriers for knowledge transfer (Park, 2012). Furthermore, more frequent
communication between a focal subsidiary and the parent company leads to emerging of common values and language, i.e. facilitates RKT (Dyer and Nobeoka 2000; Håkanson and Nobel 2001) as well as strengthens the relationship between the two parties. A positive relation of the communication intensity between the focal subsidiary and the parent firm to RKT finds support by Gupta and Govindarajan (2000), Crespo et al. (2014) and Barnard (2011). However, according to Monteiro et al.’s analysis (2008), the frequent communication with the HQ is positively associated with RKT but not significant, thus they don’t find support to their hypothesis as the above-mentioned researchers stating that a certain frequency of communication between the focal subsidiary and the HQ is mandatory for the provision if routine information, thus, it does not mean that there is necessarily any kind of vertical knowledge transfer.

The academic literature classifies two types of transfer mechanisms – electronic-based and person-based. Electronic-based communication includes written documents and reports as well as databases and information systems that enable employees to codify, store and access knowledge (Ambos & Ambos, 2009). Person-based transfer mechanisms involves all kinds of oral communication such as face-to-face and telephone communication (Pedersen, Petersen, & Sharma, 2003), e.g. visits, meetings, seminars etc. Therefore, the implementation of standardized electronic-based as well as frequent interpersonal communication increase the extent of RKT (Rabbiosi, 2010; Strube and Berg, 2011).

**Hypothesis 9:** The more frequent the communication between the focal subsidiary and the HQ, the greater the extent of RKT.

**Corporate socialization mechanisms**

Corporate socialization practices such as corporate culture and joint business practices as well as regular visits, meetings and personnel exchanges can facilitate RKT. If the different units of the MNC are embedded in the same social structure, there are higher degree of developing trust and motivation to engage in knowledge transfer (Granovetter, 1985; Gupta & Govindarajan, 2000). It is the understanding of long-term company objectives that makes the different MNC units realize the importance of knowledge diffusion. Furthermore, the employment of socialization mechanisms increases the HQ managers’ awareness of the existence of new
subsidiary knowledge, which facilitates RKT. Thus, the higher the degree of corporate socialization, the higher the extent of RKT. (Strube and Berg, 2011; Najafi-Tavani et al., 2012). By contrast, Gupta and Govindarajan (2000) with a population of 374 do not find a positive relation of vertical socialization mechanisms (such as job transfers to parent corporation and/or participation in corporate mentoring programs (Ghoshal and Bartlett, 1988) as well as interpersonal familiarity and personal affinity (Edstrom and Galbraith, 1977; Van Maanen and Schein, 1979) to RKT.

**Hypothesis 10**: The employment of more corporate socialization mechanisms will have a positive relation to the extent of RKT.

**Motivational disposition**

Reverse knowledge transfer also depends on the motivational disposition of the two parties involved in it. Lahti and Beyerlein (2000) argue that the existence of new knowledge is not sufficient itself for knowledge transfer; it is the knowledge holder that must be motivated enough to share its knowledge with the other MNC units. The willingness of the knowledge holder has a positive impact on the inclination of knowledge diffusion, thus Najafi-Tavani et al. (2012) finds a significant relationship between willingness and RKT. Furthermore, Reiche (2011) also research subsidiary willingness to share its knowledge through the role of inpatriates (defined as boundary spanners since they mediate between the social ties they maintain in their home subsidiary and the social ties they have created at the parent firm). According to him, HQ employees may not perceive the knowledge provided by the inpatriates as valuable due to their status as HQ newcomers (Harvey et al., 2005). On the other hand, inpatriates may not be willing to share the knowledge created in their subsidiary in order to keep its strategic position within the MNC (Gupta & Govindarajan, 2000). Moreover, if inpatriates would like to keep their employability, they might feel obliged to keep the subsidiary's unique knowledge to themselves.

Gupta and Govindarajan (2000) examine the motivational disposition in terms of the subsidiary vs. corporate focus based on the incentive system for the subsidiary president. They assumed that the greater the extent to which the subsidiary president bonus is focused on the network
rather than the subsidiary, the greater are the knowledge transfers from that sub-unit to the HQ. However, their hypothesis does not find support.

**Hypothesis 11**: Subsidiary willingness to share its knowledge will be positively associated with the degree of vertical knowledge flows to the parent company.

**Cultural distance between the subsidiary and the HQ**

Factors, such as different cultures, languages and institutional frameworks, may create perception of ‘cultural distance’ between the knowledge sender and receiver. In the context of great cultural differences knowledge transfer could become problematic due to potentially low level of comfort and trust between the two parties, thus employees might engage in less knowledge leverage (Barkema & Vermeulen, 1997; Hákanson and Nobel, 2001; Hansen & Lovas, 2004). The greater the extent of shared values between two parties, the easier and less costly the knowledge transfer will be, which respectively increases the willingness of the knowledge holder to leverage the possessed knowledge. By contrast, a lack of shared values has a negative impact on the frequency of knowledge transfer between two units (Ambos et al., 2006). And according to Ambos & Ambos (2009), a fundamental basis for any kind of knowledge transfer, including RKT, is the same cultural context which facilitates communication and understanding of each other. However, Strube and Berg (2011) do not find support to their hypothesis that the lower the cultural distance, the higher the degree of RKT. On the contrary, they find a strong positive relationship between the two variables, i.e. cultural distance is positively associated with RKT. By contrast, based on their results Najafi-Tavani et al. (2012) reject a positive relation of the extent of shared values between the focal subsidiary and the HQ to the extent of RKT occurring (despite the positive relationship between the two variables which is not significant), whereas Crespo et al. (2014) find a strong negative relationship between cultural distance and the degree of RKT.

**Hypothesis 12**: Cultural distance does not have an impact on the extent of RKT.
Methodology

This chapter describes the choice and implementation of theory of science together with research design and method. Furthermore, the method of meta-analysis is introduced by depicting its main characteristics. Later in this part data collection and data analysis processes will be presented along with short explanation of the included variables. The chapter will be closed with the critical explanation of the study limitations.

Theory of science

The main purpose of this paper is to fill the knowledge gap that exists in the academic literature concerning the impact of the various factors on the extent of knowledge transfer from the focal subsidiary to its parent firm. Since research papers present numerous differentiating evidence regarding which independent variables play a positive and/or negative role on RKT and which don’t have any impact at all, the author of this paper conducts a meta-analysis which aims to combine all the available empirical data regarding RKT based on which the researcher is able to test the set of hypotheses grounded on existing theory and to present an explanatory analysis concluding the results.

The theory behind explaining the phenomenon of the research question is positivism. Positivism allows the researcher to behave as a natural scientist, i.e. to collect data about an observable reality and look for regularities and casual relationship in the collected data to develop law-like generalizations (Gill and Johnson, 2010). In order to create a research strategy to collect the necessary data, the researcher has used the existing theory to generate hypotheses. These hypotheses will be tested and confirmed, either entirely or partially, or rejected in a following chapter, leading to a further development of theory which may be tested by further research.

An essential characteristic of the positivist approach is that “the research is undertaken, as far as possible, in a value-free way” (Saunders, Lewis and Thornhill, 2012, p. 134). In other words, the researcher is external to the process of data collection which means that the data collected cannot be easily altered. In contrast, researcher who applies interpretivist approach is more likely to manipulate the results due to their “feelings” attached while collecting the data. The positivist research is expected to collect information based on quantifiable observations that
lend to statistical analysis to test the set of hypotheses (Saunders, Lewis and Thornhill, 2012). Thus it can be assumed that the author of this paper adopts the objectivist view, i.e. “social entities in reality external to and independent of social actors” (Saunders, Lewis and Thornhill, 2012, p. 131).

Quantitative strategies emphasize a positivist approach. The quantitative research is best when a set of hypotheses has to be tested in order to fill the knowledge gap in early academic literature, thus it is suitable for the current research.

To sum up, the quantitative research examines numerically measured relationships between variables in order to test hypotheses by using a range of statistical techniques for the analysis (epistemological assumption); the researcher is seen as independent from the social actors being researched (ontological assumption); quantitative researchers tend to use deduction methods (methodological assumption).

**Research design and method**

The author claims that deductive reasoning is used in the current research, which is defined as moving from general to specific. In other words, the research question of this paper was developed based on theory by reading the academic literature regarding the topic of knowledge transfer in MNCs, after which the author designs a research strategy to test the theory.

The research began by identifying the topic of reverse knowledge transfer as relatively new in the field of knowledge flows within MNEs to the academic literature, therefore, there is a great ambiguity about its characteristics, determinants, contributions etc. Furthermore, the researcher noticed that there was various unclear evidence on factors which determine the extent of knowledge transfer from the focal subsidiary to its parent firm. Hence, the author believes that it is worth to investigate this phenomenon by conducting a meta-analysis which is one of the most contributing methods to synthesize and analyze empirical data provided by different research papers.

The deduction research approach has several steps which the authors has followed strictly (Robson, 2002):

1) deducing a hypothesis (a testable proposition about the relationship between two or more variables) or a set of hypotheses from the theory;
2) expressing the hypotheses in operational terms (i.e. indicating precisely how the variables are to be measured), which proposes a relationship between the variables;
3) testing the hypotheses by collecting the appropriate data which measures the different variables and analyzing it;
4) confirming or rejecting the hypotheses based on the produced results from the analysis.

To sum up, deduction reasoning is used to explain casual relationships between two or more variables. Consequently, a number of hypotheses are developed after getting familiar with the different theories that are present. To test the propositions in this paper, the researcher collects quantitative data.

The author states that the research strategy used in the current paper is experiment. “The purpose of an experiment is to study the probability of a change in an independent variable causing a change in another, dependent variable” (Saunders, Lewis and Thornhill, 2012, p. 174). An experiment employs predictions, i.e. hypotheses, rather than questions. The aim of the researcher is to find whether or not a relationship exists between the variables. Two types of hypotheses exist in a standard experiment – the null hypothesis and the alternative hypothesis, often referred to it as simply “a hypothesis”. The null hypothesis predicts that there is not a significant relationship between the variables, whereas the alternative hypothesis predicts a possible significant relationship between the variables.

The focus of the research is on empirical data provided in academic studies that have examined the relationships between the 12 determinants and knowledge transfer from a focal subsidiary to the parent firm. This allows the author to objectively synthesize and analyze the data, acknowledging that she has no control on the results provided, however, a possible impact on the researchers’ interpretation of the results during their analyses is also recognized.

**Meta-analysis – definition and main characteristics**

Meta-analysis is a term which describes different techniques regarding data synthesis and analysis (Allen, 2009). It should be emphasized that the unit of currency in a meta-analysis is the effect size. The latter one presents the strength of any relationship between two variables. Hence, an effect size for each study is computed which the researcher works with in order to evaluate the consistency of the effect across studies and to generate a summary effect. Moreover, a confidence interval for the effect size of each study is provided which describes
the precision of estimating the effect size in the particular study. A study’s precision determines the importance of each academic paper in the literature, called a study weight. Therefore, more weight is assigned to studies with relatively good precision, whereas studies with relatively poor precision get less weight. When the summary effect is computed, each study weight is taken into account. In addition, a p-value is shown for each study to test the null hypothesis, described earlier in this chapter, which helps the researcher to identify the statistically significant studies (Borenstein, Higgins and Rothstein, 2009).

Despite some of the similarities between a meta-analysis and a narrative review, there is a major difference between the two research strategies. Theoretical and empirical reviews often generate mismatches in terms of measurement, stimuli, samples etc. Meta-analysis provides the scholars with the great opportunity to examine and test systematically whether those mismatches actually contribute to variability in observed empirical outcomes. Moreover, it shows whether methodological features really contribute to variability as well as generates an estimate of the extents and the specific direction these features change results (Borenstein, Higgins and Rothstein, 2009).

One of the main reasons for a researcher to conduct a meta-analysis is led by their desire for more detailed quantitative understandings than could be achieved with a narrative literature review. However, meta-analysis is not a substitute to a narrative review; instead it complements it with better evidence for the conclusions that are made of any narrative summary. This means that the narrative review gets improved when it is combined with a meta-analysis, otherwise without the application of some type of meta-analysis it “remains difficult to evaluate, replicate, or challenge” (Allen, 2009, p. 398).

As mentioned earlier, the main purpose of the synthesis is to understand the results of each study in the context of all the other ones. The first step is to determine whether the effect size is consistent or not across the body of data. If it is consistent, then it should be precisely estimated and reported that it is robust across the various studies being part of the synthesis. However, if it differentiate greatly from study to study, then the extent of variance should be estimated and the implications should be considered. Therefore, meta-analysis is able to address the above mentioned issues whereas the narrative review is not (Borenstein, Higgins and Rothstein, 2009).

In other words, the problem that occurs while doing a classic narrative review (called also vote counting review because the majority of the scholars count the number of significant vs non-
significant findings to draw a conclusion) is the inability to precisely identify the random appearance of Type I and Type II error (Allen, 2009).

When a researcher establishes a conclusion relied on the significance test, this creates a fundamental statistical problem. The significance test has 2 sources of error:

- **Type I error** – also called false positive or alpha error; theoretically it occurs about 5% of the time and represents the level of random appearance that reflects the probability levels for the significance test;
- **Type II error** – also called false negative or beta error; it occurs about 50% of the time which means that 50% of non-significant findings are random Type II errors. It consists of combination of three factors – Type I error, the size of effect and the size of sample (Hunter and Schmidt, 2004; Allen, 2009).

The main feature of meta-analysis is to reduce the Type II errors by combining samples and represent an average effect related to the properties of the combined samples. In this way a more accurate estimate of the population parameter would be provided. Meta-analysis moves the literature form single sample estimates regarding the significance of a relationship to a more precise estimate of the population parameter across a set of combined empirical examples (Allen, 2009).

Usually, a meta-analysis has the following steps (Allen, 2009) which the author of this paper has strictly followed:

- Literature search;
- Conversion/correction of statistical information;
- Estimation of average effect;
- Consideration of sources of variability (see Appendix A)

In order to estimate the average effect, two popular statistical models used for meta-analysis should be distinguished – the fixed-effect model and random-effects model. The fixed-effect model is represented only by one true effect size that combines all the studies in the analysis. According to this model, all the differences in observed effects are caused by sampling error. In opposition to fixed-effect model is random-effects one which allows the true effect size to vary, i.e. there is a possibility that all studies share a common effect size, on the other hand, there is a possibility that the effect size differs from study to study. Due to different mixes in
participants or implemented interventions in the various studies, there are diverse effect sizes (Borenstein et al, 2010).

The author of this paper claims that the random-effects model is the most convenient for the current research since the studies included in the analysis have different samples in terms of size, independent and control variables, participants etc. In addition, Borenstein et al. (2010) argue that the random-effects model would be the more appropriate choice because it:

- Has more potential to fit the actual sampling distribution;
- Does not cause a restriction on the common effect size;
- Presents the identical results as the fixed-effect model if there is no heterogeneity;
- Generalizes the meta-analysis’ conclusion to a broader range of situations.

To conclude, meta-analysis is a requirement for quantitative social scientist who meet the objectives represented by empirical investigation. It reduces an important source of inconsistent findings and provides better understanding of the analyzed phenomenon (Allen, 2009).

Data collection

The first stage in collecting the data focused on searching scholarly peer-reviewed articles in the major academic and practitioner journals. Three major online databases were assessed: EBSCO, JSTOR and ScienceDirect. EBSCO was assessed in October 2014, whereas JSTOR and ScienceDirect were assessed in November 2014. In addition to that, CBS Library database was assessed in November 2014 since it unites numerous databases including the above mentioned ones. Since the topic of reverse knowledge transfer is relatively new and there are not many articles investigating it, no publication date frame was selected to narrow down the research. To identify the main articles in this field, the keywords used for the search were: reverse knowledge transfer; reverse knowledge flow; vertical knowledge outflow; knowledge transfer AND headquarters AND subsidiary/ies.

The main criterion for selecting the articles which are included in the analysis is that reverse knowledge transfer is a dependent variable in the study. In this way, the author could collect the necessary data to analyze the relationship between the various factors (independent variables) and RKT (dependent variable) and to evaluate the strength if such a relationship exists.
In order to identify the main articles during the research process in the various databases, the researcher read thoroughly the abstracts of all the studies that had included the term knowledge transfer and MNC in their articles. When the researcher had doubts whether an article analyzes the conventional, lateral and/or reverse knowledge transfer, the development of hypotheses part was further carefully read.

However, no selection criterion of high ranking or specific journals was applied due to the newness of the topic, as mentioned earlier, therefore, in order to provide a wide range overview of the work in this area, all journals were considered relevant for the current study. In this first stage of data collection, 45 articles were selected for inclusion in the meta-analysis.

In the second stage of data collection, the selected articles were downloaded and reviewed so that the author could see whether they report the necessary for the meta-analysis statistics – population, correlation coefficient and/or zero-order correlation matrix of the dependent as well as independent variables. Due to lack of data, 17 articles were excluded after the initial review. Moreover, articles that investigate the knowledge outflow of a focal subsidiary but did not make a clear distinction as well as provide separate data for subsidiary’s vertical (to the HQ) and lateral (to peer subsidiaries) knowledge transfers, were excluded from the study. The remaining 28 articles were thoroughly read by the author while examining their references in order to locate additional studies that the other searches were unable to capture.

After the second stage of data search, 13 articles were excluded from the study (Appendix B) due to one of the following reasons - the article:

- does not provide the necessary data for conducting a meta-analysis;
- does not provide separate data for subsidiary’s vertical and lateral knowledge outflow (which were not detected during the first stage);
- analyzes the benefits of RKT to the HQ;
- uses the same sample as another article included in the study.

All in all, 15 academic papers constitute the dataset of the current study with a population of 3,352 firms (see Table 3).
### Table 3: Studies included in the current meta-analysis

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Article</th>
<th>Journal</th>
<th>Publication year</th>
<th>Population (firms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barnard</td>
<td>Emerging multinationals benefiting from subsidiaries located in more developed countries: drivers for the sharing capabilities</td>
<td>Innovation and Development</td>
<td>2011</td>
<td>53</td>
</tr>
<tr>
<td>Borini et al.</td>
<td>The reverse transfer of innovation of foreign subsidiaries of Brazilian multinationals</td>
<td>European Management Journal</td>
<td>2012</td>
<td>66</td>
</tr>
<tr>
<td>Crespo et al.</td>
<td>The performance effects of vertical and horizontal subsidiary knowledge outflows in multinational corporations</td>
<td>International Business Review</td>
<td>2014</td>
<td>1008</td>
</tr>
<tr>
<td>Gupta &amp; Govindarajan</td>
<td>Knowledge Flows Within Multinational Corporations</td>
<td>Strategic Management Journal</td>
<td>2000</td>
<td>374</td>
</tr>
<tr>
<td>Håkanson and Nobel</td>
<td>Organizational Characteristics and Reverse Technology Transfer</td>
<td>Management International Review</td>
<td>2001</td>
<td>75</td>
</tr>
<tr>
<td>Mudambi et al.</td>
<td>Reverse Knowledge Transfer in MNEs: Subsidiary Innovativeness and Entry Modes</td>
<td>Long Range Planning</td>
<td>2014</td>
<td>293</td>
</tr>
<tr>
<td>Najafi-Tavani et al.</td>
<td>The interplay of networking activities and internal knowledge actions for subsidiary influence within MNCs</td>
<td>Journal of World Business</td>
<td>2014</td>
<td>184</td>
</tr>
</tbody>
</table>
Data analysis

The researcher of the paper has focused on the meta-analytical techniques developed by Hunter and Schmidt (Hunter and Schmidt, 1990). The Pearson product-moment correlation $r$ was used to estimate the direction and magnitude of the relationship between the different variables and RKT. When other translatable statistics, such as t-test, were available, they were converted into the $r$-statistic. To address the problem of conceptual replication, the author ascertained that studies were independent and had no overlapping samples. Following previous meta-analytical reviews, if multiple studies were based on the same dataset with the same variable, only the

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1 There is a typo mistake in the Meta-analysis – results chapter where Najafi-Tavani et al.’s study (2012) is stated to be published in 2011. However, it is officially published in 2012.
effect size of one study was included. If datasets were the same but variable differed, the effect sizes were maintained separately.

Sample sizes were directly taken from the method and results sections of the articles included in the study. Classification of the study variables was based on the descriptions of the measures. Following previous meta-analyses, meta-analytic estimates are provided when at least three independent effect sizes were available. This is the reason why not all factors that potentially have an impact on RKT are included in the current study. However, Appendix C provides information regarding the excluded independent variables due to limited effect sizes.

In order to conduct the meta-analysis, the researcher has used the specifically created for this purpose software programme Comprehensive Meta-Analysis produced by Biostat, Inc. and developed by Michael Borenstein and his team.

A key issue of meta-analysis is whether there is a publication bias in the included in the analysis studies which is likely to be reflected in the meta-analysis. In other words, studies that report relatively high effect sizes are more likely to be published compared to studies with lower effect sizes (called file drawer problem) (Borenstein, Higgins and Rothstein, 2009). In order to address this issue, the researcher tested whether the 95% confidence intervals did overlap zero. As Figure 2 shows that the correlation of all researched factors on RKT is 0.144 whereas 95% confidence interval is 0.069 to 0.218, \( p < 0.001 \). The researcher presents also a funnel plot (Figure 3) which is another mechanisms for displaying the presence of any publication bias. If a publication bias is present, studies are expected to be symmetric at the top, a few studies missing in the middle, and more studies missing near the bottom (Borenstein, Higgins and Rothstein, 2009). The fact that five out of fifteen studies are statistically significant as well as the missing studies at the bottom of the forest plot makes the researcher to suspect that the current study could be publication biased. Therefore, the author has decided to test Rosenthal’s Fail-safe N (Rosenthal, 1979), which provides information regarding how many missing studies would need to be retrieved and incorporated in the analysis before the \( p \)-value became insignificant. In this case, the researcher would have missed 194 studies to make the findings of this paper non-significant, thus the results appear to be robust.

Furthermore, the author of this paper decided to do a sensitivity analysis with and without the studies of Strube and Berg (2011) and Hákanson and Nobel (2001) (Appendices D, E and F). A sensitivity analysis is another mechanism that determines how robust the findings are, i.e. how the findings would shift if some of the assumptions were changed while performing the
**Figure 2:** 95% confidence intervals of the included studies

<table>
<thead>
<tr>
<th>Model</th>
<th>Study name</th>
<th>Outcome</th>
<th>Statistics for each study</th>
<th>Correlation and 95% CI</th>
<th>Weight (Random)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Correlation: -0.136, Upper Limit: 0.440, Z-Value: 1.301, p-Value: 0.167</td>
<td>1.00, -0.50, 0.00, 0.50, 1.00</td>
<td>4.30</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Correlation: -0.391, Upper Limit: 0.683, Z-Value: 3.661, p-Value: 0.000</td>
<td>1.00, -0.50, 0.00, 0.50, 1.00</td>
<td>4.97</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Correlation: -0.179, Upper Limit: 0.259, Z-Value: 5.743, p-Value: 0.000</td>
<td>1.00, -0.50, 0.00, 0.50, 1.00</td>
<td>5.37</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Correlation: -0.023, Upper Limit: 0.478, Z-Value: 0.450, p-Value: 0.653</td>
<td>1.00, -0.50, 0.00, 0.50, 1.00</td>
<td>6.47</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Correlation: 0.188, Upper Limit: 0.286, Z-Value: 1.637, p-Value: 0.106</td>
<td>1.00, -0.50, 0.00, 0.50, 1.00</td>
<td>5.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Correlation: 0.089, Upper Limit: 0.238, Z-Value: 1.165, p-Value: 0.244</td>
<td>1.00, -0.50, 0.00, 0.50, 1.00</td>
<td>7.14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Correlation: 0.119, Upper Limit: 0.257, Z-Value: 1.524, p-Value: 0.127</td>
<td>1.00, -0.50, 0.00, 0.50, 1.00</td>
<td>7.10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Correlation: 0.130, Upper Limit: 0.249, Z-Value: 2.221, p-Value: 0.036</td>
<td>1.00, -0.50, 0.00, 0.50, 1.00</td>
<td>6.13</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Correlation: 0.110, Upper Limit: 0.253, Z-Value: 1.603, p-Value: 0.144</td>
<td>1.00, -0.50, 0.00, 0.50, 1.00</td>
<td>7.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Correlation: 0.200, Upper Limit: 0.487, Z-Value: 5.175, p-Value: 0.000</td>
<td>1.00, -0.50, 0.00, 0.50, 1.00</td>
<td>7.21</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Correlation: -0.071, Upper Limit: 0.486, Z-Value: 1.056, p-Value: 0.296</td>
<td>1.00, -0.50, 0.00, 0.50, 1.00</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Correlation: 0.065, Upper Limit: 0.183, Z-Value: 1.063, p-Value: 0.288</td>
<td>1.00, -0.50, 0.00, 0.50, 1.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Correlation: 0.157, Upper Limit: 0.945, Z-Value: 1.530, p-Value: 0.126</td>
<td>1.00, -0.50, 0.00, 0.50, 1.00</td>
<td>5.86</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Correlation: 0.651, Upper Limit: 0.758, Z-Value: 3.889, p-Value: 0.000</td>
<td>1.00, -0.50, 0.00, 0.50, 1.00</td>
<td>2.68</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Correlation: -0.547, Upper Limit: 0.146, Z-Value: 0.474, p-Value: 0.635</td>
<td>1.00, -0.50, 0.00, 0.50, 1.00</td>
<td>6.06</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Correlation: 0.144, Upper Limit: 0.260, Z-Value: 3.702, p-Value: 0.000</td>
<td>1.00, -0.50, 0.00, 0.50, 1.00</td>
<td>4.30</td>
</tr>
</tbody>
</table>

**Figure 3:** Forest plot of the included articles

Funnel Plot of Standard Error by Fisher’s Z
analysis. Since Strube and Berg’s (2011) study has the greatest effect size that differs remarkably compared to the rest of the included articles, made the researcher doubt that it is publication biased. Furthermore, Hákanson and Nobel’s (2001) study sample is biased towards larger R&D units, therefore, the researcher assumed that excluding it from the analysis might have changed the findings. Nonetheless, since results on the separate independent variables did not significantly altered (change in the correlation coefficient $r$ of less than 0.1) without the empirical data of the above-mentioned studies, the researcher have decided to include them in the final analysis.

**Construct of variables**

The dependent variable of the current study is reverse knowledge transfer. It is measured by the extent to which the subsidiary provides knowledge and skills to the parent corporation in terms of marketing know-how; distribution know-how; packaging design/technology; product designs; process designs; purchasing know-how; management systems and practices (Gupta and Govindarajan, 2000); financial resources (Yang et al., 2008); knowledge about local basic conditions (e.g. legal and/or tax systems) as well as local market conditions (e.g. client data and preferences) and competitor details (Strube and Berg, 2011; Reiche, 2011).

The independent variables of the study are related to knowledge, organizational and network characteristics. Knowledge characteristics in the current study are related to knowledge codification which is measured by the extent to which the transferred knowledge could be stored in written form such as documents, manuals, reports etc.

Organizational characteristics include: 1) the entry mode of the MNE into the host country which is determined by whether the subsidiary became part of the MNC as an acquisition (coded 1) or greenfield operation (coded 0). 2) Subsidiary innovativeness measured by the creation of new products, processes and/or technologies and improvement of existing ones. 3) Subsidiary autonomy which is estimated by extent to which the subsidiary could affect the decision-making regarding the definition of R&D projects, planning, resources; changes and product/services; introduction of new technologies; formulation of the subsidiary’s annual budget; hiring and firing of the subsidiary workforce (Gupta and Govindarajan, 2000). 4) Subsidiary capabilities determined by the different competencies the subsidiary possess compared to their peer-units on functions ranging from R&D to logistics and marketing to
management of international activities. 5) Subsidiary age which is estimated by the difference between the year when the subsidiary is part of the MNC to the year of the sample collection, and 6) subsidiary size presenting the number of employees in the subsidiary.

Network characteristics are presented by: 1) subsidiary dual embeddedness which is estimated by its external embeddedness (frequency of contacts and number of ongoing cooperative projects with local partners) and its internal embeddedness (the extent of mutual adoption of practices/activities as well as strong working relationship; trust delegated to the subsidiary; exchange of information; and understanding (by the parent company) the subsidiary’s responsibilities (Birkinshaw and Morrison, 1995)). 2) Communication between the focal subsidiary and the HQ measured by their frequency of communication via face-to-face; telephone or video conference; routine and periodic formal reports, and electronic or paper-based letters or memos (Gupta, Govindarajan and Malhotra, 1999). 3) Corporate socialization mechanisms which are estimated by the use of international taskforces, international training programs, informal communication, movement of employees/top managers between the two firms. 4) Motivational disposition measured by the extent to which a subsidiary committed physical, financial, organizational and logistical resources to transfer its knowledge to the HQ as well as the extent to which the parent company motivated/encouraged (financially or emotionally) a subsidiary to transfer its knowledge. 5) Cultural distance which is determined by a possible confounding effects related to the location of the subsidiary measured through Kogut and Singh’s (1988) index².

Limitations

During the search process of articles, the author have noticed that most scholars use the platform ABI/INFORM in order to identify studies for their meta-analysis. However, the researcher of this paper did not have access to the mentioned platform as a CBS student (CBS library does not have a subscription to it), therefore, it was not included in the research methodology. Furthermore, after the data collection and while examining the references of the included articles, the researcher realized that as a student at CBS, she did not have access to certain

² Kogut and Singh’s index for measurement of cultural distance is: \( CD_j = \frac{\sum_{i=1}^{4} \left\{ (\text{i}_{ij} - \text{i}_{jp})^2 / \text{V}_i \right\}}{4} \) where CD\(_j\) stands for the cultural distance between the j\(_{th}\) country (i.e. headquarters country) and the subsidiary\(_j\)'s home country, \( \text{i}_{ij} \) is the index of the i\(_{th}\) cultural dimension (e.g. individualism, power distance, masculinity-femininity and uncertainty avoidance) and j\(_{th}\) country, \( \text{i}_{jp} \) is the cultural dimension index for the subsidiary's home country (p), and \( \text{V}_i \) is the variance of the index in the i\(_{th}\) dimension.
studies, thus they were not showed in the search results. Therefore, there might be a possibility that an important article in this field is not included in the current analysis.

On the other hand, a lot of researchers decide not to include studies in their meta-analyses that have not been published in peer-review journals since they are expected to be of lower quality. However, according to Borenstein, Higgins and Rothstein (2009) journal reviews do not assure high quality of a study, moreover, it is not the only mechanism that can give this assessment. They state that “not all researchers aim to publish their research in academic journals.” (p. 279). Therefore, papers with high quality are unlikely to be published in an academic journal if their authors are not pursuing an academic career. Thus, the researcher was also limited to have access to unpublished studies that have investigated RKT and could contribute to the current meta-analysis.

The time given for the thesis and the period chosen for data collection are also seen as a limitation. The data collection was conducted in October and November 2014, therefore, any articles, examining the phenomenon of reverse knowledge transfer and potential factors that influence it, published after the data collection are not included in the analysis.

Moreover, not all variables that influence the extent of RKT could be included in the research due to a very small number of studies that examine their relation to the knowledge transfer from the focal subsidiary to the HQ. However, the researcher notices that some of the excluded variables can potentially have an important effect on the degree of RKT which could provide more detailed explanation on the phenomenon. In addition, the relatively small number of original studies addressing specific relationships is also recognized as a limitation. For instance, the researcher found only three studies examining the association of motivational disposition with RKT, hence this limited number of studies could potentially affect the effect size found in the analysis.

The author of the current paper had to omit numerous studies from the meta-analysis due to insufficient data regarding the computation of effect sizes. The limitation of missing data in primary studies highlights the need for more comprehensive reporting of the research results in published articles, therefore, statistical tests or at least zero-order correlation matrix should be reported in the articles (Eden, 2002; Allen, 2009).

Furthermore, meta-analytic findings might be limited by “systematic or widely shared feature of the original studies” (Wijk et al., 2008; p. 846). Hence, the researcher should be cautious in
imputing causality to the meta-analytic relationships investigated under the current study since the majority of the studies were cross-sectional in nature. Thus, in order to better assess the temporal stability of the findings and provide more detailed understanding of the casual relationships between the variables of interest in the present paper, a longitudinal analysis would be worth conducted.
Meta-analysis – results

This chapter presents the findings of the conducted meta-analysis where each of the 12 hypotheses is presented by a separate meta-analytic table. The analysis helps the author to clarify what impact the 12 variables included in the current study have on the extent of reverse knowledge transfer in multinational corporations. However, a detailed discussion of the results is provided in the following chapter.

Table 4: Meta-analysis for hypothesis 1: The more codifiable the new knowledge created by the focal subsidiary, the greater the extent of RKT.

Table 5: Meta-analysis for hypothesis 2: Greenfield subsidiaries are positively associated to the extent of RKT.
Table 6: Meta-analysis for hypothesis 3: The higher the subsidiary innovativeness, the higher the degree of RKT.

Table 7: Meta-analysis for hypothesis 4: The greater autonomy the focal subsidiary possess, the lower the extent of knowledge transfer from the former one to the HQ.

Table 8: Meta-analysis for hypothesis 5: The higher the capabilities of the focal subsidiary, the higher the degree of RKT.
Table 9: Meta-analysis for hypothesis 6: The older the subsidiary is, the greater the extent of RKT.

Table 10: Meta-analysis for hypothesis 7: The larger the subsidiary is, the higher the degree of its vertical knowledge outflow.
Table 11: Meta-analysis for hypothesis 8: Subsidiary dual embeddedness will be positively related to the degree of outflow from the focal subsidiary to the HQ\(^3\).

<table>
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<th>Model</th>
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<th>Statistics for each study</th>
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Table 12: Additional meta-analysis for hypothesis 8 regarding subsidiary external embeddedness.

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Table 13: Additional meta-analysis for hypothesis 8 regarding subsidiary internal embeddedness.

\(^3\) The outcome “Combined” presents the mean of subsidiary internal and external embeddedness provided by a common sample. The data for internal and external embeddedness cannot be analysed separately when their outcomes come from the same group of people because assuming independence will negatively affect the precision of the point estimate.
Table 14: Meta-analysis for hypothesis 9: The more frequent the communication between the focal subsidiary and the HQ, the greater the extent of RKT.\(^4\)

Table 15: Meta-analysis for hypothesis 10: The employment of more corporate socialization mechanisms will have a positive relation to the extent of RKT.

\(^4\) The outcome “Combined” presents the mean of personal-based and electronic-based coordination mechanisms, which describes the two types of transmission channels between the focal subsidiary and the HQ, provided by a common sample. The data for personal- and electronic-based coordination mechanisms cannot be analyzed separately when their outcomes come from the same group of people because assuming independence will negatively affect the precision of the point estimate.
Table 16: Meta-analysis for hypothesis 11: Subsidiary willingness to share its knowledge will be positively associated with the degree of vertical knowledge flows to the parent company.

Table 17: Meta-analysis for hypothesis 12: Cultural distance does not have an impact on the extent of RKT.
Discussion

Prior research has indicated that the more codifiable the knowledge is, the easier its transfer would be (Zander, 1991; Dhanaraj et al., 2004). However, that does not mean that firms will transfer mainly explicit knowledge because of its nature. The results of the meta-analysis show a weak positive relation of knowledge codification to the extent of reverse knowledge transfer (Table 4) with $r = 0.138$, $p > 0.1$, nevertheless, it is not significant, thus hypothesis 1 is not supported.

As it has been discussed in the Literature review chapter (p. 15) tacit knowledge brings more value to the MNC than explicit one due to its uniqueness, rarity and difficulty to imitate by rivals which contribute continuously to the corporation’s competitive advantage (Barney, 1991; Dhanaraj et al., 2004). Therefore, despite its easiness to transfer, explicit knowledge might not be attractive, valuable and beneficial to the HQ as tacit one.

Table 5 shows a support for hypothesis 2 that greenfield subsidiaries are positively associated to the extent of RKT compared to acquired units. Entry mode was a dummy variable in all of the included studies, thus it is a dummy variable in the current one as well, indicating 1 for acquired subsidiaries and 0 for greenfield subsidiaries. In other words, if $r$ was positive, then the results would be in favor of acquired units. However, in this study $r$ equals -0.027, i.e. greenfield units are related to higher knowledge transfers to the parent firm.

The results in favor of greenfield subsidiaries could be explained by the common language, culture and routines it has with the parent firm since its establishment which facilitates reverse knowledge transfer (Mudambi et al., 2014). Even though acquired subsidiaries had more time to absorb and generate new knowledge that could be beneficial to the HQ, the RKT is more difficult compared to knowledge created by a greenfield subsidiary due to the weaker integration of the acquired unit into the corporate network (Anand, 2011). Moreover, the organizational structure and routines of the latter one are quite different from those of the other parts of the MNC, therefore, great efforts are required for the adaptation of processes and systems for RKT (Borini et al. 2012, Mudambi et al. 2014).

Evidence indicate a strong and significant effect of subsidiary innovativeness on the extent of reverse knowledge transfer in the MNC (Table 6; $r = 0.288$, $p < 0.01$) which supports hypothesis 3. Hence, subsidiaries that innovate more are more likely to create valuable, unique and non-
duplicative knowledge which could be beneficial to their parent firm (Papanastassiou & Pearce, 1997; Pearce, 1999; McDonald et al., 2005). By contrast, subsidiaries that have low level of innovativeness, will not have much knowledge in stock that potentially could be leveraged to the headquarters. Moreover, a subsidiary that has high innovativeness will more easily attract HQ’s attention, respectively the greater the degree of RKT will be (Mudambi et al., 2014).

However, the author of this paper has decided to combine subsidiary roles and subsidiary innovativeness due to their complementary nature. Subsidiary roles, as described in Table 2 (p. 12), could be divided into three groups:

- Subsidiaries adapting products to local market needs, thus they are characterized with low innovativeness;
- Subsidiaries exploiting the corporations’ technological competences on a global level – they are characterized with a higher extent of innovativeness than the previous group;
- Subsidiaries creating new technological competencies abroad – they have the highest innovativeness among the subsidiaries (Ambos and Schlegelmilch, 2007; Rabbiosi, 2011).

Prior research indicates that competence-creating subsidiaries (Cantwell and Mudambi, 2005; Yang et al., 2008), Contributor and Innovators (Ghoshal, 1986; Rabbiosi, 2011) and Integrated Players (Gupta and Govindarajan, 2000), contribute the most to the enterprise’s competitive advantage by transferring created by them knowledge. All of the above mentioned subsidiary types are characterized with very high level of innovativeness, therefore, the author of this paper found it convenient to combine subsidiary roles and innovativeness into one variable.

A very weak positive relationship is found between the subsidiary autonomy and the degree of RKT (Table 7) with a correlation coefficient equal to 0.052 and p-value of 0.538 (p>0.1) which means that this relationship is not significant. However, a sensitivity analysis was made by excluding the study of Strube and Berg (2011) (for more details see Data analysis section in Methodology chapter) showing that r = -0.046 with a p-value = 0.471 (p > 0.1) (appendix D). Hence, without Strube and Berg’s study, results indicate that there is a weak negative relationship between subsidiary autonomy and RKT, nevertheless, it is also not significant. Thus, evidence shows that subsidiary autonomy does not influence the extent of knowledge transfer from the foreign subsidiary to its parent firm which rejects hypothesis 4.
According to Harzing and Noorderhaven (2006) and Rabbiosi (2011) the academic literature presents controversial evidence regarding the direct effect of subsidiary autonomy on the extent of the knowledge flows from daughter firm to the parent firm due to their failure to relate subsidiary autonomy to subsidiary roles. In other words, subsidiary autonomy’s impact on RKT cannot be separately taken into consideration from the subsidiary roles as well as, according to Rabbiosi (2011), from the use of the two communication mechanisms, namely personal- and electronic based mechanisms. Hence, subsidiary autonomy has a different effect on the degree of RKT depending on the role the sub-unit has within the MNC.

Table 8 shows statistically significant positive relationship between subsidiary capabilities and knowledge transfer from the focal subsidiary to the HQ with $r = 0.182$ and $p$-value < 0.01 which supports hypothesis 5. Subsidiaries that have strong capabilities in terms of operational, technological, organizational and marketing activities are more likely to generate new and unique knowledge that is relevant to the HQ’s needs, thus they transfer more knowledge to the parent firm than subsidiaries with weak capabilities, which receive more knowledge from the HQ (Foss and Pedersen, 2002). Moreover, the stronger capabilities the subsidiary has, the greater its ability to attract HQ’s attention about the knowledge they possess, respectively increases the extent of vertical knowledge outflow from the former one. In addition, if subsidiary’s particular specialized capabilities are recognized by the corporation, it may lead to granting of a world product mandate, respectively a formation of a “center of excellence” within the MNC (Birkinshaw and Hood, 1998; Holm and Pedersen, 2000; Blomkvist et al., 2014). Becoming a center of excellence, the subsidiary is very likely to have developed capabilities that are characteristic of a competence-creating subsidiary (Blomkvist et al., 2014) which, as discussed previously, is positively related to the extent of RKT.

An interesting result shows Table 9 regarding the effect the subsidiary age has on the degree of RKT. A very weak and statistically non-significant relationship is found between the two variables indicating that subsidiary age has no impact on the knowledge transfer from the focal subsidiary to the HQ ($r = 0.079$, $p > 0.1$), thus hypothesis 6 is not supported. Prior research has indicated that the older the subsidiary is, the more integrated it is into its local environment, respectively generates more new knowledge (Zander, 1999; Minbaeva et al., 2003). Despite that fact, with increasing its age, the subsidiary becomes more externally embedded, while its internal embeddedness decreases (Hákanson and Nobel, 2001) which potentially can cause decrease in RKT. Hákanson and Nobel (2001) find support to their hypothesis that with age, the greenfield subsidiaries become less integrated within the MNC, whereas for acquisitions...
there is an inversely U-shaped relationship between integration and age. In other words, at the early stages of the unit’s acquisition, the level of its integration are very low due to different routines, processes, culture etc. (Anand, 2011; Mudambi et al., 2014). However, with age their integration within the MNC increases and after 10-15 years it reaches the level of integration of greenfield units. Thereafter, Hákanson and Nobel (2001) state that acquisition’s integration begins to decline.

To sum up, a possible explanation for not finding a support to the hypothesis that older subsidiaries are positively associated to the extent of RKT, could be that with age the daughter firms become less internally embedded, which will hinder knowledge transfer from the sub-unit to its parent firm. Because as it will be discussed further below, internal embeddedness has a strong positive and statistically significant impact on the subsidiary vertical knowledge outflow.

Moreover, Blomkvist et al. (2014) find a very weak partial evidence that with growing age subsidiaries generate more knowledge (in terms of new technology in their case). Additional analyses indicated that younger subsidiaries are associated with faster entry into new technologies rather than old ones (Blomkvist et al., 2014).

By contrast, table 10 shows positive and statistically significant association of subsidiary size with the degree of RKT ($r = 0.132$, $p < 0.01$), hence supporting hypothesis 7 that larger subsidiaries engage more in knowledge transfer to the HQ. As Gupta and Govindarajan (2000) state, larger subsidiaries have greater pool of resources to create new, unique and non-duplicative knowledge. Moreover, larger subsidiaries are more likely to develop strong capabilities compared to their smaller peer-units (Noorderhaven and Harzing, 2009; Crespo et al. 2014).

Furthermore, subsidiary dual embeddedness is shown to have a positive impact on the extent RKT ($r = 0.166$; $p < 0.1$) which supports, even though weakly, hypothesis 8 (Table 11). Prior research has indicated that subsidiaries that are embedded into the local environment have more unique and valuable knowledge output. However, in order the MNC to gain benefit from this knowledge, the subsidiary should be internally embedded, i.e. integrated into the MNC network, which will facilitate the knowledge leverage process from the focal sub-unit to the parent firm (Frost, 1998; Forsgren et al., 2005; Yamin and Andersson, 2011) as well as will make the HQ aware of the new competencies available in their subsidiaries.
However, an interesting results are presented by the analysis on the relationship between external embeddedness and the degree of RKT. With a correlation coefficient of 0.092 and p-value > 0.1, evidence indicate that external embeddedness does not have any influence on the extent of RKT (Table 12). By contrast, internal embeddedness, with r = 0.265 and p < 0.01, has a statistically significant and positive influence on the high knowledge flows from the subsidiary to the HQ (Table 13). Thus, it could be concluded that external embeddedness plays a crucial role in the subsidiary knowledge output (Cantwell, 1995; Andersson et al., 2002; Cantwell and Mudambi, 2011), whereas internal embeddedness has a positive impact on the subsidiary vertical knowledge outflow.

Table 14 presents a strong positive effect of communication frequency between the subsidiary and its parent firm which is also statistically significant (r = 0.396, p < 0.01) on the extent of RKT, thus hypothesis 9 is supported. Rich communication between the daughter and the parent firms allows the latter one to get familiar with its sub-units knowledge and retrieve competencies that are relevant to its needs (Monteiro et al., 2008). Moreover, rich communication media such as face-to-face communication, teamwork, informal interaction etc. help the different parties to overcome the “transmission losses” that could occur during a complex knowledge transfer (Noorderhaven and Harzing, 2009). Additionally, Gupta and Govindarajan (2000) elaborate that the more developed the formal mechanisms such as task forces, permanent committees, liaison personnel etc. will integrate more tightly the subsidiary with the rest of the MNC units, which respectively will increase the extent of knowledge leverage to the parent company.

On the other hand, corporate socialization mechanisms such as corporate culture, joint business practices, regular visits, meetings and personnel exchanges have a positive effect on the degree of RKT, which is neither strong, nor statistically significant (p > 0.1), therefore, hypothesis 10 is not supported (Table 15). However, the author of the current paper have decided to do a sensitivity analysis without the study of Gupta and Govindarajan (2000) because in their paper, they argue that the possible explanations for the negative relationship found between socialization mechanisms and RKT is more likely to be due to “substitution effect among the independent variables and/or irreducible noise in the data” (p. 490). As it can be seen in Table 18, socialization coordination mechanisms would have a strong and significantly positive effect on the extent of subsidiary vertical knowledge outflow (r = 0.244, p < 0.001) without their study. Therefore, the researcher cannot generalize based on the current results what impact the corporate socialization mechanisms have on the extent of RKT and claims that the relationship...
between the two variables remains rather unclear, hence future research shall elaborate on the association of corporate socialization mechanisms with the degree of RKT.

**Table 18: Meta-analysis on the relationship between socialization coordination mechanisms and the extent of RKT excluding Gupta and Govindarajan’s study (2000)**

A weak relationship \( r = 0.138 \) but significant at \( p < 0.1 \) is found between motivational disposition and the degree of knowledge flow from the focal subsidiary to the headquarters, hence, hypothesis 11 is supported (Table 16). Therefore, evidence indicate that despite of the knowledge uniqueness and/or relevance (Gupta and Govindarajan, 2000; Yang et al., 2008), competencies are more likely to be transferred if the knowledge holder has the willingness to share its knowledge. In case the knowledge holder decides not to share its competencies and to enjoy an “information monopoly” within the enterprise (Cyert, 1995), it implies that the sub-unit tries to acquire and retain relative power within the MNC in terms of corporate decision making, global products etc. (Gupta and Govindarajan, 2000). However, this issue could be solved if the subsidiary knowledge holder is, for instance, offered a career development as a reward (Leana and Van Buren, 1999).

Table 17 provides data indicating that cultural distance does not have an impact on the extent of RKT \( r = 0.031, p = 0.817 \), thus hypothesis 12 is supported. Other studies have also found no influence of cultural distance on subsidiary vertical knowledge outflow (Ambos et al., 2006; Zhou and Frost, 2003). This evidence supports that headquarters can obtain knowledge from subsidiaries in culturally distant countries, meanwhile it could be concluded that even though cultures, languages, institutional frameworks and shared values differentiate between the focal subsidiary and the HQ, they do not have a negative impact on the levels of RKT. Additionally,
Granovetter (1973) states that subsidiaries operating in a different context which are not regularly communicating with the rest of the MNC network, i.e. have weak network ties, are able to introduce new knowledge, hence they are perceived as a vital source of innovation.

However, Table 19 presents a summary of the 12 hypotheses, the expected results as well as the outcome of the meta-analysis.

**Table 19: Summary of the meta-analysis results**

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Expected sign</th>
<th>Meta-analysis result</th>
</tr>
</thead>
<tbody>
<tr>
<td>The more codifiable the new knowledge created by the focal subsidiary, the greater the extent of RKT</td>
<td>positive</td>
<td>not supported</td>
</tr>
<tr>
<td>Greenfield subsidiaries are positively associated to the extent of RKT.</td>
<td>positive</td>
<td>supported</td>
</tr>
<tr>
<td>The higher the subsidiary innovativeness, the higher the degree of RKT</td>
<td>positive</td>
<td>supported</td>
</tr>
<tr>
<td>The greater autonomy the focal subsidiary possess, the lower the extent of knowledge transfer from the former one to the HQ</td>
<td>negative</td>
<td>not supported</td>
</tr>
<tr>
<td>The higher the capabilities of the focal subsidiary, the higher the degree of RKT</td>
<td>positive</td>
<td>supported</td>
</tr>
<tr>
<td>The older the subsidiary is, the greater the extent of RKT</td>
<td>positive</td>
<td>not supported</td>
</tr>
<tr>
<td>The larger the subsidiary is, the higher the degree of its vertical knowledge outflow</td>
<td>positive</td>
<td>supported</td>
</tr>
<tr>
<td>Subsidiary dual embeddedness will be positively related to the degree of outflow from the focal subsidiary to the HQ</td>
<td>positive</td>
<td>supported</td>
</tr>
<tr>
<td>The more frequent the communication between the focal subsidiary and the HQ, the greater the extent of RKT</td>
<td>positive</td>
<td>supported</td>
</tr>
<tr>
<td>The employment of more corporate socialization mechanisms will have a positive relation to the extent of RKT</td>
<td>positive</td>
<td>not supported</td>
</tr>
<tr>
<td>Subsidiary willingness to share its knowledge will be positively associated with the degree of vertical knowledge flows to the parent company</td>
<td>positive</td>
<td>supported</td>
</tr>
<tr>
<td>Cultural distance does not have an impact on the extent of RKT</td>
<td>neutral</td>
<td>supported</td>
</tr>
</tbody>
</table>
Conclusion

The purpose of the study conducted is to assess the potential impact of twelve factors on the extent of knowledge transfer from the foreign subsidiary to the headquarters. The research question, which has shaped the study, is the following: “Which factors do have an impact on the extent of reverse knowledge transfer in multinational corporations?”

In order to answer the research question, the researcher has conducted a meta-analysis which synthesized and analyzed empirical data from 15 studies that have examined the relationship between the 12 factors included in the current inquiry and reverse knowledge transfer. By aggregating and consolidating existing research, this research paper represents a first step towards quantitatively summarizing the empirical literature related to RKT in MNCs.

After testing a set of hypotheses and evaluating the results from the conducted meta-analysis, the researcher is able to conclude that a strong positive and statistically significant impact on the extent of RKT has the communication frequency between the HQ and the focal subsidiary (which is presented by the highest correlation coefficient in the whole study), i.e. the richer the communication channels between the two parties, the higher the level of RKT. Additionally, the subsidiary high level of innovativeness as well as its high capabilities are factors that positively determine the extent of reverse knowledge leverage. The willingness of the daughter firm to share its competencies with the corporation is also an important determinant likewise the size of the sub-unit, in other words, the larger the subsidiary, the higher its vertical knowledge outflows.

The subsidiary dual embeddedness also affects positively the degree of RKT, however, evidence indicate that it is mainly the internal embeddedness that plays a crucial role in the reverse knowledge diffusion, whereas external embeddedness does not have any impact. However, prior research shows that external embeddedness is an important factor for subsidiary knowledge output (subsidiary innovativeness) (Andersson et al., 2002; Cantwell and Mudambi, 2011), thus, it could be stated that it has an indirect influence on the degree of RKT.

Furthermore, findings indicate that greenfield subsidiaries are positively associated to the extent of RKT compared to acquired units, even though the latter one has relatively more knowledge in stock (Anand, 2011) as well as is more likely to contribute to the overall MNC growth (Blomkvist et al., 2014). The reason for this is that greenfield subsidiaries are internally
embedded within the corporation from the very first day of their establishment which facilitates the knowledge transfer, whereas acquired subsidiaries need more time and resources to integrate into the MNC network in order to be able to leverage its unique competencies (Mudambi et al., 2014).

However, the meta-analysis has also presented some interesting results. Even though explicit knowledge is easier transferred rather than tacit, evidence shows that it would be wrong presuming it will be the preferred type of knowledge diffusion. On the contrary, prior research states that tacit knowledge would be the desired one from the HQ since it is unique, rare and difficult to imitate by competitors as well as it contributes more to the MNC’s competitive advantage (Barney, 1991; Gupta and Govindarajan, 2000; Dhanaraj et al., 2004).

Although a negative association of subsidiary autonomy with RKT was expected, results indicate that the former one does not have any impact on the knowledge flow from the sub-unit to the parent company. However, some scholars argue that a relationship between the two variables cannot be found because researches has failed to relate subsidiary autonomy to subsidiary roles (Harzing and Noorderhaven, 2006; Rabbiosi, 2011). Thus, it could be concluded that subsidiary autonomy has a different impact on RKT depending on the various subsidiary roles, i.e. there is an indirect relationship.

In addition, findings indicate that cultural distance does not hinder the process of RKT, hence the headquarters can obtain knowledge created and possessed by subsidiaries in culturally distant countries.

According to the results of the current meta-analysis, corporate socialization mechanisms do not have an effect on the extent of RKT. Nevertheless, the researcher has decided to do a sensitivity analysis on this relationship by excluding one of the studies since its authors were unable to explain the negative relationship their study has found between the two variables. As it has been discussed previously, without their empirical data, corporate socialization mechanisms would have a strong and statistically significant impact on RKT. Thus, the researcher believes that a further investigation on the relationship between the two variables is worth conducting in the future so that more clear explanation of the relationship could be provided.

Another interesting result presented by the meta-analysis is the relationship between subsidiary age and the degree of knowledge leverage from the daughter to the parent firm. It was assumed
that older subsidiaries would engage in higher RKT since they would be more integrated into their local environments, respectively would generate more knowledge. However, the meta-analysis did not confirm this hypothesis, indicating no relationship between the two variables. A possible explanation for this result could be that with time, subsidiaries become less integrated within the MNC (Håkanson and Nobel, 2001) which is an important determinant for the occurrence and extent of RKT. Besides, Blomkvist et al. (2014) find very weak partial evidence that older subsidiaries generate more knowledge than younger ones which could be positively related to RKT. However, a deeper research on this relationship would also be worth conducting in the future.

The study has provided a thorough investigation of the academic literature on the phenomenon reverse knowledge transfer as well as the factors that determine its extent, as it was required by the purpose set for the study. Its major contribution to the academic literature is solving numerous apparent contradictions regarding which of the 12 factors have a positive impact, which have a negative effect and which of the determinants have no influence on the extent of reverse knowledge transfer. By conducting a meta-analysis and synthesizing various studies, the author was able to make generalizations on some of the findings. However, the study has faced several limitations that need to be taken into consideration when analyzing the results. The main limitations include: no access to the biggest platform ABI/INFORM as well as unpublished papers which might have prevented the author to identify an important for the analysis study; exclusion of articles due to missing data necessary for conducting a meta-analysis which otherwise could have contributed with more detailed understanding of RKT to the analysis; a very small number of articles that are available in the academic literature investigating the relation of different factors to RKT, thus some variables were excluded from the study due to a non-sufficient empirical data, whereas other variables’ effect sizes found in the analysis might have been affected by a limited number of studies.

**Future research**

Although the conducted meta-analytical review takes a vital step towards better solving of the many existing ambiguities in the academic field regarding reverse knowledge transfer, the results indicate that the study has only just reached the starting point for future research. A deeper analysis is worth conducting regarding the relationship between subsidiary autonomy
and RKT so that a more detailed understanding between the two variables could be provided as well as whether subsidiary autonomy has an indirect effect on RKT as it is argued by some researchers (Harzing and Noorderhaven, 2006; Rabbiosi, 2011). Moreover, the relationship between corporate socialization mechanisms and RKT should also be further investigated due to the inconsistent results presented in the current study because of the sensitivity analysis conducted with and without the research of Gupta and Govindarajan (2000).

In addition, a major part of the academic literature has inquired reverse knowledge transfer as a unidimensional construct, i.e. a common theme across the studies was the investigation of the extent or the degree of RKT (which is also the primary construct in the current study). However, a further research of multiple dimensions of RKT beyond extent, for instance, speed (how fast and efficient competencies are leveraged (Zander and Kogut, 1995; Hansen, 2002)) and/or quality (whether the diffused knowledge generates fresh thinking and provides useful new insights (Sheremeta, 2000)) of RKT, could be carried out in order to obtain a more comprehensive understanding of the phenomenon.

Although 12 variables have been analyzed in this paper and their impact on RKT has been assessed, some factors that might have an important effect on RKT have not been studied extensively across studies. Consequently, the author of the current analysis was not able to estimate relationships for additional variables due to a lack of pre-existing studies. For instance, knowledge relevance (Yang et al., 2008) as well as HQ’s absorptive capacity (Ambos et al., 2006; Reiche, 2011) relation to RKT has been hardly covered in extant research. Hence, their further inquiry could be beneficial to the academic literature.
References


Appendix

Appendix A: Sources of variance in meta-analysis

In meta-analysis the term variance is used in 5 different situations:

- The population variance;
- The between-study variance;
- The within-study error variance;
- The overall study error variance;
- The meta-analysis error variance.

In the first two situations the variance is caused by the distribution of score within and across populations, therefore, it is not dependent on the sample size. In opposition, the last three situations describe variance that is dependent on the sizes of the sample. Most of the meta-analyses assign weights to each study based on the opposite of the overall study error variance. Thus, studies with an accurate estimate of the population effect size (i.e. a low variance) are allotted more weight, whereas studies with a less accurate estimation of the population effect size (i.e. a high variance) are allotted less weight, no matter of the size of the sample. (Borenstain et al., 2010)

Appendix B: Articles excluded from the study

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Article</th>
<th>Journal</th>
<th>Publication year</th>
<th>Reason for exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambos et al.</td>
<td>Learning from foreign subsidiaries: An empirical investigation of headquarters’ benefits from reverse knowledge transfers</td>
<td>International Business Review</td>
<td>2006</td>
<td>Analyzes the benefits of RKT to the HQ</td>
</tr>
<tr>
<td>Bresman, Birkinshaw and Nobel</td>
<td>Knowledge transfer in International Acquisitions</td>
<td>Journal of International Business Studies</td>
<td>2010</td>
<td>Does not provide separate data for subsidiary’s vertical and lateral knowledge outflow</td>
</tr>
<tr>
<td>Authors/</td>
<td>Title of the Contribution</td>
<td>Journal or Conference</td>
<td>Year</td>
<td>Remarks</td>
</tr>
<tr>
<td>--------</td>
<td>---------------------------</td>
<td>-----------------------</td>
<td>------</td>
<td>---------</td>
</tr>
<tr>
<td>Håkanson and Nobel</td>
<td>Technology Characteristics and Reverse Technology Transfer</td>
<td>Management International Review</td>
<td>2000</td>
<td>Does not provide the necessary data for conducting a meta-analysis</td>
</tr>
<tr>
<td>Jimenéz, Martínez-Costa &amp; Sanz-Valle</td>
<td>Innovation, Organizational Learning Orientation and Reverse Knowledge Transfer in Multinational Companies</td>
<td>Electronic Journal of Knowledge Management</td>
<td>2014</td>
<td>Analyzes the benefits of RKT to the HQ</td>
</tr>
<tr>
<td>McGuinness et al.</td>
<td>Towards a multi-perspective model of reverse knowledge transfer in multinational enterprises: A case study of Coats plc</td>
<td>European Management Journal</td>
<td>2013</td>
<td>Does not provide the necessary data for conducting a meta-analysis</td>
</tr>
<tr>
<td>Nigel Driffield et al.</td>
<td>The multinational enterprise as a source of international knowledge flows: Direct evidence from Italy</td>
<td>Journal of International Business Studies</td>
<td>2010</td>
<td>Does not provide the necessary data for inclusion in the meta-analysis</td>
</tr>
<tr>
<td>Noorderhaven &amp; Harzing</td>
<td>Knowledge-Sharing and Social Interaction within MNEs</td>
<td>Journal of International Business Studies</td>
<td>2009</td>
<td>Does not provide the necessary data for conducting a meta-analysis</td>
</tr>
<tr>
<td>Phene &amp; Almeida</td>
<td>How do firms evolve? The patterns of technological evolution of semiconductor subsidiaries</td>
<td>International Business Review</td>
<td>2003</td>
<td>Does not provide data for RKT</td>
</tr>
<tr>
<td>Piscitello &amp; Rabbiosi</td>
<td>How does knowledge transfer from foreign subsidiaries affect parent companies' innovative capacity?</td>
<td>FRUID Summer Conference 2006</td>
<td>2006</td>
<td>Analyzes the benefits of RKT to the HQ</td>
</tr>
<tr>
<td>Rabbiosi &amp; Santangelo</td>
<td>Parent company benefits from reverse knowledge transfer: The role of liability of newness in MNEs</td>
<td>Journal of World Business</td>
<td>2013</td>
<td>Analyzes the benefits of RKT to the HQ</td>
</tr>
<tr>
<td>Simonin &amp; Özsomer</td>
<td>Knowledge processes and learning outcomes in MNCs: An empirical investigation of the role of HRM practices in foreign subsidiaries</td>
<td>Human Resource Management</td>
<td>2009</td>
<td>Does not provide separate data for subsidiary’s vertical and lateral knowledge outflow</td>
</tr>
<tr>
<td>Yamao, De Cieri &amp; Hutchings</td>
<td>Transferring subsidiary knowledge to global headquarters: Subsidiary senior executives' perceptions of the role of HR configurations in the development of knowledge stocks</td>
<td>Human Resource Management</td>
<td>2009</td>
<td>Does not provide the necessary data for conducting a meta-analysis</td>
</tr>
</tbody>
</table>
Appendix C: Variables excluded from the study

Knowledge relevance

Even if a subsidiary is motivated to transfer knowledge to the HQ due to reasons such as improving their strategic position within the organization (Gupta & Govindarajan, 2000; Mudambi & Navarra, 2004), the parent firm would only be interested in RKT if it sees it beneficial (Gupta & Govindarajan, 2000; Kogut & Zander, 1993; McDonald, Tüselmann, Voronkova, & Dimitratos, 2005). Thus, Yang et al. (2008) with a population number of 105 provide data showing a highly statistical significance of knowledge relevance that help the parent firm consider the new knowledge created by their subsidiaries and recognize the potential benefits it can gain from its transfer. Therefore, the more their knowledge overlaps, the bigger possibility there is that the parent company recognizes the benefits of their subsidiary knowledge which respectively leads to more RKT.

In addition, Gupta and Govindarajan (2000) also argue that the knowledge transfer from the subsidiary is higher when its knowledge stock is relevant to the HQ’s needs.

Observability and uniqueness of the new knowledge

Unique knowledge that is created and possessed only by the focal subsidiary makes the knowledge more attractive to the rest of the MNC which respectively intensifies the transfer of knowledge from the latter one to its parent firm. Thus, the higher the knowledge uniqueness of a subsidiary compared to its peer units, the higher the extent of RKT (Schulz, 2001). Furthermore, Gupta and Govindarajan (2000) also argue that the knowledge transfer from the subsidiary is higher when its knowledge stock is non-duplicative.

However, observability is the extent of revealing of fundamental knowledge necessary for the use of the knowledge, which will allow the product/practice to be imitable by the competitors. Thus, a high degree of observability reduces RKT (Håkanson and Nobel, 2000). In other words, if a subsidiary knowledge is unique but with high observability to the competitors, the levels of RKT will not be high.
Subsidiary’s geographical location

Gupta and Govindarajan (2000) also argue that subsidiaries that are based in more advanced countries are assumed to serve as trend-setters and to provide the sources of technological, managerial know-how and marketing to a greater extent than those subsidiaries based in a less developed country. In other words, the parent company is more likely to accept the knowledge created in a subsidiary located in a more advanced country as more valuable than the knowledge stock of a subsidiary based in a developing country. Their results provide support to their statement that RKT is greater, if the level of the host country’s economic development is higher compared to the home country.

Moreover, Yang et al. state that depending on the strategic importance of a subsidiary’s geographical location (including culture, government regulations, institutions, labor availability and customer preferences), the same level of knowledge relevance may have a higher or lower impact on RKT. They conclude that the more strategically vital the subsidiary’s location, the easier it is for the HQ to recognize the knowledge.

HQ’s absorptive capacity

However, a successful reverse knowledge transfer depends also on the absorptive capacity of the HQ employees. Absorptive capacity is the individual’s ability to acknowledge the value of new information, assimilate it and “apply it to commercial ends” (Cohen and Levinthal, 1990: 128). Reiche (2011) states that inpatriates are more likely to undertake a transfer if their colleagues at the parent firm are able to understand it and see it relevant. By contrast, if the former ones consider the parent firm’s absorptive capacity low, inpatriates would not be motivated to transfer knowledge since they will consider it as a waste of time. Thus, Reiche (2011) finds a significant positive effect of HQ absorptive capacity on the inpatriates’ boundary spanning and their efforts to transfer knowledge to HQ employees. Thus, the higher the HQ absorptive capacity, the larger the extent of RKT.

Brokering

Knowledge combination of old knowledge could also be seen as creating new ones that is potentially transferred to the HQ. This process is called “brokering” (Hargadon & Sutton,
Knowledge brokers are area experts that import knowledge from e.g. peer subsidiaries, combine it and provide it to other units. Thus, brokering has a positive impact on inflows from one group of MNC units on outflows to another group. Hence, Schulz (2001) states that the higher the extent of knowledge inflows from peer subsidiary, the higher the level of RKT. However, he doesn’t find support to his hypothesis, thus horizontal inflows does not have an impact on the subsidiaries vertical knowledge outflow.

**Knowledge generation length of time**

An important factor for transferring knowledge from the subsidiary to the HQ is the length of time necessary for the generation of the knowledge. Hàkanson and Nobel (2000) argue that the longer time it takes to generate new knowledge, the more difficult it would be for competitors to imitate it, thus, it will increase the inclination of diffusing the knowledge to other parts of the MNC. Hàkanson and Nobel (2000) assume that average project duration will have a positive impact on the level of RKT.

**Learning substitution**

However, a negative impact on RKT may have the learning substitution. It occurs when two or more mechanisms, processes and/or practices are substitutes for each other (Levinthal & March, 1993). One of the reasons for occurring of learning substitute is when a peer subsidiary generates a strong expertise, freeing the focal subsidiary from learning and producing it, which will reduce the level of RKT from the focal subsidiary. The other reason could be when subsidiaries receive knowledge from the HQ in terms of procedures and rules which will decrease the need for creating new local knowledge, thus the level of RKT will decrease, too. Hence, Schulz (2001) assumes that the higher the extent of knowledge inflows in the focal subsidiary, the lower the extent of RKT. However, evidence indicate that the extent of knowledge inflows has no effect on vertical outflows.

**Appendix D:** Sensitivity analysis without the study of Strube and Berg (2011)
Meta-analysis for **hypothesis 4**: The greater autonomy the focal subsidiary possess, the lower the extent of knowledge transfer from the former one to the HQ.

Meta-analysis for **hypothesis 9**: The more frequent the communication between the focal subsidiary and the HQ, the greater the extent of RKT.

Meta-analysis for **hypothesis 10**: The employment of more corporate socialization mechanisms will have a positive relation to the extent of RKT.
Meta-analysis for **hypothesis 12**: Cultural distance does not have an impact on the extent of RKT.

95% confidence intervals of the included studies
Appendix E: Sensitivity analysis without the study of Hákanson and Nobel (2001)

Meta-analysis for hypothesis 6: The older the subsidiary is, the greater the extent of RKT.

Meta-analysis for hypothesis 7: The larger the subsidiary is, the higher the degree of its vertical knowledge outflow.

Appendix F: Sensitivity analysis without the studies of Strube and Berg (2001) and Hákanson and Nobel (2001)

Meta-analysis for hypothesis 8: Subsidiary dual embeddedness will be positively related to the degree of outflow from the focal subsidiary to the HQ.
Additional meta-analysis for **hypothesis 8** regarding *subsidiary external embeddedness*.

<table>
<thead>
<tr>
<th>Model</th>
<th>Study name</th>
<th>Outcome</th>
<th>Statistics for each study</th>
<th>Correlation and 95% CI</th>
<th>Weight (Random)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Correlation</td>
<td>Lower limit</td>
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<tr>
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</tbody>
</table>

Additional meta-analysis for **hypothesis 8** regarding *subsidiary internal embeddedness*.

<table>
<thead>
<tr>
<th>Model</th>
<th>Study name</th>
<th>Outcome</th>
<th>Statistics for each study</th>
<th>Correlation and 95% CI</th>
<th>Weight (Random)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Correlation</td>
<td>Lower limit</td>
</tr>
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</table>

85
Appendix G: Data entered into the program Comprehensive Meta-Analysis by Biostat, Inc. based on which the current meta-analysis was conducted
<table>
<thead>
<tr>
<th>Study/Year</th>
<th>Decisive Factor</th>
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<th>Mean</th>
<th>SD</th>
<th>Value for Correlation</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Value for Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mudambi et al. 2014</td>
<td>Subsidiary innovativeness</td>
<td></td>
<td>0.390</td>
<td>0.050</td>
<td>0.412</td>
<td>0.099</td>
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</tr>
<tr>
<td>Najafi-Tavani et al. 2011</td>
<td>Cultural distance</td>
<td></td>
<td>0.320</td>
<td>0.067</td>
<td>0.332</td>
<td>0.074</td>
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</tr>
<tr>
<td>Najafi-Tavani et al. 2011</td>
<td>External embeddedness</td>
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