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Subsidiary importance and knowledge seeking

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Declaration

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

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Date: 7 November 2016

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ABSTRACT

Most studies of subsidiary knowledge flows involve technological knowledge seeking, and exclude currently less important subsidiaries in the multinational corporation (MNC). Yet those subsidiaries are often located in developing markets with high economic growth and expansion opportunities for MNCs. Less is known about knowledge flows between less important subsidiaries, or about *operational* knowledge seeking. This study proposes a definition for subsidiary importance, compares more and less important subsidiaries, and examines technological and operational knowledge seeking. Findings suggest headquarters remain the dominant source for technological knowledge for both high and low importance subsidiaries but operational knowledge seeking is more varied.

Keywords: knowledge seeking behavior; subsidiary performance; network theory; knowledge sourcing; subsidiary importance; multinational enterprise

INTRODUCTION

Developing countries are seeing higher growth rates than their developed counterparts, but often host smaller, less important multinational corporation (MNC) subsidiaries. Scholarship has yet to look more closely at these subsidiaries that harbor future growth prospects for the MNC and the knowledge they seek in order to grow. Though MNCs enjoy a competitive advantage through their ability to transfer knowledge throughout their organization (Gupta & Govindarajan, 2000), scholarship has seen limited investigation into the knowledge seeking of less important subsidiaries and whether it were different from that of more advanced subsidiaries in the MNC.

This paper makes a contribution by defining subsidiary importance, a multidimensional construct that has often been implied in previous studies but not specifically defined. Secondly, it makes a contribution by widening the MNC knowledge flow literature which has typically focused on technological knowledge transfers, to include operational knowledge required by senior and middle managers for achieving their business goals. In this quantitative study we surveyed operational managers from all 24 subsidiaries of a Japanese-owned multinational via an online questionnaire. The sample comprised of senior financial, parts, service and technical managers from a range of subsidiaries varying in size and mandate, providing adequate diversity to assess the knowledge seeking behavior of more and less important subsidiaries.

Results show that headquarters remain a dominant source of technological knowledge for both high and low importance subsidiaries. However operational knowledge seeking behavior is more varied, and suppliers feature prominently. High importance subsidiaries are more likely to contact other subsidiaries for knowledge compared to their lower important counterparts who are less likely to reach out to peers in the differentiated network of the MNC. Low importance subsidiaries exhibited a greater reliance on headquarters for technological knowledge than their more important peers. Low levels of inter-subsidiary information sharing highlights an opportunity for headquarters to encourage interactions between entities at similar levels to allow for best practices to diffuse more organically.

The shift towards developing countries for new growth opportunities is now well under way, hence the need for MNC headquarters to understand how best to support not only subsidiaries with

expanded mandates, but also their currently less important subsidiaries. This study thus provides guidance about appropriate knowledge sharing channels that can maximize value creation throughout the differentiated network of the MNC.

Knowledge flows and subsidiary importance

Subsidiary learning and knowledge creation is central to the notion of the competitive advantage of the MNC (Andersson, Forsgren, & Holm, 2002). Moreover, knowledge in the MNC is increasingly sourced from subsidiaries (Mudambi, Pedersen, & Andersson, 2014). The view of the MNC as a differentiated network (Hedlund, 1986) suggests various nodes from which knowledge can be transferred, as opposed to the traditional hierarchical structure (Mudambi, Pedersen, et al., 2014; Mudambi, Piscitello, & Rabbiosi, 2014). Within this network, subsidiaries and headquarters have varying levels of influence which are largely obtained through technological and business-related power (Mudambi, Pedersen, et al., 2014). Subsidiaries within the MNC compete for this power and influence and thus endeavor to enhance their competitive advantage through expanding their mandate (Birkinshaw & Hood, 1998; Yamin, Tsai, & Holm, 2011).

Knowledge flows and influencing factors such as subsidiary embeddedness (Andersson et al., 2002; Meyer, Mudambi, & Narula, 2010), transfer mechanisms (Riusala & Smale, 2007), interpersonal relationships (Ellis, 2010; Levin & Barnard, 2013; Phelps, Heidl, & Wadhwa, 2012), characteristics of actors (Cohen & Levinthal, 1990; Mudambi, Piscitello, et al., 2014; Perri & Andersson, 2014) and various other elements of knowledge transfer have been extensively covered by previous scholars. However the majority of this research has focused on knowledge flows between high importance subsidiaries which typically include headquarters and subsidiaries with particular competencies, referred to as centers of excellence (Frost, Birkinshaw, & Ensign, 2002). Such intra-MNC knowledge transfers have initially focused on technological knowledge through the transfer of patents and novel intellectual property (Gittelman, 2008; Perri & Andersson, 2014). Operational knowledge transfer relevant to daily business functions has been less researched.

Operational knowledge can be described as knowledge that assists in transferring inputs into outputs (Wijnhoven, 2003) and applies especially to managers involved in improving systems or

processes beneath the strategic management level. Such knowledge could be expected to be more practical and applicable to all subsidiary managers, as opposed to technological knowledge relating to cutting-edge research and development transferred through patents and intellectual property that may matter more at subsidiaries with a knowledge creating mandate (Cantwell & Mudambi, 2005; Perri & Andersson, 2014) or very sophisticated customer base. This study argues that it is also useful to understand the operational knowledge flows that allow for business success across the MNC. This perspective allows for a better understanding of currently less important subsidiaries that nonetheless may present important avenues for future business growth.

Subsidiary importance

Subsidiary importance has been referred to as the value headquarters and subsidiaries in the MNC assign to an entity, recognizing them as a source of knowledge or capability in the MNC (Yamin & Andersson, 2011; Yamin et al., 2011). This importance can for example be reflected in the reliance of other units on the particular subsidiary's production and product development capabilities (Andersson et al., 2002). As advanced subsidiaries develop their capabilities and become recognized as centers of excellence in the MNC, headquarters are likely to extend such subsidiaries' charter through parent-driven investment (Birkinshaw & Hood, 1998). Through this additional support and focus from headquarters, more important subsidiaries are more likely to hold an expanded mandate as they service increasingly more units and subsidiaries in the MNC. Subsidiary importance can furthermore be defined in terms of contribution to MNC performance and operations (Tseng, 2015) such as subsidiary revenue.

Absorptive capacity (Cohen & Levinthal, 1990) is an additional indicator that can be used to indicate subsidiary importance. This well-documented characteristic defines a subsidiary's ability to identify the value of new external information, assimilate and apply it to improve its innovation capabilities for commercial gain (Cohen & Levinthal, 1990). It has been documented that host country organizations cannot use knowledge spill-overs from MNCs operating in countries or industries more advanced than host country organizations due to their inability to internalize the novel information, i.e. lack of absorptive capacity (Perri & Andersson, 2014). As absorptive capacity is largely a

function of a subsidiary's level of prior knowledge and capabilities, it is reasonable to assume that this characteristic can be used as an indicator of subsidiary importance.

These dimensions do not always co-occur. A subsidiary in a knowledge-rich location can be expected to play an important role in created asset seeking (Cantwell, 2009), but may not necessarily have a large customer base, while a subsidiary in a populous developing country may make a large financial contribution but not contribute to created asset seeking. For this reason, a multidimensional construct for subsidiary importance is proposed that defines a high importance subsidiary as one likely to meet a threshold level in terms of a global mandate, high absorptive capacity and making a significant financial contribution to the MNC. A low importance subsidiary would be on the opposite of the spectrum with a local mandate, low absorptive capacity, and a smaller financial or technological contribution to the MNC. Less important subsidiaries have been argued to be active in standardized downstream functions (Shulz, 2001) and would not typically support other subsidiaries in the MNC as a source of knowledge.

Based on this general construct of subsidiary importance, the substantial body of scholarly work about knowledge flows can be divided into four categories by identifying the importance of the knowledge sending and receiving entity, as indicated in Figure 1. It is clear that the majority of extant research falls in the “high” to “high” quadrant and typically focusses on technological knowledge transfer.

Much less research has been conducted on lower importance entities. But given the centrality of the current view of the MNC as a differentiated network with many nodes (Hedlund, 1986; Luo, 2005; Nohria & Ghoshal, 1997; Rugman, Verbeke, & Yuan, 2011), it can be assumed that knowledge exchange takes place at various levels within the MNC. A better understanding of nodes involving less important subsidiaries is therefore important to understand how the overall network functions.

The “low” to “high” quadrant refers to vertical reverse knowledge transfer where headquarters typically requests information from lower importance subsidiaries to understand their operating conditions (Mudambi, Piscitello, et al., 2014; Yang, Mudambi, & Meyer, 2008). Reverse knowledge flows from less important subsidiaries to headquarters have been less covered, but such

knowledge transfers have nonetheless been found to be beneficial for the MNC, particularly regarding customer and competitor information transfer (Ambos, Ambos, & Schlegelmilch, 2006).

Figure 1: Selected knowledge transfer literature categorized by sender and receiver importance

Importance of Knowledge Sender	High	High to Low	High to High
	Low	Low to Low	Low to High
		Low	High

<p style="text-align: center;">High to Low</p> <p>Liu, Lu, Filatotchev, Buck & Wright, 2010.</p> <p style="text-align: right;">Tseng, 2015</p> <p>Wibowo, 2013</p> <p style="text-align: right;">Noorderhaven & Harzing, 2009</p> <p style="text-align: center;">Knowledge Seeking</p> <p style="text-align: right;">Kedia, Gaffney & Clampit, 2015</p> <p>Levin & Barnard, 2013</p>	<p style="text-align: center;">High to High</p> <p>Perri & Andersson, 2014</p> <p style="text-align: right;">Perri, Andersson, Nell, Santangelo, 2013</p> <p>Riusala & Smale, 2007</p> <p style="text-align: right;">Mudambi, Pedersen & Andersson, 2014</p> <p>Gupta & Govindarajan, 2000</p> <p style="text-align: right;">Weigelt & Sarkar, 2009</p> <p>Lee & MacMillan, 2008</p> <p style="text-align: right;">Holm & Sharma, 2006</p>
<p style="text-align: center;">Low to Low</p>	<p style="text-align: center;">Low to High</p> <p style="text-align: right;">Ambos, Ambos & Schlegelmilch, 2006</p> <p>Mudambi, Piscitello & Rabbiosi, 2014</p> <p style="text-align: right;">Yang, Mudambi & Meyer 2008</p> <p style="text-align: center;">Reverse Knowledge Transfer</p>

The “high” to “low” quadrant typically covers studies where less important and often developing country subsidiaries obtain knowledge in order to improve their competitiveness. Examples include knowledge spillovers through returnee entrepreneurs from advanced economies (Liu, Lu, Filatotchev, Buck, & Wright, 2010) and international technology transfers through technical licensing agreements (Wibowo, 2013). There is a distinct lack of research in the bottom left quadrant where low importance subsidiaries transfer knowledge with each other.

In short, the lower importance subsidiaries appear to be understudied from a knowledge seeking perspective. The lack of empirical work on how, if at all, less important subsidiaries engage with each other is an important oversight, firstly because it results in an incomplete understanding of how the MNC network currently functions, and secondly because of their potential future role in the

MNC. This begs the question; do less important subsidiaries show different knowledge-seeking behavior to their more important counterparts? Do their sources differ when seeking technological compared to operational knowledge?

In order to capture the difference between supply and demand factors in terms of knowledge seeking, it is useful to distinguish technological knowledge from operational knowledge.

Technological knowledge

The process of technology transfer can be seen as an initiative taken by subsidiaries which can result in the accrual of power to the host subsidiary in the MNC (Ciabuschi, Dellestrand, & Kappen, 2012). MNC-specific technological knowledge is typically found from advanced subsidiaries, ‘centers of excellence’, that have developed their competencies over time (Frost et al., 2002) or from headquarters. Traditionally headquarters has been viewed as the prevailing source of technological knowledge which is disseminated vertically to subsidiaries. Although there has increasingly been a decentralization in terms of the sources of technological knowledge (Najafi-Tavani, Giroud, & Andersson, 2014; Rugman et al., 2011), knowledge flows from the headquarters to the subsidiaries continue to be important, particularly in Japanese MNCs where technological knowledge typically resides with the parent (Fang, Wade, Delios, & Beamish, 2013; Zhang & Cantwell, 2011). For this reason, it can be expected that the knowledge seeking of more and less important subsidiaries will be similar, and advice regarding research will be sought primarily from headquarters:

Hypothesis 1. Managers from both high (a) and low (b) importance subsidiaries will request advice regarding research primarily from headquarters.

Similarly, as subsidiaries look to align themselves with future trends to mitigate the risk of disruption through technological innovation, they can be expected to turn to headquarters for guidance on new products and future technologies. This pattern of knowledge seeking is also unlikely to be affected by relative subsidiary importance:

Hypothesis 2. Managers from both high (a) and low (b) importance subsidiaries will request advice regarding new product development primarily from headquarters.

Hypothesis 3. Managers from both high (a) and low (b) importance subsidiaries will request advice regarding the strategic direction of future technologies primarily from headquarters.

Operational knowledge

Operational knowledge relates to enhancing competencies important for operational business functions and relationships such as sales and marketing, logistics and distribution and purchasing activities (Andersson, Dellestrand, & Pedersen, 2014). This is important knowledge as it allows business to reap the advantages of their technological knowledge, or that of an ally's, through exploiting "complementary assets" as an approach to survive sweeping technological change (Rothaermel, 2001).

The need to reduce uncertainty in an increasingly global competitive environment can serve as an impetus for action and predict the formation of ties with other subsidiaries (Gnyawali, Singal, & Mu, 2009). These ties matter, because absorptive capacity is a function also of the degree of homophily ('love of the own') between actors (Yamin et al., 2011). Moreover, subsidiaries engage in lateral knowledge transfer to reduce their strategic vulnerability which in turn has a notable impact on the effectiveness and efficiency of lateral knowledge transfers (Yamin et al., 2011). The underlying logic can be expected to drive the knowledge seeking behavior of all subsidiaries, but with very different outcomes.

The more important subsidiaries are likely to develop ties with similar subsidiaries – the other high importance subsidiaries. They are likely to share their challenges, perhaps the demands of key customers and "lead users" (Von Hippel, 1986). They may also choose to engage in knowledge sharing to improve their strategic position in the MNC. But throughout, their most important knowledge partners are likely to be other important subsidiaries and headquarters. For example, as stricter environmental, financial or labor regulations are introduced in one territory, the subsidiary there may find it useful to share its challenges in meeting those requirements with other subsidiaries that are likely to be confronted with such changes. Or to satisfy demanding customers, subsidiaries may need to engage with headquarters to find out what new products are coming to market.

Because shared experiences can be expected to enhance the degree of homophily, subsidiaries are likely to seek out contact with similar subsidiaries. Low importance subsidiaries, due to their lower absorptive capacity, are similar in that they may have had limited exposure to advanced

knowledge sharing activities. They also often face similar challenges and uncertainties such as smaller and often turbulent markets. Moreover, as low importance subsidiaries are unlikely to be engaged in extensive R&D activities or hold an expanded mandate, their competence is likely to be associated with their embeddedness in their host environment, such as their knowledge of and relationships with key customers and local suppliers. This implies that such subsidiaries will look to sources from a similar environment and with similar capabilities as they aim to enhance their competitiveness.

Those knowledge sources are likely to be other less important subsidiaries and key suppliers. Other lower importance subsidiaries may be able to offer advice on, for example, the logistics costs associated with small sale volumes or purchasing strategies where there are severe currency fluctuations. In turn, suppliers are not only likely to be familiar with their customers, but also have a vested interest in helping its customer base.

Without suggesting that no knowledge is sourced from other sources, hypotheses about the dominant patterns of knowledge seeking can be proposed:

Hypothesis 4: Managers from higher importance subsidiaries are more likely to request advice regarding marketing and sales from other high importance subsidiaries and headquarters (a), whereas managers from lower importance subsidiaries are more likely to request such advice from other low importance subsidiaries and from key suppliers (b).

Hypothesis 5: Managers from higher importance subsidiaries are more likely to request advice regarding logistics and distribution from other high importance subsidiaries and headquarters (a), whereas managers from lower importance subsidiaries are more likely to request such advice from other low importance subsidiaries and from key suppliers (b).

Hypothesis 6: Managers from higher importance subsidiaries are more likely to request advice regarding purchasing from other high importance subsidiaries and headquarters (a), whereas managers from lower importance subsidiaries are more likely to request such advice from other low importance subsidiaries and from key suppliers (b).

METHODOLOGY

The purpose of this study is to determine differences, if any, in knowledge seeking behavior between subsidiaries of varying importance. Existing studies of subsidiary knowledge flows have been conducted in a limited variety of geographical contexts without significant effort to analyze the impact of these contexts on knowledge transfer (Michailova & Mustafa, 2012). For this reason, a questionnaire was developed regarding knowledge seeking activities across an entire MNC. The

objective was not to identify why subsidiaries seek knowledge but rather to determine where they seek knowledge in the differentiated network of the MNC, including its suppliers.

Setting and sampling

The study is set in a Japanese MNC with 24 subsidiaries on all continents. Apart from subsidiary sales figures (obtained from headquarters and used as complementary indicator of subsidiary importance), all data were collected via questionnaire. Operational level managers operating in business or technical general management roles were the target population as they were most likely to seek knowledge in order to improve performance of their division within their subsidiary. The knowledge seeking by individual managers was the unit of analysis.

To construct a sample frame, internal list serves were used. They have the benefit of targeting the individuals who are directly responsible for certain tasks, and thus avoid a given subsidiary being weighted too much or too little. The eventual sample included senior financial managers, senior parts managers, service and operations general managers and technical experts. From the 212 individuals emailed, 91 responded (43% response rate) of which 69 questionnaires had no missing data. The sizes of subsidiaries (and thus their representation on the list serves) vary, but at least one response from each of the subsidiaries was obtained.

Survey design

The web-based questionnaire was developed with constructs such as subsidiary mandate or subsidiary absorptive capacity measured as multi-item constructs using seven-point Likert scales. The questionnaire was pretested with individuals within the MNC as well as with academics.

There were four main sets of questions. Initial questions served to locate respondents – primarily identifying the subsidiary in which they were employed. A series of questions relate to subsidiary importance, as well as questions relating to knowledge sourcing for technological and finally for operational purposes.

Subsidiary importance measures

Subsidiary mandate. The multi-item mandate variable was obtained using measures used by Mudambi et al. (2014) which indicated the extent to which other entities in the MNC are dependent on the subsidiaries' competencies. These were measured by asking what the implications would be for the MNC if the focal subsidiary no longer existed (one question), as well as asking to what extent the subsidiaries technological and business competencies were of use to other units in the MNC (three questions each). Technological activities were defined through (1) research, (2) product development and (3) production of goods and services. Business activities were defined through (1) marketing/sales, (2) logistics/distribution and (3) purchasing (Mudambi, Pedersen, et al., 2014). All of these were measured using a seven point Likert scale where one represented "no use for other units" and seven represented "very useful for other units" in the MNC. Respondents were also asked if their subsidiary's responsibilities extended beyond their own territory and if they supplied products or services to other units in the MNC in order to measure subsidiary mandate. These two questions provided poor correlation to one another and the rest of the mandate measures, so they were subsequently excluded from the analysis. Cronbach's alpha for the remaining mandate items was 0.83, providing adequate reliability and allowing for these results to be combined into one mandate measure.

The notion of dependence was also directly measured by including an "identified as a knowledge source" ranking. It was compiled based on the number of times a subsidiary was identified as a source of knowledge by another subsidiary.

Absorptive capacity. The multi-item absorptive capacity variable was measured using three constructs developed from Cohen & Levinthal's (1990) original work. As absorptive capacity is largely a function of a subsidiary's prior related knowledge influencing its ability to identify, retrieve and exploit novel information (Cohen & Levinthal, 1990), the items were defined in terms of a subsidiary's ability to obtain, interpret and utilize novel information sourced from other units in the MNC. This was measured through three questions using a seven-point Likert scale where one corresponded with "quite a lot of difficulty" and seven with "no difficulty at all". The question

relating to a subsidiary's ability to obtain novel information from other units in the MNC not only negatively affected reliability, but also, given the emphasis of the study on knowledge seeking, risked contaminating the knowledge seeking indicators. It was subsequently removed from the analysis. Cronbach's alpha for the remaining two items relating to interpreting and utilizing novel information was 0.76, providing suitable reliability.

Size. Revenue figures for each of the subsidiaries were used to measure the size and scale of the contribution to the MNC. The revenue values were transformed by deriving their natural logarithm to improve the distribution, emphasizing the more numerous small and mid-size subsidiaries. Thereafter a constant was added to avoid negative values. This approach has been used in MNC knowledge flow literature when defining subsidiary size and subsidiary age variables (Ciabuschi et al., 2012).

Subsidiary importance. The proposed subsidiary importance index consisted of all four constructs; subsidiary mandate, the number of times the subsidiary had been identified as a source of knowledge by other subsidiaries in the MNC, subsidiary absorptive capacity and subsidiary size. The indicators were given even weight, but no clear break in the ranking was evident. Instead, there seemed to be a steady diminishing in importance. Using the ranking, the subsidiaries were divided into two categories, low and high importance, based on the total number of respondents, a division that allowed for meaningful statistical testing of the hypotheses. The relative weighting of these variables, and what would be the most appropriate division between high and low importance (or maybe high, medium and low) is an area for future research that may yield more robust insights into the classification and behavior of subsidiaries.

Because there were many more respondents in the high importance subsidiaries, eight subsidiaries (34 fully usable responses) were considered as high importance, and sixteen (35 responses) as low importance subsidiaries. Most of the important subsidiaries were located in advanced economies, although one subsidiary from a populous developing country was included. The less important subsidiaries included most of the developing country subsidiaries and some small subsidiaries in advanced economies (some niche providers, and others the largely unplanned results of mergers). It is a limitation of this study that there were not enough responses to assess, for example, if

the knowledge seeking of a small subsidiary in advanced economies was affected more by its location than by its strategic importance.

Once the high and low importance categories had been created, the two groups of subsidiaries were assessed in terms of the most likely sources of their operational knowledge and technological knowledge.

Technological and operational knowledge sources

The sources for technological knowledge and operational knowledge were both measured through three questions each. In terms of technological knowledge, respondents were asked to anchor on the most recent instance where they sought information (to reduce memory bias), and asked whether they approached headquarters, another subsidiary or suppliers for information on research, product development, and the strategic direction of future technologies respectively. They were also required to identify which subsidiaries and suppliers they approached. The reason why suppliers were included is because they develop local linkages and become highly embedded in their host environment as they work with the MNC. These linkages can act as channels through which inter alia the subsidiary can learn from the host environment (Perri et al., 2013). The questions asked read as follows: “Indicate the source your subsidiary would most likely contact to gain knowledge regarding marketing and sales”. In answering the question either “global supplier”, “local supplier”, “headquarters” or “another subsidiary” were to be selected. This was repeated for all three operational knowledge and technological knowledge types defined in this study. Had the respondent indicated “another subsidiary”, they were then asked to identify which subsidiary from the list provided.

Similarly, assessment of the operational knowledge sources involved asking which entity they had contacted for information on marketing and sales, logistics and distribution, and purchasing respectively. Once again, respondents had to select one of headquarters, another subsidiary or supplier (global or local).

In order to test the hypotheses, the counts of the respective knowledge sources were used to calculate proportions which were then tested statistically where this method is useful for assessing

differences between groups (Keller & Warrack, 1999). Hypotheses were tested to the 90% confidence interval for this exploratory analysis.

RESULTS

Technological knowledge seeking

This paper sought to explore the knowledge seeking behavior of less versus more important subsidiaries. For typically smaller and less important subsidiaries, an approach to expand their influence in the MNC can involve pursuing technology-oriented functions (Mudambi, Pedersen, et al., 2014) where the source for such MNC-specific knowledge has increasingly been found in "centers of excellence" (Frost et al., 2002). Indeed, the two most important subsidiaries were collectively noted by 42% of respondents as a source of knowledge in some way.

However, considering technological knowledge (research, new product development, and the strategic direction for future technologies) it was found that headquarters dominates other subsidiaries and suppliers as a source of knowledge for both high importance and low importance subsidiaries as shown in Figure 2. Statistical evidence was found to suggest that high importance subsidiaries turn to headquarters for research (H1a, $p = 0.02$), product development (H2a, $p = 0.02$) and strategic direction for future technology knowledge (H3a, $p = 0.00$) where all p -values were found to be significant at the 95% confidence level as indicated in Table 1. A similar result was found for low importance subsidiaries where the likelihood of contacting headquarters versus the alternative knowledge sources for research (H1b, $p = 0.00$), product development (H2b, $p = 0.00$) and strategic direction for future technologies (H3b, $p = 0.00$) were all found to be significant.

Figure 2: Technological knowledge sources identified by high and low importance subsidiaries

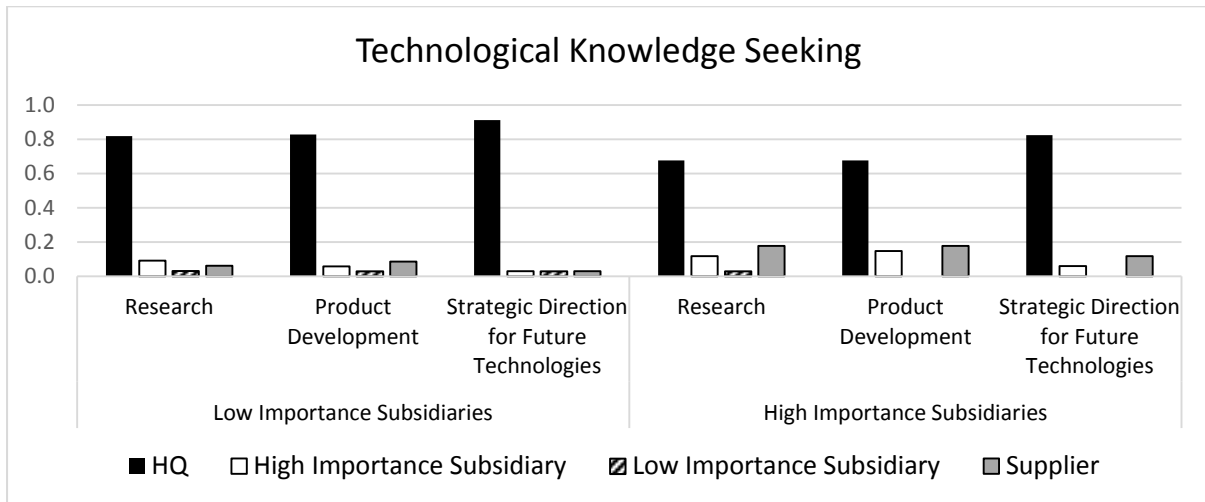


Table 1: Technological knowledge Z-scores and p-values (* p < 0.05)

	Importance		Z-score		p-value	
	High	Low	High	Low	High	Low
Research						
High Importance Subsidiary & HQ	0.79	0.91	3.43	4.70	0.00*	0.00*
Low Importance Subsidiary & Supplier	0.21	0.09	-3.43	-4.70	1.00	1.00
Product development						
High Importance Subsidiary & HQ	0.82	0.89	3.77	4.56	0.00*	0.00*
Low Importance Subsidiary & Supplier	0.18	0.11	-3.77	-4.56	1.00	1.00
Strategic Direction.						
High Importance Subsidiary & HQ	0.88	0.94	4.46	5.14	0.00*	0.00*
Low Importance Subsidiary & Supplier	0.12	0.06	-4.46	-5.14	1.00	1.00

This result provides support for H1a, H2a, H3a as well as H1b, H2b and H3b: Headquarters are the central source of various types of technological knowledge for both the high and the low importance subsidiaries. Comparing low important subsidiary reliance on headquarters to that of high importance subsidiaries, support was found for low importance subsidiaries to be more reliant regarding research and product development knowledge at the 90% confidence level ($0.05 < p < 0.10$). However, results must be interpreted with some caution. First, the study is conducted in a Japanese MNC, and those MNCs have been found to hold most of their technological knowledge with the parent (Fang, Wade, Delios, & Beamish, 2007) or in horizontal networks with other Japanese firms (Zhang & Cantwell, 2011). Of the advanced MNCs, Japanese MNCs are arguably organized least as a differentiated network.

Second, subsidiaries and suppliers comprise a minority but nonetheless non-trivial proportion of technological knowledge sources, but mainly the high rather than low importance subsidiaries rely on those sources. High importance subsidiaries were significantly more likely to contact suppliers for research ($p = 0.07$) and strategic direction ($p = 0.08$) for future technology than low importance subsidiaries considering the 90% confidence interval. This is likely to be as a result of higher levels of absorptive capacity providing more confidence in knowledge seeking both inside and outside of the MNC (Cohen & Levinthal, 1990). This finding suggests agreement with previous research in that suppliers' technical experiential diversity has been found to positively influence a subsidiary's innovation adoption (Weigelt & Sarkar, 2009). However, it is clear from the behavior of all the subsidiaries that they see headquarters as a central source of technological information.

Operational knowledge seeking

Widening the traditional view of MNC knowledge flows to include operational aspects yields some useful insights, particularly for low importance subsidiaries. It was hypothesized that lower importance subsidiaries looking for operational knowledge to improve their daily functioning would turn to subsidiaries of similar importance or suppliers with an arguably better understanding of their customers and environment. In turn, high importance subsidiaries were argued to seek out advice from headquarters and other high importance subsidiaries. A much greater variance was seen in operational knowledge seeking compared to technological knowledge seeking, although the role of headquarters remained dominant.

As for H4a, the relative importance of headquarters for marketing knowledge for high importance subsidiaries is clear where the (distant) second most likely source for such knowledge was similar high importance subsidiaries, Figure 3. Thus support was found for H4a as the difference in proportion of high importance subsidiaries seeking knowledge from headquarters and other high importance subsidiaries compared to low importance subsidiaries and suppliers was significant ($p = 0.00$), Table 2. No such support was found for H4b as low importance subsidiaries were not more likely to contact other low importance subsidiaries or suppliers for marketing and sales knowledge as hypothesized. There is clearly a strong connection between all subsidiaries and headquarters'

marketing department. As for knowledge seeking by low importance subsidiaries, headquarters was the principal source for marketing knowledge with high importance subsidiaries featuring to a lesser extent. Low importance subsidiaries and suppliers comprised a smaller portion of the likely sources, failing to provide support for H4b regarding low importance subsidiaries ($p = 0.99$).

Figure 3: Operational knowledge sources identified by high and low importance subsidiaries

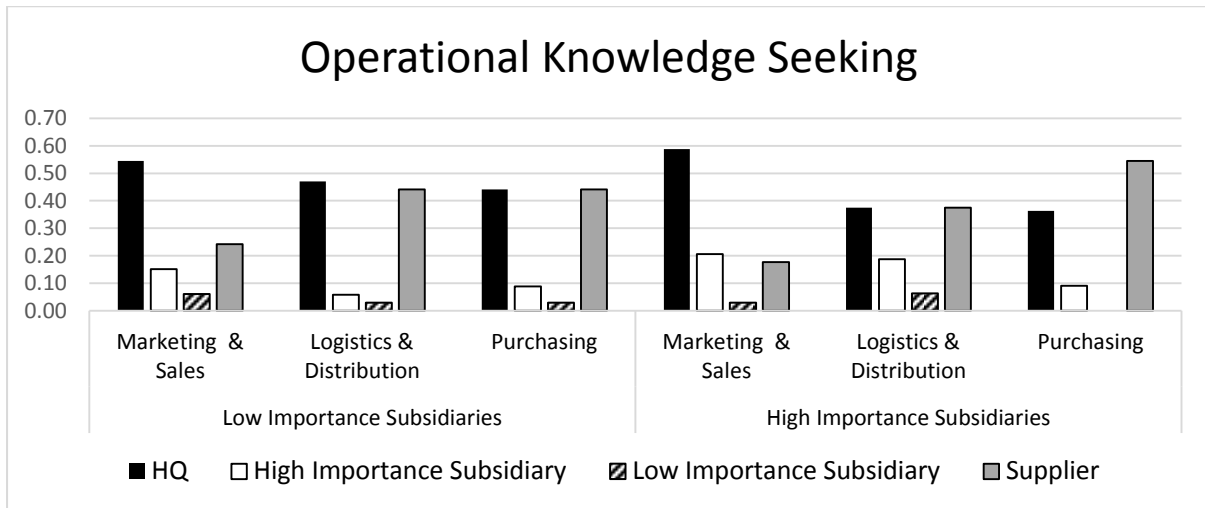


Table 2: Operational knowledge Z-scores and p-values (* $p < 0.05$)

	Importance		Z-score		p-value	
	High	Low	High	Low	High	Low
Marketing & Sales						
High Importance Subsidiary & HQ	0.79	0.70	3.43	2.26	0.00*	0.01*
Low Importance Subsidiary & Supplier	0.21	0.30	-3.43	-2.26	1.00	0.99
Logistics & Distribution						
High Importance Subsidiary & HQ	0.56	0.53	0.71	0.34	0.24	0.37
Low Importance Subsidiary & Supplier	0.44	0.47	-0.71	-0.34	0.76	0.63
Purchasing						
High Importance Subsidiary & HQ	0.45	0.53	-0.52	0.34	0.70	0.37
Low Importance Subsidiary & Supplier	0.55	0.47	0.52	-0.34	0.30	0.63

Hypothesis 5a deals with logistics and distribution. The relative importance of headquarters compared to suppliers is similar for both subsidiary groups. Considering high importance subsidiaries, the likelihood of contacting headquarters and high importance subsidiaries was not significantly different from low importance subsidiaries and suppliers as a sources of knowledge ($p = 0.24$), failing to provide support for H5a. However it is clear that high importance subsidiaries are more likely to rely on insights from other high importance subsidiaries than low importance subsidiaries where the

difference was found to be significant at the 90% confidence level ($p = 0.06$). The distinct preference for low importance subsidiary managers to contact headquarters or suppliers for logistics and distribution knowledge was surprising. As there was no significant difference between these dominant groups ($p = 0.63$), no support is found for H5b regarding low importance subsidiaries. These findings suggest poor networking between low importance subsidiaries and other subsidiaries of both high and low importance. The coordination of regular conferences or workshops to enhance social ties that have been found to improve the quality and value of exchanges (Ellis, 2010; Levin & Barnard, 2013) may change how this functions.

Hypothesis 6a, about purchasing, is the function where the influence of headquarters is arguably lowest. The tendency to contact suppliers regarding purchasing most likely stems from the fact that purchasing activities involve suppliers directly who have experience in this regard. Considering high importance subsidiary preferences, the difference between contacting headquarters and high importance subsidiaries versus low importance subsidiaries and suppliers was not significant ($p = 0.70$), failing to provide support for H6a. Similarly low importance subsidiaries were not more likely to contact other low importance subsidiaries and suppliers regarding purchasing knowledge, providing no support for H6b ($p = 0.63$). The reduced levels of inter subsidiary communication is more apparent here which was not anticipated as subsidiaries with similar levels of absorptive capacity have been found to exhibit effective lateral knowledge transfers (Yamin et al., 2011).

DISCUSSION

This paper aims to make a contribution to literature on MNC knowledge flows by proposing a definition and measure for subsidiary importance, a concept that is often used by business people but, probably because of its multidimensional nature, also a concept that has not been the subject of much academic scrutiny. Operationalizing this construct, it became clear that there is very limited research into the knowledge seeking activities of lower importance subsidiaries. But if the MNC is indeed conceptualized as a differentiated network (Hedlund, 1986; Nohria & Ghoshal, 1997), then it is important to understand how the various nodes relate. For example, if lower importance subsidiaries

limit their engagement with other subsidiaries, there is a risk of the MNC fracturing into disconnected networks where best practices do not diffuse to all subsidiaries.

Secondly, this paper makes a contribution by expanding the conventional definition of knowledge transfer to consider not only technological knowledge, but also to include the operational elements that enable the effective daily functioning of the business, a dimension of knowledge seeking that is especially salient for less important subsidiaries. Both technological and operational knowledge seeking was examined. As expected, headquarters are a central source in the technological knowledge seeking of both more and less important subsidiaries. However, very different patterns of knowledge seeking were evident for operational knowledge seeking.

Indeed, one of the main contributions of this paper is the insights into operational knowledge seeking, particularly for lower importance subsidiaries. Very varied patterns of knowledge sourcing were observed, and suppliers were found to equal subsidiaries in importance as a source of operational knowledge. For less important subsidiaries, the heavy dependence on headquarters and apparent lack of networking with other subsidiaries also suggest opportunities for headquarters to reduce reliance and promote inter-subsidary knowledge sharing, particularly among less important subsidiaries.

Thus our evidence suggests that high importance subsidiary managers were generally more likely to approach other subsidiaries than low importance subsidiary managers for operational knowledge, particularly for logistics and distribution information. And while high importance subsidiaries generally engaged with true peers – the other more important subsidiaries – in the few cases when low importance subsidiaries did contact another subsidiary, it was often not with a peer but instead with a more important subsidiary.

Given their limited mandates and low absorptive capacity, it is probably not desirable for low importance subsidiaries to engage purely with each other. But in the case of operational issues, there are likely cases where contextual knowledge matters and where MNC performance can be improved if subsidiaries with similar conditions can share lessons learned. Understanding why low importance subsidiaries do not engage more with each other – are there limited opportunities to develop the appropriate networks or perhaps a lack of confidence because of low absorptive capacity? – and when

it would be appropriate for them to engage directly with each other are both important avenues for future research.

In terms of practical recommendations that MNCs can use to enhance innovation and subsidiary competitiveness, it is important for MNCs to be aware of knowledge seeking activities of subsidiaries across the organization and to ensure that those engagements are in some way managed, for example through regular conferences for similar markets to share best practices. If there is an issue in terms of how subsidiaries perceive themselves in the MNC hierarchy, there needs to be signaling from the headquarters that the success of the MNC is dependent on the success of all the separate parties so that a culture of knowledge sharing can be nurtured as subsidiary learning is central to the notion of competitive advantage (Andersson et al., 2002).

A number of limitations arise from the fact that only one MNC was surveyed. Japanese MNCs are known to differ from North American and European MNCs (Fang et al., 2013; Zhang & Cantwell, 2011), and while there appears to be general applicability to the results, further research will be needed to understand knowledge sharing across various types of MNCs.

The survey was sent only in English despite the many native languages spoken across the respective subsidiaries. As English is the main business language used in the MNC, for example the language used for correspondence sent out to the list serves, there was likely no language barrier in understanding the questionnaire. However, it is quite possible that respondents were primed to think about knowledge sharing that took place in English because the questionnaire was in English. This may have resulted in an underreporting of informal knowledge sharing among for example Spanish-speaking subsidiaries in Latin America.

Finally, the number of respondents from some of the smaller subsidiaries was very low, despite the acceptable overall response rate from the list serves. These subsidiaries may therefore not be accurately represented and results potentially influenced by selection bias.

This study only looked at knowledge seeking activities within the MNC and a single external party, suppliers. Suppliers were found to be important sources of operational knowledge, but given that many suppliers are themselves large and research-intensive MNCs, e.g. General Electric is an important supplier for many MNCs across the globe, their possible role in technological knowledge is

worthy of additional knowledge. Given the clear importance of suppliers even among high importance subsidiaries, it is important to also examine differences in how more versus less important subsidiaries use alternative sources of knowledge outside of the MNC such as the universities, business schools and other companies in the industry.

Subsidiaries, especially those with a limited mandate and small local market, may not realize that there is value in interacting with other subsidiaries within the MNC. With all subsidiaries looking to headquarters, headquarters could become a bottleneck in knowledge transfer. This finding is of concern, as MNCs are increasingly relying on multiple locations using their global network for innovation and to seek new knowledge (Cantwell & Mudambi, 2005). Unless subsidiaries know they can go elsewhere for both technological and operational knowledge, the expected benefits will not be realized for the company. Although much remains to be done, this paper makes an attempt at mapping how subsidiaries of different levels of importance source the knowledge they need to advance the business.

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Subsidiary importance and knowledge seeking

(Supporting document)

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Abstract

Most studies of subsidiary knowledge flows involve technological knowledge seeking, and exclude currently less important subsidiaries in the multinational corporation (MNC). Yet those subsidiaries are often located in developing markets with high economic growth and expansion opportunities for MNCs. Less is known about knowledge flows between less important subsidiaries, or about *operational* knowledge seeking. This study proposes a definition for subsidiary importance, compares more and less important subsidiaries, and examines technological and operational knowledge seeking behavior. Findings suggest headquarters remain the dominant source for technological knowledge for both high and low importance subsidiaries but operational knowledge seeking is more varied.

Keywords: knowledge seeking behavior; subsidiary performance; network theory; knowledge sourcing; subsidiary importance; multinational enterprise

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Chapter 1: Introduction

This document has been compiled to provide support for the project publish paper submitted. It provides further insight into the literature base considered which was whittled down for the paper. This document provides additional details in the methodology section including a brief review of an approach considered but not used. Furthermore additional details are provided in the results section that was not added to the paper due to word count limitations.

Chapter 2: Literature Review

This chapter provides a more comprehensive review of the multinational knowledge flow literature used for this study, including sections that were cut from the paper due to word count limitations. It also provides insight into my thought process and classification of the literature.

2.1 MNC Knowledge Flows

Multinational corporations have been considered to derive advantage from their capability to acquire and utilize knowledge across numerous countries (Gupta & Govindarajan, 2000). To maintain these advantages across a diverse multinational network appropriate knowledge transfer or knowledge flows are essential, where subsidiaries are increasingly noted as sources of knowledge for headquarters and other subsidiaries within the MNC (Michailova & Mustaffa, 2012).

The network structure of MNCs offers numerous benefits such as improved marketing knowledge (Holm & Sharma, 2006), economies of scope through subsidiary knowledge sharing (Luo, 2005) and mitigating threats posed by volatile emerging markets (Luo, 2003). Hence knowledge transfer is an important aspect of MNC operations worth investigating.

2.2 Headquarters to Subsidiary Flow

Two major streams have dominated the MNC knowledge transfer literature. Firstly the resource based view of the firm suggests that subsidiary performance results from the transfer of the parents valuable, rare knowledge (Ambos, Ambos, & Schlegelmilch, 2006; Fang, Wade, Delios, & Beamish, 2007; Levin & Cross, 2004; Perri, Andersson, Nell, & Santangelo, 2013) which explains vertical inflows into subsidiaries. The second stream is based on absorptive capacity theory (Cohen & Levinthal, 1990) focused on the subsidiary's ability to utilize and manage transferred knowledge (Fang, Wade, Delios, & Beamish, 2013;

Phelps, Heidl, & Wadhwa, 2012). Limitations to this approach include only focusing on one side of the transfer – subsidiary or parent – and secondly the multifaceted nature of knowledge desired by the subsidiary for its operations is not explained (Fang et al., 2013), which motivates the need for this study.

In transferring knowledge vertically from headquarters to subsidiaries there is strong association with coordinated knowledge sharing (which unites the parties in a common set of goals and values) and subsidiary performance compared to procedural knowledge sharing (what to do and how to do it) (Lee & MacMillan, 2008). This suggests that scheduled knowledge sharing from headquarters is positive for subsidiaries, where organizational differences need to be considered when transferring knowledge from headquarters (Yang, Mudambi, & Meyer, 2008).

2.3 Subsidiary to Headquarters Flow

As MNC structures have changed from traditional hierarchical structures to network-based and heterarchical configurations, the literature has shifted to focus on the subsidiary as an increasingly recognized source of knowledge for MNC headquarters and other subsidiaries (Buckley & Strange, 2011; Michailova & Mustafa, 2012). This signifies a shift in the previously dominant view that subsidiary success results from knowledge inflows from the parent where new knowledge was created by headquarters and not developed in subsidiaries. In the continuous search for novel knowledge a new factor in knowledge flow dynamics is introduced which is that of subsidiary power and influence in the MNC.

A growing number of studies have investigated how subsidiaries gain influence in their MNC. In this regard a distinction is made between network- and knowledge-based activities which enable subsidiaries to exert influence on their MNC and impact knowledge transfer (Andersson, Forsgren, & Holm, 2002; Ciabuschi, Dellestrand, & Kappen, 2012; Najafi-Tavani, Giroud, & Andersson, 2014). Internal knowledge based activities which include knowledge development and reverse knowledge transfers involve the creation and sharing of knowledge back to headquarters. Of these activities reverse knowledge transfer is more important than knowledge creation alone in explaining subsidiary influence (Najafi-Tavani et al., 2014). This implies that transferring knowledge vertically back to headquarters is important for increasing a subsidiary's influence where technology related power as opposed to business related power provides greater influence in MNC strategic decisions (Mudambi, Pedersen, & Andersson, 2014). In order to achieve this, knowledge relevancy is an important characteristic when the direction of knowledge flow is vertical from subsidiary back to headquarters (Yang et al., 2008).

Internal network based activities such as the embeddedness of subsidiaries within their local

networks can be seen as a strategic resource enhancing future capability and promote knowledge sharing through trust relationships (Andersson et al., 2002). The concept of embeddedness describes the level to which the subsidiary is entrenched in its host country environment. This has been expanded further to “multiple embeddedness” defining how subsidiaries need to be “externally embedded” in their host country network to take advantage of local opportunities yet be “internally embedded” in their MNC network to potentially share the benefits to the rest of the MNC (Meyer, Mudambi, & Narula, 2010) through reverse knowledge transfer.

The motivation for knowledge flows from subsidiaries back to headquarters expands on the need for MNCs to share knowledge across the company by introducing this concept of inwardly focussed power and influence driving individual subsidiary gain and rent seeking behaviour.

2.4 Subsidiary to Subsidiary Flows

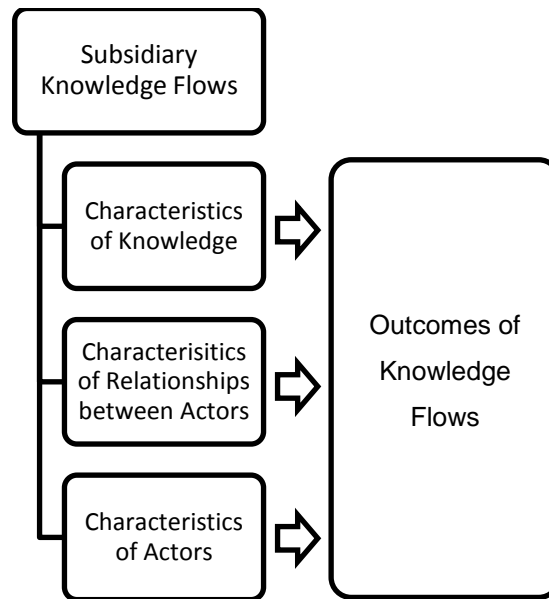
Horizontal knowledge flows involve the sharing of knowledge between subsidiaries where competence based trust has been identified as a key enabler for useful knowledge transfer among subsidiaries with strong relational ties (Levin & Cross, 2004). However strong relational ties is not necessarily a key requirement for innovation and knowledge creation as weak ties allow for separation between parties yet enough commonality to provide access to nonredundant information (Levin & Cross, 2004) that can significantly benefit the subsidiary.

As subsidiaries report to the same parent, they share many commonalities where sharing knowledge between one another can be reassuring and provide a sense of coalition. Hence transfer between subsidiaries (Noorderhaven & Harzing, 2009) implying that hierarchical relations are important for vertical knowledge transfer but not so for horizontal knowledge transfer. This presumably makes other subsidiaries prime candidates for knowledge seeking activities should middle managers seek operational knowledge. Further to this point the MNC as a whole benefits from internalization advantages when subsidiaries share knowledge as transaction costs with others outside of the MNC can be avoided (Tseng, 2015).

2.5 Factors Influencing Subsidiary Knowledge Flow

Distinction is made in subsidiary knowledge flow literature between factors that influence the outcomes of knowledge flows and actual outcomes of knowledge flows. These factors are categorized as characteristics of knowledge transferred, characteristics of relationships between actors and characteristics of actors (Michailova & Mustaffa, 2012) as indicated in Figure 1.

Figure 1: Categorization of Subsidiary Knowledge Flow Literature (Michailova & Mustafa, 2012)



The focus of this study primarily involves the relationship between actors as understanding who subsidiary middle managers approach in order to seek relevant knowledge is to be investigated.

2.5.1 Characteristics of Relationships between Actors

Relational characteristics between actors engaged in knowledge transfer include distance or similarity which is defined in terms of institutional, organizational or cultural distance. Cultural distance links closely with linguistic distance and social networks appear to show significance in most knowledge flows.

Institutional Distance

Institutional theory outlines the extent to which the two actor's home country environments differ from a regulatory, political or social standpoint. Central to this theory is the concept that organisations sharing the same environment will employ similar practices where cross border dissimilarities in institutional structures are likely to result in varying management practices (Kostova & Roth, 2002) between those countries. Institutional theory is particularly relevant to the field of subsidiary knowledge flows where countries' institutional differences can be defined in terms of institutional profiles (Kostova & Roth, 2002).

Cultural Distance

Cultural distance is based on reasoning that actors with different values will hinder understanding and their ability to collaborate (Ambos & Ambos, 2009). The measurement of cultural distance can be traced back to Hofstede's cultural value scores calculated over four

cultural dimensions to determine cultural similarity. This implies that in contextually similar cultures where the dominant cultural patterns are compatible, a better chance of comprehension and absorption of transferred knowledge can be expected (Bhagat, Kedia, Harveston, & Triandis, 2002). However cultural similarity can also hinder knowledge transfer as suggested by research identifying that cultural homogeneity had assisted the transfer of rich tacit knowledge among Japanese companies yet was identified as a possible competitive disadvantage in a global economy that is culturally diverse (Bhagat et al., 2002).

Linguistic Distance

Linguistic distance measured by genealogical classifications of languages expands on cultural distance which complicates knowledge transfer as linguistic boundaries often involve misunderstandings (Ambos & Ambos, 2009). Interestingly linguistic distance can act as a power structure in companies whereby language can reveal a hierarchy in the company that may not relate to the formal structures. Remarkably linguistic distance is unlikely to affect knowledge flows relating to technical systems as these are typically designed around one language in which most users are proficient (Ambos & Ambos, 2009), implying that technical systems knowledge is more easily transferred and absorbed.

Organizational Distance

Organizational distance relates to the extent of difference in structures, processes and values between organizational units which includes subsidiaries and HEADQUARTERS's (Schlegelmilch & Chini, 2003). Organizational distance amplifies ambiguity in knowledge transfer which can result in lack of understanding of logical linkages, impacting on the effectiveness of knowledge transfer (Schlegelmilch & Chini, 2003).

Social Networks

Another notable area adding to the literature on relationships between knowledge sharing actors, is that of social relationships and networks. A social networks involves the sum of relationships linking a person to other people, which can be compared to a business network which is defined as the set of relationships linking a firm with other firms (Ellis, 2010). These social networks show influence in explaining the processes involved in knowledge creation, transfer, absorption and application of knowledge (Phelps et al., 2012) . The influence of social networks on subsidiary knowledge flows cannot be understated considering there is a positive effect of social interaction intensity on all intra-MNC knowledge flows (Noorderhaven & Harzing, 2009).

Social networks are driven by the notion of interpersonal ties where stronger ties facilitate more effective knowledge transfer from individuals abroad. This is largely due to the novelty of obtaining knowledge from another country as well as trust due to the strong ties between the knowledge seeker and the provider (Levin & Barnard, 2013). However there are limitations to social networks in that social ties are constrained by geographic and linguistic distance which restrict knowledge flows (Ellis, 2010).

2.5.2 Characteristics of Actors

Perhaps the most important characteristic of actors engaging in knowledge transfer is their level of absorptive capacity. Absorptive capacity is described as a firm's ability to identify the value of new external information, assimilate it, and apply it to improve its innovation capabilities for commercial gain (Cohen & Levinthal, 1990). When knowledge is required to be transferred, a minimum level of absorptive capacity in the receiving firm is necessary. This can be illustrated by MNCs belonging to countries or industries more advanced than host country organizations, where knowledge spillovers cannot be internalized by the host country organizations as they may not have adequate absorptive capacity (Perri & Andersson, 2014). Absorptive capacity is largely a function of the firm's level of prior knowledge which is a basic requirement for any related knowledge flows.

Actors' innovative capacity has also been found to influence knowledge flows in that increasing subsidiary inventiveness is associated with lower reverse knowledge transfers back to headquarters (Mudambi, Piscitello, & Rabbiosi, 2014). Similarly advanced subsidiaries with superior technology contribute less to their local knowledge networks and will only share their knowledge if they expect to get something in return (Perri & Andersson, 2014).

2.5.3 Characteristics of Knowledge

Organisational knowledge is often divided into two categories, explicit and tacit knowledge. Explicit knowledge refers to knowledge that can be codified and easily transferred from one actor to another. Tacit knowledge refers to knowledge that can be challenging to articulate and difficult to transfer as it is rooted in commitment and focus in a specific topic (Nonaka, 1994). This distinction is relevant to this study as middle managers may struggle to obtain tacit knowledge without an adequate level of absorption capacity or the patience to fully internalize tacit knowledge that is shared.

Another knowledge characteristic identified is that highly valuable knowledge drives knowledge protection strategies which can effectively reduce knowledge outflows (Perri &

Andersson, 2014). Hence it can be expected to be more difficult to seek highly valuable knowledge.

2.6 Knowledge Flows in Developing Countries

Knowledge flows from subsidiaries in developing countries do not appear to be comprehensively investigated however various papers have been published on the topic of knowledge management (Reza, 2008; Wibowo, 2013) and the influence of knowledge based productivity in developing countries (Goedhuys, Janz, & Mohneny, 2014). Knowledge remains instrumental in enabling the investment and mastering of new machinery and equipment in developing countries which has been found to be the most important method for technological learning. This leads to production process improvement according to a study conducted in five developing countries and three industries (Goedhuys et al., 2014). Furthermore knowledge sources that raise productivity were found to be sector or industry specific and not country specific (Goedhuys et al., 2014), suggesting that research in a particular industry may be acceptable to identify trends in knowledge flows.

Although most knowledge development and knowledge transfer studies have focused on the developed world, developing countries stand to benefit from knowledge advancements and technology developments assuming adequate absorption capabilities exist to harness this knowledge or technology for productivity and efficiency gains. Particularly for technologies created with developing countries in mind or developed in such countries for similar environments. Knowledge requirements for subsidiaries in developed versus developing countries can be expected to vary significantly and hence influence knowledge seeking activities.

The dynamic introduced by developed and developing countries can also impact knowledge flows as it is increasingly common to find people from less developed countries living in the developed world (Liu, Lu, Filatotchev, Buck, & Wright, 2010). Typically developing countries seek knowledge from more developed countries but how does this transfer take place? Who does the developing country middle manager contact in order to seek knowledge?

2.7 Operational Knowledge

Operational knowledge can be described as knowledge that assists in transferring certain inputs into outputs (Wijnhoven, 2003). This implies that operational knowledge is useful knowledge that enables an operational manager to improve systems or processes in order to achieve organisational goals. Hence operational knowledge should make a tangible difference or result in a desired outcome as opposed to theoretical insights that may not be necessarily be applicable by middle managers. Operational knowledge typically relates to

the knowledge and skills required for efficient control of production processes (Wibowo, 2013) where the application of knowledge is key.

Distinction is made between cutting edge R&D knowledge often created by high tech headquarters facilities resulting in the generation of patents and applicable operational knowledge that can be immediately applied by operational managers to improve functional process. The former has attracted significant attention in knowledge flow literature compared to the latter which is perhaps more useful to a wider spectrum of companies aiming to improve their performance.

2.8 Seeking Knowledge

Knowledge seeking relates to an intended action by an individual to locate and retrieve useful information assuming that the knowledge holder will not openly provide such knowledge. Knowledge seeking behaviour can be predicted by characteristics such as knowing what someone else knows, valuing what that person knows in relation to what you know and being able to retrieve that persons knowledge timeously (Borgatti & Cross, 2003). Knowledge seeking strategies include reconnecting with dormant ties where the hurdle of increasing dormancy needs to be overcome (Levin, Walter, & Murnighan, 2011), connecting with interpersonal ties abroad where quick access to novel knowledge is more suited for short interactions, and contacting local ties where longer interactions are possible (Levin & Barnard, 2013). Knowledge seeking can also be influenced by a firms exploitive versus exploratory strategic direction where an exploratory approach increases the firms propensity to engage in knowledge seeking behaviour (Kedia, Gaffney, & Clampit, 2012).

An understanding of knowledge seeking is instrumental in this study as this is the action to be evaluated as managers look to the various sources of knowledge available to him or her to pursue improvement strategies.

2.9 Sources of Knowledge

The sources of knowledge available to subsidiary managers are identified for the purposes of this study as headquarters, sister subsidiaries, sister companies and suppliers. The characteristics of each are briefly discussed.

2.9.1 Headquarters

As the traditional source of R&D and knowledge creation, headquarters would appear to be the first choice managers turn to when seeking knowledge. As subsidiary performance is strongly associated with the level of integration of headquarters' technological and marketing knowledge resources (Fang et al., 2013) this would be an intuitive source of knowledge.

Strong organisational similarity allows good understanding of the middle managers processes and knowledge requirement needs where headquarters can exert its power and influence on the subsidiary.

2.9.2 Sister Subsidiaries

Sister subsidiaries by definition report to the same parent through which they typically share organisational similarity. Despite differing levels of institutional distance in various host countries, sister subsidiaries perform similar tasks improving familiarity with specific operational challenges faced. This familiarity suggests that middle managers could obtain useful operational knowledge from their sister subsidiary counterparts.

Another strong motivation for contacting sister subsidiaries is the existence of centres of excellence that are developed in MNC subsidiaries. Centres of excellence are defined as an organizational unit that has a set of capabilities that have been recognised as an important source of value creation for the MNC (Frost, Birkinshaw, & Ensign, 2002). These centres of excellence develop through a combination of factors including internal capabilities, environmental and institutional conditions, clustering of firms and parent firm investment (Frost et al., 2002) to provide an unparalleled source of MNC specific knowledge that subsidiaries can utilize.

2.9.3 Sister Companies & Interdivisional Sources

For this study sister companies are defined as those belonging to the same parent or holding company, offering completely different products and services. Similarly interdivisional sources are defined as divisions within the same holding company that produce different products or services to that of the knowledge seeker. Sourcing knowledge for innovation is an important activity for subsidiaries where sister companies and interdivisional sources provide institutional and often cultural similarity for the knowledge seeking firm. Furthermore interdivisional knowledge has been found to have a profound impact on inventions which is stronger than the effect of utilising knowledge from within the division as well as from outside the firm boundaries (Miller, Fern, & Cardinal, 2007). This is explained by the concept of local and distant combinations of knowledge elements where local combinations involve recombining or revising existing knowledge, compared to distant combinations where far flung knowledge elements combine to produce ground breaking innovations or introduce a new paradigm (Miller et al., 2007).

The advantage of sourcing far flung knowledge from sister companies or interdivisional units is undeniable and provides a useful alternative for middle managers to pursue as they seek operational insight.

2.9.4 Suppliers

When new innovations are implemented in firms, knowledge hurdles may need to be overcome. Suppliers such as consultants or technology providers offering specialist expertise can assist in overcoming such organizational and technological knowledge hurdles (Weigelt & Sarkar, 2009). Thus firms benefit from drawing on a suppliers expertise where the suppliers technical experiential diversity is positively correlated with the firms innovation adoption (Weigelt & Sarkar, 2009). This means that subsidiaries can develop their innovation related capabilities by drawing on experiential learning from its suppliers which is a useful channel from which middle managers can seek knowledge.

However, when subsidiaries work closely with suppliers they develop local linkages and become highly embedded in their host environment. These linkages can act as channels through which MNC knowledge spills to local firms but also allow the subsidiary to learn from their host environment (Perri et al., 2013). In developed countries the competitive pressure is often greater where domestic actors are likely to be highly competent with absorptive capacity, making them desirable partners for subsidiary learning albeit at the cost of losing competitive advantage through spillovers (Perri et al., 2013). As such a curvilinear relationship has been identified between perceived local competitive pressure and the quality of local linkages where more competitive environments result in weaker relationships between subsidiaries and local actors (Perri et al., 2013) such as suppliers. This has implications for this study on subsidiary knowledge flows in that the local competitive environment should be understood prior to seeking and sharing knowledge with institutionally similar domestic actors and suppliers in one's host country.

2.10 Subsidiary Importance

Subsidiary importance has been referred to as the value headquarters and subsidiaries in the MNC assign to an entity, recognizing them as a source of knowledge or capability in the MNC (Yamin & Andersson, 2011; Yamin, Tsai, & Holm, 2011). This importance can for example be reflected in the reliance of other units on the particular subsidiary's production and product development capabilities (Andersson et al., 2002). As advanced subsidiaries develop their capabilities and become recognized as centers of excellence in the MNC, headquarters are likely to extend such subsidiaries' charter through parent-driven investment (Birkinshaw & Hood, 1998). Through this additional support and focus from headquarters, more important subsidiaries are more likely to hold an expanded mandate as they service increasingly more units and subsidiaries in the MNC. Subsidiary importance can furthermore be defined in terms of contribution to MNC performance and operations (Tseng, 2015) such as subsidiary revenue.

Absorptive capacity (Cohen & Levinthal, 1990) is an additional indicator that can be used to indicate subsidiary importance. This well-documented characteristic defines a subsidiary's ability to identify the value of new external information, assimilate and apply it to improve its innovation capabilities for commercial gain (Cohen & Levinthal, 1990). It has been documented that host country organizations cannot use knowledge spill-overs from MNCs operating in countries or industries more advanced than host country organizations due to their inability to internalize the novel information, i.e. lack of absorptive capacity (Perri & Andersson, 2014). As absorptive capacity is largely a function of a subsidiary's level of prior knowledge and capabilities, it is reasonable to assume that this characteristic can be used as an indicator of subsidiary importance.

2.11 Classification and Visualisation of Literature

Various approaches were taken to categorise the literature discussed above. The review paper by Michailova & Mustaffa, 2012 was used as the starting point and their findings mapped into a tree structure where after additional literature were added. This literature map can be found in Appendix 1 and served as the starting point for literature classification.

Chapter 3: Hypotheses

The motivations for the hypotheses are detailed in the paper submitted. The hypotheses are repeated below for consistency.

3.1 Technological Knowledge

Hypothesis 1. Managers from both high (a) and low (b) importance subsidiaries will request advice regarding research primarily from headquarters.

Hypothesis 2. Managers from both high (a) and low (b) importance subsidiaries will request advice regarding new product development primarily from headquarters.

Hypothesis 3. Managers from both high (a) and low (b) importance subsidiaries will request advice regarding the strategic direction of future technologies primarily from headquarters.

3.2 Operational Knowledge

Hypothesis 4: Managers from higher importance subsidiaries are more likely to request advice regarding marketing and sales from other high importance subsidiaries and headquarters (a), whereas managers from lower importance subsidiaries are more likely to request such advice from other low importance subsidiaries and from key suppliers (b).

Hypothesis 5: Managers from higher importance subsidiaries are more likely to request advice regarding logistics and distribution from other high importance subsidiaries and headquarters (a), whereas managers from lower importance subsidiaries are more likely to request such advice from other low importance subsidiaries and from key suppliers (b).

Hypothesis 6: Managers from higher importance subsidiaries are more likely to request advice regarding purchasing from other high importance subsidiaries and headquarters (a), whereas managers from lower importance subsidiaries are more likely to request such advice from other low importance subsidiaries and from key suppliers (b).

Chapter 4: Research Methodology

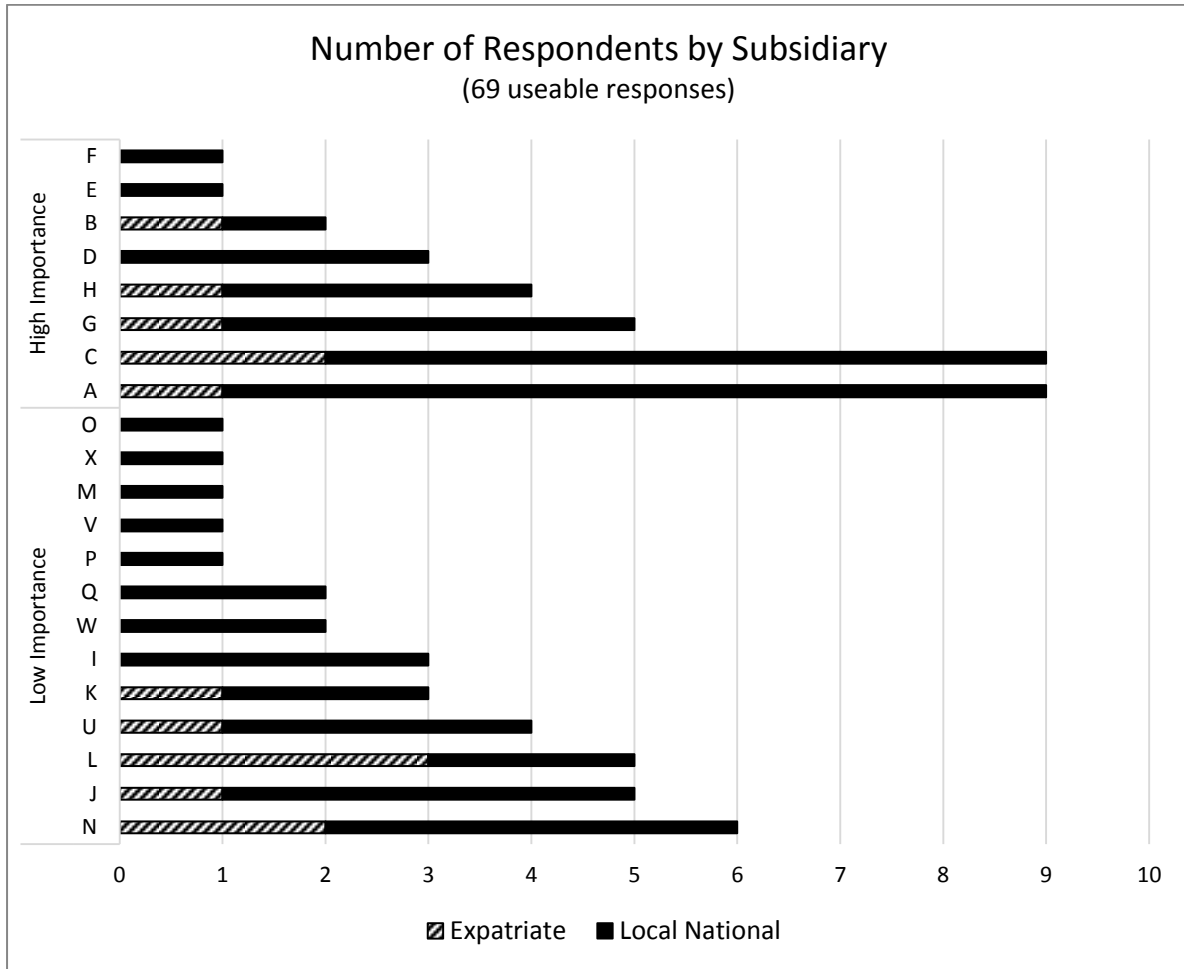
The purpose of this study is to determine differences, if any, in knowledge seeking behavior between subsidiaries of varying importance. Existing studies of subsidiary knowledge flows have been conducted in a limited variety of geographical contexts without significant effort to analyze the impact of these contexts on knowledge transfer (Michailova & Mustafa, 2012). For this reason, we developed a questionnaire regarding knowledge seeking activities across an entire MNC. The objective was not to identify why subsidiaries seek knowledge but rather to determine where they seek knowledge in the differentiated network of the MNC, including its suppliers.

4.1 Setting and Sampling

The study is set in a Japanese MNC with 24 subsidiaries on all continents. Apart from subsidiary sales figures (obtained from headquarters and used as complementary indicator of subsidiary importance), all data were collected via questionnaire. Operational level managers operating in business or technical general management roles were the target population as they were most likely to seek knowledge in order to improve performance of their division within their subsidiary. The knowledge seeking by individual managers was the unit of analysis.

To construct a sample frame, internal list serves were used. They have the benefit of targeting the individuals who are directly responsible for certain tasks, and thus avoid a given subsidiary being weighted too much or too little. The eventual sample included senior financial managers, senior parts managers, service and operations general managers and technical experts. From the 212 individuals emailed, 91 responded (43% response rate) of which 69 questionnaires had no missing data. Expatriates comprised 20% of these responses which is evident in Figure 2. At least one response from each of the 24 subsidiaries was received although three subsidiaries were excluded due to incomplete responses. The sizes of subsidiaries (and thus their representation on the list serves) vary.

Figure 2: Useable response count by subsidiary



4.2 Survey Design

The web-based questionnaire was developed with constructs such as subsidiary mandate or subsidiary absorptive capacity measured as multi-item constructs using seven-point Likert scales. The questionnaire was pretested with individuals within the MNC as well as with academics and can be found in Appendix 2.

There were four main sets of questions. Initial questions served to locate respondents – primarily identifying the subsidiary in which they were employed. A series of questions relate to subsidiary importance, as well as questions relating to knowledge sourcing for technological and finally for operational purposes. To improve reliability, questions relating who to subsidiaries had sought knowledge from as well as which subsidiaries had contacted them for knowledge was included. The intention was to ensure enough measure were obtained to allow flexibility and triangulation of results.

4.3 Subsidiary Importance Measures

Subsidiary mandate.

The multi-item mandate variable was obtained using measures used by Mudambi et al. (2014) which indicated the extent to which other entities in the MNC are dependent on the subsidiaries' competencies. These were measured by asking what the implications would be for the MNC if the focal subsidiary no longer existed (one question), as well as asking to what extent the subsidiaries technological and business competencies were of use to other units in the MNC (six questions). Technological activities were defined through (1) research, (2) product development and (3) production of goods and services. Business activities were defined through (1) marketing/sales, (2) logistics/distribution and (3) purchasing (Mudambi, Pedersen, et al., 2014). All of these were measured using a seven point Likert scale where 1 represented "no use for other units" and 7 represented "very useful for other units" in the MNC.

Respondents were also asked if their subsidiary's responsibilities extended beyond their own territory and if they supplied products or services to other units in the MNC in order to measure subsidiary mandate. These two questions provided poor correlation to one another and the rest of the mandate measures, so they were subsequently excluded from the analysis. Cronbach's alpha for the remaining mandate items was 0.83, providing adequate reliability and allowing for these results to be combined into one mandate measure. Detail of the coding used and list of constructs can be found in Appendix 3.

The notion of dependence was also directly measured by including an "identified as a knowledge source" ranking. It was compiled based on the number of times a subsidiary was identified as a source of knowledge by another subsidiary.

Absorptive capacity.

The multi-item absorptive capacity variable was measured using three constructs developed from Cohen & Levinthal's (1990) original work. As absorptive capacity is largely a function of a subsidiary's prior related knowledge influencing its ability to identify, retrieve and exploit novel information (Cohen & Levinthal, 1990), the items were defined in terms of a subsidiary's ability to obtain, interpret and utilize novel information sourced from other units in the MNC. This was measured through three questions using a seven-point Likert scale where 1 corresponded with "quite a lot of difficulty" and 7 with "no difficulty at all". The question relating to a subsidiary's ability to obtain novel information from other units in the MNC not only negatively affected reliability, but also, given the emphasis of the study on knowledge seeking, risked contaminating the knowledge seeking indicators. It was

subsequently removed from the analysis. Cronbach's alpha for the remaining two items relating to interpreting and utilizing novel information was 0.76, providing suitable reliability.

Size.

Revenue figures for each of the subsidiaries were used to measure the size and scale of the contribution to the MNC. The revenue values were transformed by deriving their natural logarithm to improve the distribution, emphasizing the more numerous small and mid-size subsidiaries. Thereafter a constant was added to avoid negative values. This approach has been used in MNC knowledge flow literature when defining subsidiary size and subsidiary age variables (Ciabuschi et al., 2012).

Subsidiary Importance.

The proposed subsidiary importance index consisted of all four constructs; subsidiary mandate, the number of times the subsidiary had been identified as a source of knowledge by other subsidiaries in the MNC, subsidiary absorptive capacity and subsidiary size. The indicators were given even weight, but no clear break in the ranking was evident as indicated by Table 1. Instead, there seemed to be a steady diminishing in importance. Using the ranking, the subsidiaries were divided into two categories, low and high importance, based on the total number of respondents, a division that allowed for a meaningful statistical testing of the hypotheses. The relative weighting of these variables, and what would be the most appropriate division between high and low importance (or maybe high, medium and low) is an area for future research that may yield more robust insights into the classification and behavior of subsidiaries.

Because there were many more respondents in the high importance subsidiaries, eight subsidiaries (34 fully usable responses) were considered as high importance, and sixteen (35 responses) as low importance subsidiaries. Most of the important subsidiaries were located in advanced economies, although one subsidiary from a populous developing country was included. The less important subsidiaries included most of the developing country subsidiaries and some small subsidiaries in advanced economies (some niche providers, and others the largely unplanned results of mergers). It is a limitation of this study that there were not enough responses to assess, for example, if the knowledge seeking of a small subsidiary in advanced economies was affected more by its location than by its strategic importance.

Table 1: Subsidiary Importance Index

Subsidiary Identifier	Size	Absorptive Capacity	Mandate	Identified as Knowledge Source (Count)	Importance Index	Important Subsidiaries (Index >11)
A	10		9	18	37	High
B	7	10	6	11	34	High
C	9		1	8	18	High
D	6	7	5		18	High
E		3	10	2	15	High
F		10	3		13	High
G	1	10		1	12	High
H		4	8		12	High
I	3	5	2	1	11	Low
J	4	6			10	Low
K			7	2	9	Low
L	8				8	Low
M		3	4		7	Low
N	5				5	Low
O		3			3	Low
P		3			3	Low
Q				2	2	Low
R	2				2	Low
S				1	1	Low
T					0	Low
U					0	Low
V					0	Low
W					0	Low
X					0	Low

Once the high and low importance categories had been created, the two groups of subsidiaries were assessed in terms of the most likely sources of their operational knowledge and technological knowledge.

4.4 Technological and Operational Knowledge Sources

The sources for technological knowledge and operational knowledge were both measured through three questions each. In terms of technological knowledge, respondents were asked to anchor on the most recent instance where they sought information (to reduce bias), and asked whether they approached headquarters, another subsidiary or suppliers for information on research, product development, and the strategic direction of future technologies respectively.

They were also required to identify which subsidiaries and suppliers they approached. The questions asked read as follows: “Indicate the source your subsidiary would most likely contact to gain knowledge regarding marketing and sales”. In answering the question either “global supplier”, “local supplier”, “headquarters” or “another subsidiary” were to be selected. This was repeated for all three operational knowledge and technological knowledge types defined in this study. Had the respondent indicated “another subsidiary”, they were then

asked to indicate which subsidiary from the list provided.

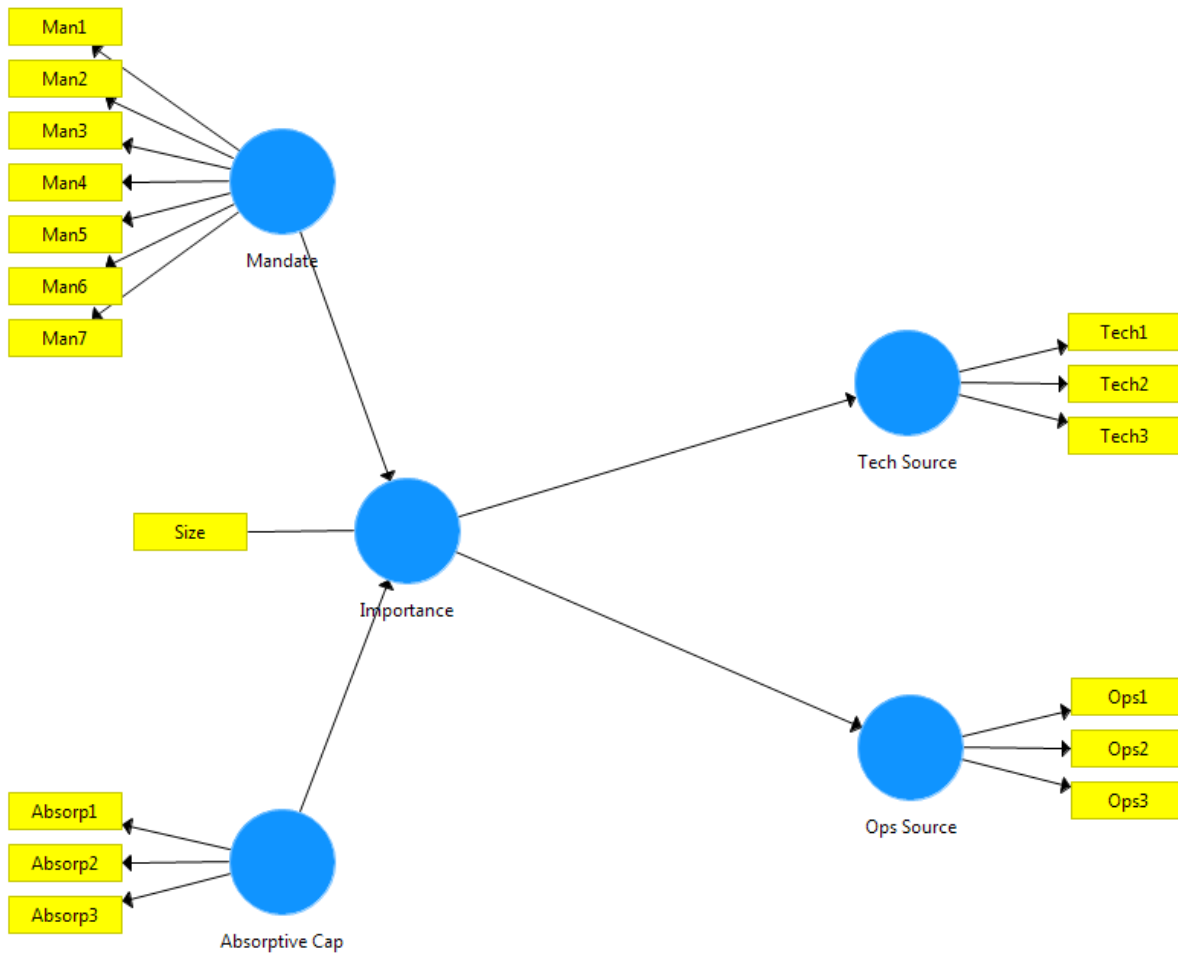
Similarly, assessment of the operational knowledge sources involved asking which entity they had contacted for information on marketing and sales, logistics and distribution, and purchasing respectively. Once again, respondents had to select one of headquarters, another subsidiary or supplier (global or local).

In order to test the hypotheses, the counts of the respective knowledge sources were used to calculate proportions which were then tested statistically where this method is useful for assessing differences between groups (Keller & Warrack, 1999). Hypotheses were tested to the 90% confidence interval for this exploratory analysis.

4.5 Method Considered but Not Used

Considering that the independent variables consisted of interval data (mandate & absorptive capacity), categorical data (mandate) and continuous data (size) and the dependent variables were categorical (supplier, subsidiary, headquarters), it was intended to use a path modelling approach using Partial Least Squares method (Sarstedt, Henseler, & Ringle, 2011) to determine if a categorical outcome could be predicted from the independent variables. This method was considered as it was suitable for small sample sizes of as few as 30 to 100 observations (Chin & Newsted, 1999). A model was created using Smart PLS software relating the mandate, size and absorptive capacity variables to a subsidiary importance variable. Thereafter the three categorical technological sources of knowledge and operational sources of knowledge defined the technological and operational source variables as depicted in Figure 3.

Figure 3: PLS model structure



However, when running the descriptive statistics and considering the correlations between the variables, there was no statistical significance between the independent and dependent variables as can be seen in Table 2. As no linear relationship was noted between these independent and dependent variable and a non-linear method was not investigated. Instead it was decided to proceed with the subsidiary importance ranking method as defined in the previous section and this approach was abandoned.

Table 2: Descriptive statistics and correlations. * Marked correlations are significant at $p < 0.05$

Variable	Means	Std.Dev.	Size	Man1	Man2	Man3	Man4	Man5	Man6	Man7	Absorp0	Absorp1	Absorp2	Absorp3	Tech_HQ	Tech_Subsidiary	Tech_Supplier	Ops_Subsidiary	Ops_Supplier	Ops_HQ
Size	2.55	0.47	100																	
Man1	5.87	1.11	0.30*	1.00																
Man2	4.32	1.94	0.17	0.28*	1.00															
Man3	4.51	1.89	0.16	0.21	0.79*	1.00														
Man4	4.58	1.91	0.10	0.25*	0.53*	0.53*	1.00													
Man5	5.16	1.43	0.06	0.24	0.31*	0.30*	0.33*	1.00												
Man6	4.72	1.60	0.04	0.22	0.21	0.30*	0.45*	0.66*	1.00											
Man7	4.33	1.66	0.16	0.38*	0.37*	0.38*	0.67*	0.52*	0.72*	1.00										
Absorp0	3.01	1.65	0.15	0.13	0.08	0.19	0.00	-0.07	-0.02	-0.05	1.00									
Absorp1	4.86	1.53	-0.24	0.10	-0.10	-0.03	0.00	0.00	0.03	0.05	-0.03	1.00								
Absorp2	4.77	1.02	0.00	-0.07	-0.21	-0.14	0.09	0.06	0.05	0.01	-0.24*	0.43*	1.00							
Absorp3	4.90	0.99	0.20	-0.04	0.00	0.03	0.27*	0.02	0.06	0.08	0.00	0.19	0.61*	1.00						
Tech_HQ	2.33	1.01	0.04	0.01	-0.28*	-0.20	-0.22	-0.10	0.11	-0.02	0.09	0.04	0.02	0.00	1.00					
Tech_Subsidiary	0.35	0.82	-0.10	-0.05	0.27*	0.20	0.11	0.01	-0.16	-0.04	-0.05	-0.09	-0.22	-0.03	-0.71*	1.00				
Tech_Supplier	0.32	0.72	0.06	0.03	0.08	0.05	0.17	0.12	0.03	0.08	-0.08	0.04	0.22	0.03	-0.14	0.10	1.00			
Ops_Subsidiary	0.58	0.91	-0.03	0.15	0.06	-0.03	0.13	0.07	-0.10	0.07	-0.15	0.02	-0.09	-0.11	0.37*	0.11	0.10	1.00		
Ops_Supplier	1.07	1.06	-0.02	-0.22	-0.10	-0.06	-0.06	0.05	-0.09	-0.12	-0.08	0.04	0.22	0.01	-0.05	0.36*	0.36*	-0.29*	1.00	
Ops_HQ	1.35	1.19	0.04	0.08	0.05	0.08	-0.05	-0.10	0.16	0.05	0.19	-0.05	-0.13	0.08	0.37*	0.37*	0.37*	-0.29*	-0.67*	1.00

Chapter 5: Results

This results section of the supporting document does not aim to add additional explanations but rather depict the results obtained in more detail.

Technological Knowledge Seeking

The questionnaire yielded 69 usable responses. However question 24 (see Appendix 2) which requested which subsidiary respondents to elaborate on the subsidiary to which they had turned (if had they indicated they had contacted a subsidiary) was not configured as a compulsory question. Subsequently there were a few cases where a respondent had indicated they would contact a subsidiary for a given type of knowledge but that subsidiary was not identified. This is evident in Table 3 below where the total number of respondents did not add to 69. This varied across the technological and operational knowledge types.

Table 3: Technological knowledge data

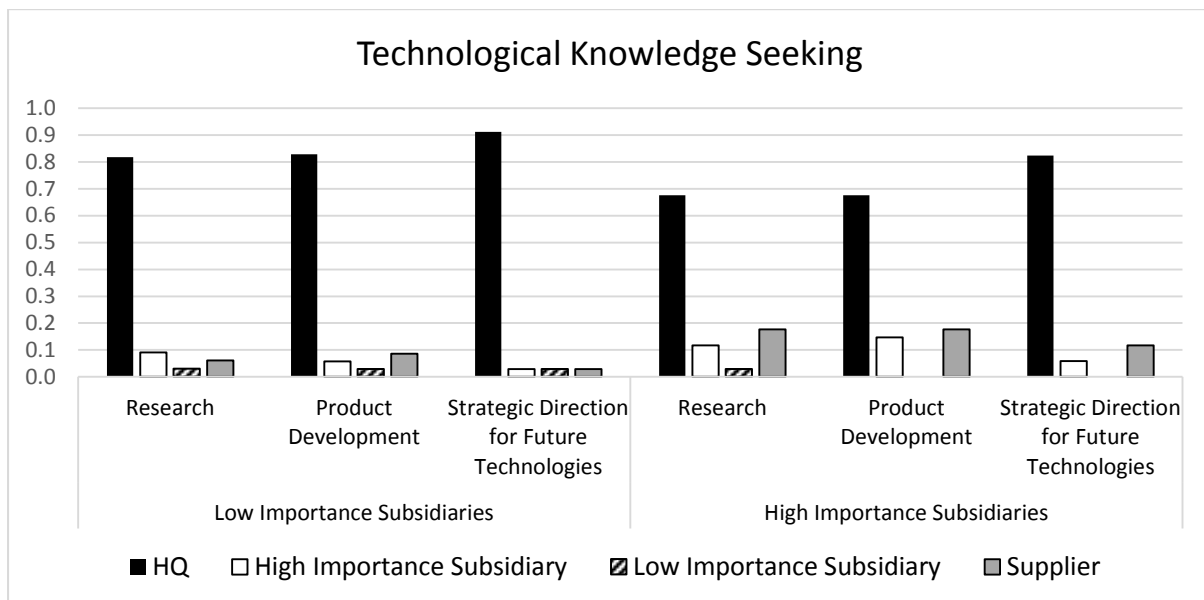
Research	Importance			Normalised Importance	
	High	Low	Grand Total	High	Low
High Importance Subsidiary	4	3	7	0.12	0.09
HQ	23	27	50	0.68	0.82
Low Importance Subsidiary	1	1	2	0.03	0.03
Supplier	6	2	8	0.18	0.06
Grand Total	34	33	67	1.00	1.00

New Product Development	Importance			Normalised Importance	
	High	Low	Grand Total	High	Low
High Importance Subsidiary	5	2	7	0.15	0.06
HQ	23	29	52	0.68	0.83
Low Importance Subsidiary		1	1	0.00	0.03
Supplier	6	3	9	0.18	0.09
Grand Total	34	35	69	1.00	1.00

Strategic Direction.	Importance			Normalised Importance	
	High	Low	Grand Total	High	Low
High Importance Subsidiary	2	1	3	0.06	0.03
HQ	28	31	59	0.82	0.91
Low Importance Subsidiary		1	1	0.00	0.03
Supplier	4	1	5	0.12	0.03
Grand Total	34	34	68	1.00	1.00

As shown in Table 3 the responses for each importance category were normalised to allow for equal comparison as well as statistical testing for proportions. Figure 4 indicates the technological results graphically.

Figure 4: Technological knowledge sources identified by high and low importance subsidiaries



To test the hypotheses the responses for high importance subsidiary and headquarters were combined and compared to low importance subsidiaries and suppliers to determine if a significant proportional difference existed. The null hypothesis represented the proportion of high importance subsidiaries and headquarters being less than or equal to 0.5. The alternative hypothesis defined this proportion to be greater than 0.5. The test statistic was calculated using the following formula (Keller & Warrack, 1999):

$$Z = \frac{(\hat{p}_1 - \hat{p}_2)}{\sqrt{\hat{p}(1 - \hat{p}) \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}}$$

The z-score and subsequent p-values for testing the technological knowledge hypotheses are presented in Table 4.

Table 4: Technological knowledge Z-scores and p-values (* p < 0.05)

Research – Normalised Results	Importance		Z-score		p-value	
	High	Low	High	Low	High	Low
High Importance Subsidiary & HQ	0.79	0.91	3.43	4.70	0.00*	0.00*
Low Importance Subsidiary & Supplier	0.21	0.09	-3.43	-4.70	1.00	1.00
Product development						
High Importance Subsidiary & HQ	0.82	0.89	3.77	4.56	0.00*	0.00*
Low Importance Subsidiary & Supplier	0.18	0.11	-3.77	-4.56	1.00	1.00
Strategic Direction.						
High Importance Subsidiary & HQ	0.88	0.94	4.46	5.14	0.00*	0.00*
Low Importance Subsidiary & Supplier	0.12	0.06	-4.46	-5.14	1.00	1.00

These results indicated support for H1a, H2a and H3a at the 95% confidence level where Headquarters and high importance subsidiaries were the clearly dominant sources identified. Similarly for lower importance subsidiary, hypotheses H1b, H2b and H3b were supported at the 95% confidence interval.

Operational Knowledge Seeking

The sources from which both high and low importance subsidiaries seek operational knowledge were more varied compared to technological knowledge. Table 5 indicates the response count obtained for both importance groups.

Table 5: Operational knowledge data

Marketing & Sales	Importance			Normalised Importance	
	High	Low	Grand Total	High	Low
High Importance Subsidiary	7	5	12	0.21	0.15
HQ	20	18	38	0.59	0.55
Low Importance Subsidiary	1	2	3	0.03	0.06
Supplier	6	8	14	0.18	0.24
Grand Total	34	33	67	1.00	1.00

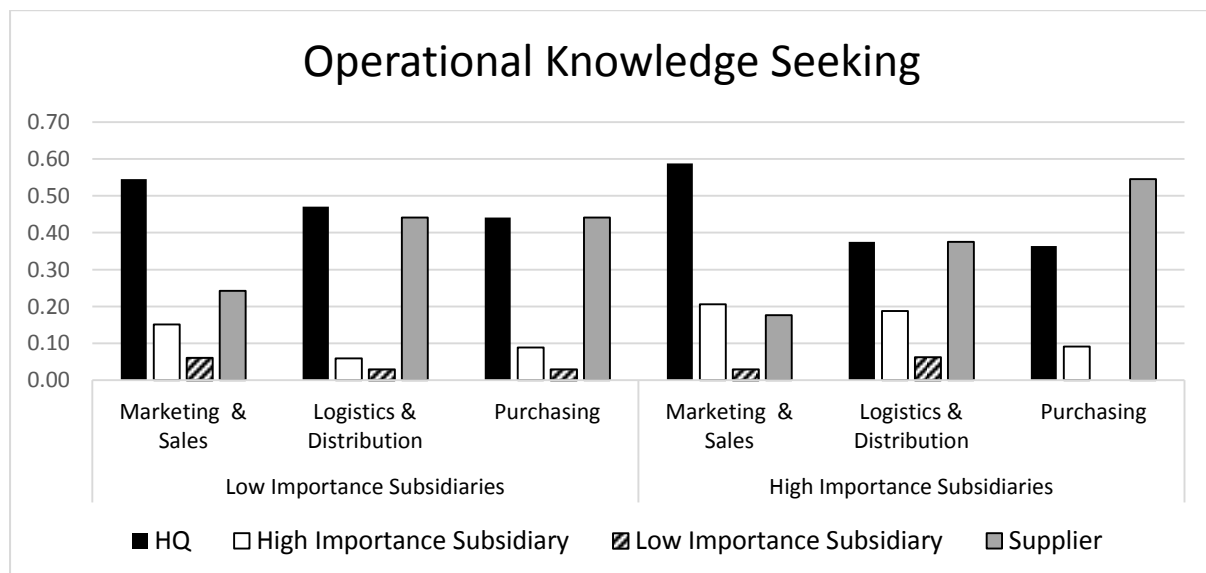


Logistics & Distribution	Importance			Normalised Importance	
	High	Low	Grand Total	High	Low
High Importance Subsidiary	6	2	8	0.19	0.06
HQ	12	16	28	0.38	0.47
Low Importance Subsidiary	2	1	3	0.06	0.03
Supplier	12	15	27	0.38	0.44
Grand Total	32	34	66	1.00	1.00

Purchasing	Importance			Normalised Importance	
	High	Low	Grand Total	High	Low
High Importance Subsidiary	3	3	6	0.09	0.09
HQ	12	15	27	0.36	0.44
Low Importance Subsidiary		1	1	0.00	0.03
Supplier	18	15	33	0.55	0.44
Grand Total	33	34	67	1.00	1.00

The normalised results were plotted graphically as shown in Figure 5.

Figure 5: Operational knowledge sources identified by high and low importance subsidiaries



The operational knowledge hypotheses were tested in a similar way to the technological knowledge hypotheses where high importance subsidiaries and headquarters were grouped

and compared to low importance subsidiaries and suppliers, Table 6.

Table 6: Operational knowledge Z-scores and p-values (* p < 0.05)

Normalised Results	Importance		Z-score		p-value	
	High	Low	High	Low	High	Low
Marketing & Sales						
High Importance Subsidiary & HQ	0.79	0.70	3.43	2.26	0.00*	0.01*
Low Importance Subsidiary & Supplier	0.21	0.30	-3.43	-2.26	1.00	0.99
Logistics & Distribution						
High Importance Subsidiary & HQ	0.56	0.53	0.71	0.34	0.24	0.37
Low Importance Subsidiary & Supplier	0.44	0.47	-0.71	-0.34	0.76	0.63
Purchasing						
High Importance Subsidiary & HQ	0.45	0.53	-0.52	0.34	0.70	0.37
Low Importance Subsidiary & Supplier	0.55	0.47	0.52	-0.34	0.30	0.63

Support was found for H4a as high importance subsidiaries were more likely to contact headquarters and other high importance subsidiaries for marketing knowledge where the difference was significant at the 95% confidence interval. However no support was found for H5a and H6a.

Considering the lower importance subsidiaries, no support was found for H4b, H5b nor H6b as the difference between the proportions of the two knowledge source groups were not significant. Low importance subsidiaries were not more likely to contact other low importance subsidiaries and suppliers for operational knowledge.

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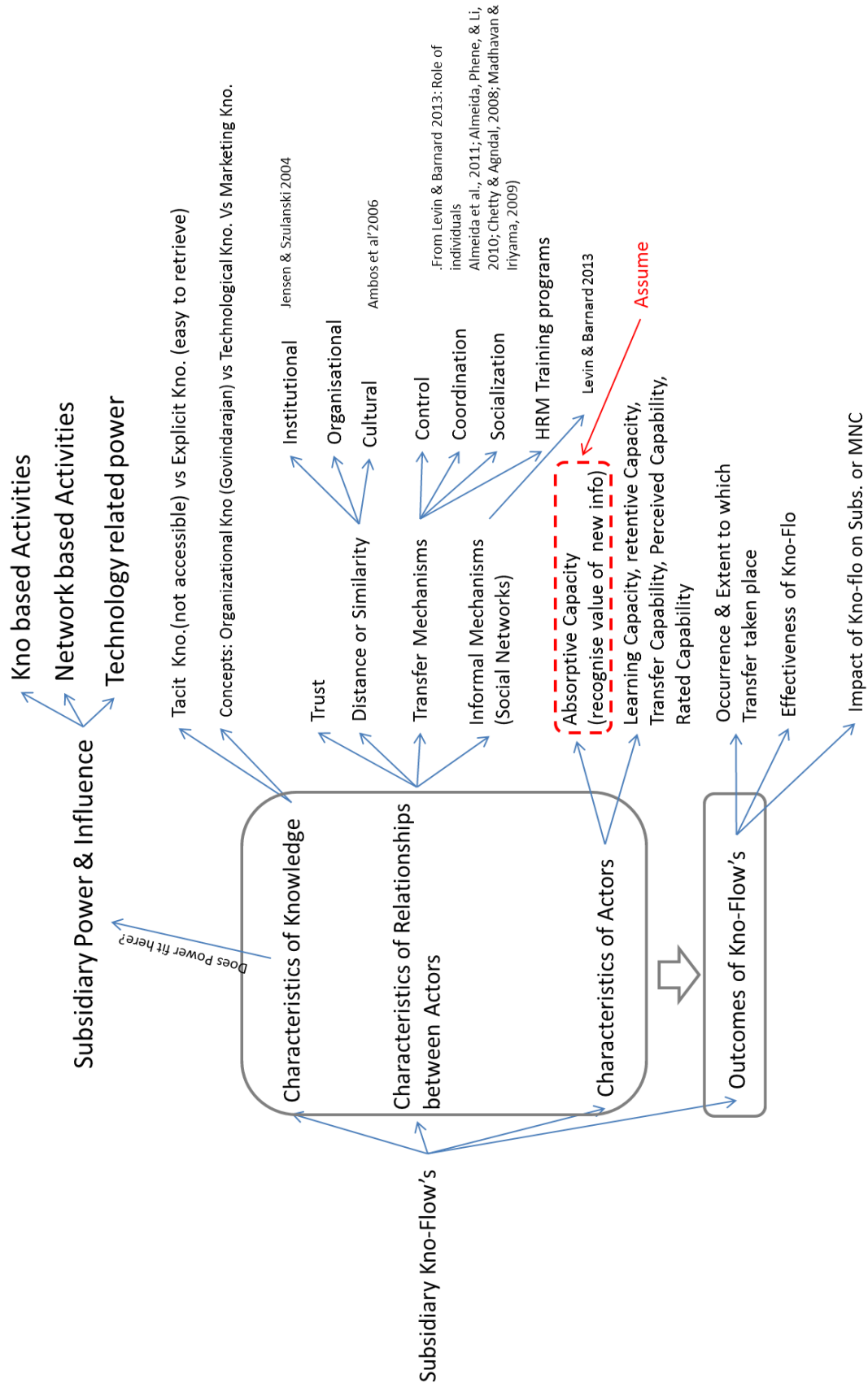
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Appendix 1: Map of Subsidiary Knowledge Flow Literature Structure

Expanded from Michailova & Mustafa, (2012).



Appendix 2: Questionnaire

Introduction

I am conducting research on knowledge flows within multinational corporations relating to who subsidiaries seek for advice. This research forms part of my MBA dissertation at the Gordon Institute of Business Science in Johannesburg, South Africa.

I ask you to complete the following survey covering questions about the Komatsu subsidiary or distributor in which you are employed. The survey should not take more than 10 minutes to complete.

Your participation is voluntary and you can withdraw at any time without penalty. Your name and particulars are not requested in this survey and all data will be kept without identifiers. By completing the survey, you indicate that you voluntarily participate in this research.

Should you have any concerns please contact myself or my supervisor.

Researcher: William Norton (william.norton@komatsu.co.za)

Research Supervisor: Prof. Helena Barnard (barnardh@gibs.co.za)

General

1. Please indicate the country in which you are currently employed

2. Please select the Komatsu subsidiary or distributor in which you are currently employed

3. Please select the option that best describes your position in the organisation

- Executive Management
- Senior Management
- Middle Management
- Technical Expert
- Supervisor
- Other (please specify)



4. Please indicate if you are an expatriate or a local national

- Expatriate
 Local National

Knowledge Seeking

5. Think of the most recent example when another Komatsu subsidiary/distributor or headquarters asked you for advice over and above normal operational activities. Which entity was it?

6. What type of information did they want to know? Select all that apply

- Marketing & Sales
 Logistics & Distribution
 Purchasing
 Research
 New Product Development
 Strategic Direction of Future Technologies

7. Did you feel you could answer their request?

- Yes
 No

8. Did you refer them to another entity in the Komatsu group?

- Yes
 No

9. If answered "Yes" to question 8, who did you refer them to?

Knowledge Seeking 2



10. Now think of an example where *you asked for advice* from another Komatsu subsidiary/distributor or headquarters over and above normal operational activities. Which entity was it?

11. What type of information did you want to know? Select all that apply.

- Marketing & Sales
- Logistics & Distribution
- Purchasing
- Research
- New Product Development
- Strategic Direction for Future Technologies

12. Did you feel they were able to answer your request?

- Yes
- No

13. Did they refer you to another entity in the Komatsu group?

- Yes
- No

14. If answered "Yes" to question 13, who did they refer you to?

Subsidiary / Distributor Responsibilities

15. Do your responsibilities as a Komatsu subsidiary/distributor extend beyond your own territory? (ie. Do you have a global mandate?)

- Yes
- No



16. Does your subsidiary/distributor supply products or services to other Komatsu subsidiaries/distributors within the Komatsu group?

- Yes
 No

17. What would be the consequences for the Komatsu group if your subsidiary/distributor no longer existed? Rate on a scale of 1-7 where 1=No consequence and 7=Disaster, very significant consequences

1. No consequence for Komatsu	2.	3.	4. Manageable consequences	5.	6.	7. Disaster, very significant consequences
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

18. To what extent are your subsidiary/distributor competencies in the following areas of use for other units in the Komatsu group? Rate on a scale of 1-7 where 1=No use for other units and 7=Very useful for other units

	1. No use for other units	2.	3.	4. Some but limited use for other units	5.	6.	7. Very useful for other units
Research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Development	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Production of Goods or Services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Marketing & Sales	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Logistics / Distribution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Purchasing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Subsidiary Capabilities

19. What is the approximate percentage of expatriates in your subsidiary/distributor's top management team, compared to local nationals? Rate on a scale of 1-7

1. 0%, no expatriates	2.	3.	4. 25% are expatriates	5.	6.	7. more than 50% are expatriates
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



20. Indicate how easily your subsidiary/distributor is able to **obtain** novel information from other Komatsu subsidiaries/distributors or Komatsu headquarters. Rate on a scale of 1-7

1. With quite a lot of difficulty	2.	3.	4. With some difficulty	5.	6.	7. No difficulty at all
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

21. Indicate how easily your subsidiary/distributor is able to **interpret** novel information received from other Komatsu subsidiaries/distributors or HQ. Rate on a scale of 1-7

1. With quite a lot of difficulty	2.	3.	4. With some difficulty	5.	6.	7. No difficulty at all
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

22. Indicate how easily your subsidiary/distributor is able to **utilize** novel information received from other Komatsu subsidiaries/distributors or HQ. Rate on a scale of 1-7

1. With quite a lot of difficulty	2.	3.	4. With some difficulty	5.	6.	7. No difficulty at all
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Seeking information on supply & demand factors

23. Indicate the source your subsidiary/distributor would most likely contact to gain knowledge regarding:

	A Global Supplier	A Local Supplier	HQ	Another Subsidiary / Distributor
Marketing & Sales	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Logistics & Distribution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Purchasing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
New Product Development	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Strategic Direction for Future Technologies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



24. If "Another Subsidiary/Distributor" was selected for any of the rows in question 23, please indicate which subsidiary/distributor you would contact to gain knowledge regarding:

	Another Subsidiary / Distributor
Marketing & Sales	<input type="text"/>
Logistics & Distribution	<input type="text"/>
Purchasing	<input type="text"/>
Research	<input type="text"/>
New Product Development	<input type="text"/>
Strategic Direction for Future Technologies	<input type="text"/>

This questionnaire is complete, thank you for participating!

I would appreciate if you could send the survey link to any other managers in your subsidiary that may be interested in completing this survey.

Appendix 3: Coding of Data

Question Type	Construct	Detail	Coding
Q0	Nominal Subs Importance	High / Low	1 = High; 0 = Low
Q15	Nominal Mandate	Global mandate	1 = Yes; 0 = No
Q16	Nominal Mandate	Global products	1 = Yes; 0 = No
Q17	Interval Mandate	No longer existed	1 = No consequence; 2; 3; 4 = Maneagable consequences; 5; 6; 7 = Disaster
Q18a	Interval Mandate	Research	1 = no use for other subs; 2; 3; 4 = Some but limited use for other subs; 5; 6; 7 = Very useful for other subs
Q18b	Interval Mandate	Development	1 = no use for other subs; 2; 3; 4 = Some but limited use for other subs; 5; 6; 7 = Very useful for other subs
Q18c	Interval Mandate	Production of Good or Services	1 = no use for other subs; 2; 3; 4 = Some but limited use for other subs; 5; 6; 7 = Very useful for other subs
Q18d	Interval Mandate	Marketing & Sales	1 = no use for other subs; 2; 3; 4 = Some but limited use for other subs; 5; 6; 7 = Very useful for other subs
Q18e	Interval Mandate	Logistics & Distribution	1 = no use for other subs; 2; 3; 4 = Some but limited use for other subs; 5; 6; 7 = Very useful for other subs
Q18f	Interval Mandate	Purchasing	1 = no use for other subs; 2; 3; 4 = Some but limited use for other subs; 5; 6; 7 = Very useful for other subs
Q19	Interval Absorptive	Number Expats	1 = No expats; 2; 3; 4 = 25% are expats; 5; 6; 7 = more than 50% are expats
Q20	Interval Absorptive	Obtain info	1 = A lot of difficulty; 2; 3; 4 = Some difficulty; 5; 6; 7 = No difficulty
Q21	Interval Absorptive	Interpret info	1 = A lot of difficulty; 2; 3; 4 = Some difficulty; 5; 6; 7 = No difficulty
Q22	Interval Absorptive	Utilize info	1 = A lot of difficulty; 2; 3; 4 = Some difficulty; 5; 6; 7 = No difficulty
Q23a	Nominal Seeking Source	Marketing & Sales	1= Supplier; 2 = Subsidiary; 3 = HQ
Q23b	Nominal Seeking Source	Logistics & Distribution	1= Supplier; 2 = Subsidiary; 3 = HQ
Q23c	Nominal Seeking Source	Purchasing	1= Supplier; 2 = Subsidiary; 3 = HQ
Q23d	Nominal Seeking Source	Research	1= Supplier; 2 = Subsidiary; 3 = HQ
Q23e	Nominal Seeking Source	New Product Development	1= Supplier; 2 = Subsidiary; 3 = HQ
Q23f	Nominal Seeking Source	Strat Direction for Future Technologies	1= Supplier; 2 = Subsidiary; 3 = HQ

Appendix 4: Turn-it-in Report

Turnitin Originality Report

Subsidiary importance and knowledge seeking by William Norton
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Appendix 5: Ethical Clearance Letter

Dear Mr William Norton

Protocol Number: **Temp2016-01770**

Title: **Knowledge seeking by subsidiaries of differing levels of strategic importance**

Please be advised that your application for Ethical Clearance has been APPROVED.

You are therefore allowed to continue collecting your data.

We wish you everything of the best for the rest of the project.

Kind Regards,

Adele Bekker