FOREIGN SUBSIDIARIES IN BRAZIL: LOCATION DETERMINANTS FOR HIGH VALUE-ADDED ACTIVITIES

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ABSTRACT

This thesis explores the location determinants for high value-added activities (HVAAs) carried out by foreign-owned subsidiaries in Brazil.

It adopts an extended version of Dunning's (2000) envelope paradigm to integrate different location factors, extracted from a wide range of location theories and frameworks that have been identified in the field of international business. The thesis is original in its conceptualisation of the degree of value added in separate activity sets in terms of complexity, which is widely recognised as a barrier to imitation of unique and valuable activities in strategic management literature. This thesis studies four activity sets (R&D, manufacturing, supply, and marketing) and analyses different facets of the host-country environment. By adopting such a disaggregate stance it accounts for the fact that different activity sets are attracted to different location factors.

Based on a large-scale telephone survey, a bespoke database of foreign-owned subsidiaries in Brazil was created. This unique database holds the most complete and up-to-date data of foreign subsidiaries in this emerging market. Such an approach minimises some limitations of prior research, such as home country bias. Likewise, in using Brazil as analytical setting, this study also extends the geographical reach of the subsidiary roles research to an emerging economy context.

The results indicate that the local environment of the foreign subsidiary has a rather limited effect on the degree of value added within its activity sets, pointing towards less advanced location advantages in emerging markets for HVAAs of foreign subsidiaries if compared to developed countries. Yet, location factors seem to be relevant for the extent of activity sets. In general, this thesis confirms the view that different activities are drawn towards different aspects of the host environment.

As regards policy implications, only very limited means are available to a host location to influence the likelihood of HVAAs at foreign subsidiaries through adjusting the profile of the local environment. Overall, policy makers need to be clear on which activity sets they intend to target, as the impact of location factors varies by activity set. Headquarters managers may be well advised to locate HVAAs in developed countries, which are more likely to offer those location factors that matter the most. Subsidiary managers may want to focus on internal sources of knowledge to unfold the potential of their unit.

DECLARATION OF ORIGINALITY

No portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

I declare that the thesis embodies the results of my own work. Following normal academic conventions, I have made due acknowledgements of the work of others.

Christopher Kramer

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To Natascha

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LIST OF ABBREVIATIONS

FDI	Foreign direct investment
FSA	Firm-specific advantage
GDP	Gross domestic product
GVC	Global value chain
HQ	Headquarters
HVA	High value added
HVAA s	High value-added activities
IBGE	Brazilian Institute of Geography and Statistics
IMF	International Monetary Fund
LSA	Location-specific advantage
LVAAs	Low value-added activities
MNE	Multinational enterprise
OECD	Organisation for Economic Co-operation and Development
OLI	Ownership, Location, Internalisation
OLS	Ordinary least square
PD	Product development
PLS	Partial least square
RBV	Resource-based view
R&D	Research and development
TC	Technological capabilities
VIF	Variance inflation factor
UN	United Nations
WPM	World product mandate

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1 INTRODUCTION

1.1 Background of the research

Multinational enterprises (MNEs) undertake ever more value-adding activities in emerging markets (Hansen et al. 2011; UNCTAD 2005). However, even if notable attention has been paid to this set of economies by international business research in recent years (e.g. Chi & Sun 2013; Meyer et al. 2009; Sahaym & Nam 2012; Tan & Meyer 2011), our understanding of the impact of location factors on value chain activities of foreign-owned subsidiaries located in emerging economies is still underdeveloped (Enright 2009; Goerzen et al. 2013). In particular, there is little work on high value-added activities (HVAAs) of foreign-owned subsidiaries in these economies.

International business (IB) scholars have underlined that, as to operate in a foreign country, MNEs need to bundle two sets of assets, their transferable firm-specific advantages (FSAs) and country, or location-specific advantages (LSAs), such as natural resources and skilled labour (Dunning & Lundan 2008b; Hennart 2009; Meyer et al. 2011). Hence, LSAs affect which markets the MNE will decide to enter, and the subsequent operations of its affiliate in the country in question (Dunning 1998; Uhlenbruck 2004). In other words, LSAs play a decisive role for the MNE. As put by Dunning (1998:60), “the locational configuration of a firm’s activities may itself be an ownership-specific advantage as well as affect the modality by which it augments, or exploits, its existing ownership advantages.”

MNEs may set up foreign affiliates as to assimilate geographically dispersed resources and capabilities, i.e. LSAs, and integrate them in the MNE network (Rabbiosi 2011; Rugman & Verbeke 2001; Yang et al. 2008). Accordingly, foreign subsidiaries are often seen as a key source of value creation and competitive advantage for MNEs (Forsgren et al. 2005; Holm et al. 2005; Nohria & Ghoshal 1997). An important challenge for MNEs is to determine the conditions under which their foreign-based entities become such key sources (Asmussen et al. 2009). However, despite notable efforts to explain the effects of location factors on subsidiary roles, the activity basis of MNE subsidiaries is still a rather under-researched topic in the IB literature (Enright 2009; Paterson & Brock 2002). This is somewhat surprising, as activities provide the link between FSAs and LSAs.

Within subsidiary research, there has been a strong focus on micro-level (i.e. firm level and industry level) location perspectives. Very little research exists that considers the impact of macro-level factors (Benito et al. 2003 are a notable exception). For example, it is claimed that institutional aspects of the host country have largely been ignored when analysing subsidiary activities and roles (Forsgren et al. 2005). Yet, it is commonly accepted that macro-level location factors are relevant for MNE location decisions (Dunning & Lundan 2008a; Pajunen 2008). This study aims to fill this evident gap in the literature. It intends to contribute to our understanding of how – both micro- and macro-level – location factors might affect value-added activities of a diverse range of foreign-owned subsidiaries, in particular those located in emerging economies. Hence, it is contrast to prior research on subsidiary roles and activities, which has concentrated on developed countries (e.g. Asmussen et al. 2009; Frost et al. 2002; Manolopoulos 2010).

Value-added activities of foreign subsidiaries in emerging economies are an important area of research for several reasons. The first is that the competitive position of MNEs is largely driven by the value-added activities of their subsidiaries (Birkinshaw et al. 1998; Pedersen 2006). Subsidiaries may contribute to the MNE as a whole in terms of learning, innovation, distribution of knowledge, and performance (Birkinshaw et al. 2005; Najafi-Tavani et al. 2014; Wang et al. 2009). Second, foreign-owned subsidiaries link the host country to the knowledge of the MNE (Narula & Dunning 2000; Katz 2001). A country may benefit from technological spillovers, increased productivity or the generation of employment that could arise from local MNE activities (Marin & Bell 2010; Ramamurti 2004). Indeed, in those countries where foreign subsidiaries dominate economic output the analysis of their value-added activities goes beyond academic interest; it is important for fundamental economic questions (Pedersen 2006). Third, the foreign subsidiary is embedded in a twofold context of both, the MNE network and the local environment (Colakoglu et al. 2014; Figueiredo 2011). Thus, the local environment, arguably, has a different influence on the value-added activities of MNE subsidiaries than on the activities of domestic firms. These reasons make the foreign-owned subsidiary an ideal unit of analysis.

As a theoretical background, this thesis adopts an extended version of the envelope paradigm (Dunning 2000; Dunning & Lundan 2008a). It advocates three groups of variables to clarify the internationalisation of MNE activities. These are ownership-specific advantages (O), location-specific advantages (L), and internalisation advantages (I). This paradigm has become one of the most widely accepted, realistic and overall explanations for the location of MNE activities (Galan et al. 2007; Hennart 2012). It is deemed suitable for investigating a wide range of subsidiaries pertaining to a heterogeneous set of firms for two key reasons. First, the paradigm is able to integrate different location frameworks and theories, such as institutional theory (North 1990; 2005) and Porter's (1990) diamond model. Thus, it allows taking into account different location factors, therein overcoming a recurrent limitation of existing studies about determinants of subsidiary activities and roles. Second, the paradigm is context specific, and in particular, its configuration is likely to vary across firms, regions as well as countries and sectors (Dunning 1988; 2000). In this study, the context specificity is very important for the associations between LSAs and the nature of value chain activities carried out by the foreign-owned subsidiary.

In order to capture subsidiary roles and their changes over time, a wide variety of concepts has been applied in relevant literature. This study is most similar to the strand of subsidiary literature that looks at the level of subsidiary competence (Asmussen et al. 2009; Bartlett & Ghoshal 1986; Pedersen 2006). In particular, it takes a disaggregate view of the subsidiary, recognising that the subsidiary may excel in some activity sets, be only average in others, and be below average in still other functions (Ray et al. 2004; Rugman et al. 2011). Much of the previous literature on the roles and development of subsidiaries has analysed the aggregate level of competence of a subsidiary spanning all parts of its value-added activities. In applying a disaggregate view this thesis considers potential variances in competence levels across dissimilar activity sets.

Concerning the concept of competence, this thesis intends to contribute to the literature by proposing an original approach that is based on theoretical considerations. This alternative is termed the concept of high value added (HVA). It is based on the resource-based view (RBV), which posits that only configurations of activity sets that are unique create competitive advantage. Accordingly, unique activity sets arise from rarity (i.e. no or few other firms or fellow subsidiaries can carry out the activity set in the same way), non-imitability (other firms or sister subsidiaries cannot imitate the routines in the activity set), and non-substitutability (i.e. there are no equivalent routines in activity sets available) (Barney 1991; Peng 2001; Ray et al. 2004; Wernerfelt 1984).

In analysing the degree of value added within distinct activity sets this thesis deviates from studies that classify particular sets, often R&D, as high value added *per se* (e.g. Hogenbirk & van Kranenburg 2006). Equating certain functions with high value added provides an incomplete and maybe deceiving picture of differences in subsidiary value chains (Szalavetz 2012). Of course, the use of even more aggregated proxies such as technology intensity of the sector, high tech products or labour productivity is still less suitable to assess the level of competence in a certain activity set. Thus, this study aims to capture the degree of value added within activity sets. In particular, this research seeks to capture the unique nature of different sets, and thus the degree of value added, by drawing on the notion of complexity. Complexity is one of the characteristics that may hinder the imitability of valuable activity sets (Barney 1991; Foss & Pedersen 2002). To this end, this thesis touches upon research from the systems complexity literature, where two aspects – numerousness and interactions of parts of a system – are recurrent (Rivkin 2000; Sivadasan et al. 2006). To the best of the author's knowledge, this thesis is the first to infer from complexity-based items the degree of value added, or competence level, within activity sets undertaken by the foreign-owned subsidiary.

The main objective of this thesis is to understand the effects of different location factors on the degree of value added within different activity sets of MNE subsidiaries. Clearly, when examining subsidiary topics, subsidiary-level data are most appropriate (Holm & Pedersen 2000; Slangen & Beugelsdijk 2010). Accordingly, this thesis uses survey data from a tailor made database of foreign-owned subsidiaries residing in Brazil, which is a large emerging market. In specific, the overall aim of this study is to comprehend the associations between location factors and the degree of value added in four individual activity sets, i.e. research and development (R&D/PD), manufacturing, supply, and marketing, carried out by foreign subsidiaries in emerging economies. Therein, this research addresses calls that demand the analysis of activity sets (Enright 2009; Paterson & Brock 2002; Szalavetz 2012).

1.2 Statement of gaps in the literature

As discussed above, our understanding about the impact of location factors on value-added activities of foreign subsidiaries in emerging economies remains underdeveloped (Goerzen et al. 2013; Hansen et al. 2011). In fact, through the comprehensive review of the literature, the author of this research has identified several conceptual and empirical knowledge gaps, which will be addressed in this research.

Conceptual gaps in the literature

The first conceptual gap concerns the use of location theories/frameworks in the context of value-added activities in foreign-owned subsidiaries. A range of location perspectives may be applied for the study of the local environment as driver for the degree of value added in activity sets. Hitherto, subsidiary research has focused on micro-level location factors (i.e. at the industry or the firm level). On the one hand, Porter's (1990) diamond model has been widely used. According to this perspective, competitive advantages are created in interplay between industry rivalry, the quality of related and supporting sectors, factor conditions and demanding customers. This means that the strength of the diamond determines the degree of value added within activity sets of the subsidiary. On the other hand, the network perspective stresses the subsidiary's relationships to external actors as a driver influencing the roles and nature of activities of the foreign subsidiary (Andersson et al. 2001; Dörrenbächer & Gammelgaard 2010). The key argument is that inter-organisational relationships provide valuable access to tacit knowledge, access to cheap supplies as well as sales opportunities (Forsgren et al. 2005). Macro-level location perspectives, despite their recognition in foreign direct investment (FDI) location theories, have hardly been applied to the study of value-added activities of MNE subsidiaries (Benito et al. 2003 are an exception). All the aforementioned perspectives have in common that, on their own, they offer a rather narrow insight (Andersson et al. 2002). In essence, research that integrates different dimensions of the local environment to explain the nature of value chain activities conducted by the MNE subsidiary is still lacking.

To this end, the envelope paradigm by Dunning (2000) is a valuable framework. It allows for integrating different location factors that may be relevant in the context of value-added activities of the foreign subsidiary. For example, the original paradigm can be extended to include institutional factors (Dunning & Lundan 2008a; Kang & Jiang 2012). Moreover, in distinguishing between different motives (i.e. resource-, market-, efficiency-, and strategic asset seeking) the envelope paradigm enables the analysis of the local environment from a multi-faceted view. Such a multi-faceted view is essential since different activity sets have different patterns of significance of relationships regarding location variables (Asmussen et al. 2009; Enright 2009; Rugman et al. 2011).

The second conceptual gap is related to the unit of analysis in IB literature about location decisions. In this literature, much work focuses upon the impact of specific location factors on overall FDI inflows into a country (e.g. Bellak & Leibrecht 2009; Cheng & Kwan 2000; Javorcik & Spatareanu 2005; Pajunen 2008; Treviño et al. 2002). However, apart from the R&D activity set, which has often been categorised into home-base augmenting and home-base exploiting (Blomkvist et al. 2010; Kuemmerle 1999; Le Bas & Patel 2007), little has been said about potential links between different location factors and high value added in individual activity sets of the foreign-owned subsidiary (a notable exception are Jensen and Pedersen, 2011). This, however, is seen as an important oversight in the literature, because location-specific advantages and the MNE's opportunities for bundling these with internal resources need to be examined separately for each part of the value chain (Kim et al. 2011; Rugman et al. 2011). This thesis narrows this gap by formulating theoretical arguments for the association between different location factors and the degree of value added within four individual activity sets.

The third gap is related to the theoretical foundations of high value added. Most subsidiary literature, the field in which this thesis can be anchored, has focused upon competence and has defined this as the capability within a functional area (Holm & Pedersen 2000; Schmid & Schurig 2003). However, this approach has a number of shortcomings. First, it does not necessarily disclose if such capabilities are harnessed, in order to create competitive advantage (Coates & McDermott 2002; Jensen & Pedersen 2012). Second, capabilities are usually created and held at a firm level. In the case of the MNE, some capabilities may reside at the MNE and others at the subsidiary level, making it challenging to separate corporate and subsidiary-specific capabilities (Birkinshaw 1994; Birkinshaw & Pedersen 2009). Third, capabilities may span activity sets (Grant 1996; Wu et al. 2010), calling into question the practice of equating competences in functional areas with capabilities. Hitherto, very little research has explored the idea of analysing the outcome of both resources and capabilities, i.e. the value added in activity sets conducted by the foreign-owned subsidiary. Building on the resource-based view (Barney 1991; Wernerfelt 1984), it is claimed that the concept of high value-added activities (HVAAs) allows for pursuing this idea. HVAAs are defined in this thesis as activities that harness valuable, rare, and difficult-to-imitate resources. Such activities cannot be transferred or imitated and are thus likely to be an important source of competitive advantage (Foss & Pedersen 2002; Frost et al. 2002).

Another gap concerns the approach to capture the degree of value added (or competence level) of the MNE subsidiary. Much work has taken a one-dimensional view of subsidiary competences by analysing individual activity sets in isolation (Ambos & Reitsperger 2004; Davis & Meyer 2004), or by aggregating the level of competence spanning all parts of the subsidiary's value chain activities (Benito et al. 2003; Pedersen 2006). Such an approach, however, disregards the fact that a subsidiary may have different degrees of competence in each activity set (Kim et al. 2011; Pyndt & Pedersen 2006; Rugman et al. 2011). Thus, it is more appropriate to view subsidiary competences as multidimensional, as has been done in studies on centres of excellence (e.g. Holm & Pedersen 2000; Frost et al. 2002). However, the dichotomous approach applied in this line of research may be too coarse, in part since it is difficult to determine what a centre of excellence is and what is not. In particular, it does not capture the actual variety of competence in activity sets. Thus, it may be more suitable to examine the degree of value added in individual sets. In that context, it is surprising that, with few exceptions (e.g. Asmussen et al. 2009; Jensen & Pedersen 2011), little research exists that explores how location factors affect the degree of value added in each activity set conducted by the foreign-owned subsidiary. This study sets out to do this, by examining four activity sets (R&D/PD, manufacturing, supply, and marketing).

Empirical gaps in the literature

Alongside these conceptual gaps, there are also shortcomings inevitably in prior *empirical* literature. First and foremost, the strand of research that draws upon the local environment perspective to explain subsidiary roles and their evolution over time has focused mainly on variables related to a specific construct, such as industrial cluster (Benito 2000; Birkinshaw

& Hood 2000) or host-country diamond strength (Asmussen et al. 2009; Frost et al. 2002). This means that only a small subset of relevant location variables is included, while other potentially important variables are largely ignored. Therefore, the impact of some location variables on the range and nature of value chain activities in the foreign-owned subsidiary is unclear.

Similar to the location variables, there is also an empirical gap regarding the measurement of value added (or competence). Most subsidiary research, thus far, has invited subsidiary managers to evaluate directly the competence level in different activity sets. In that regard, more factual indicators may add considerable value to the analysis of value chain activities at the subsidiary (Birkinshaw & Hood 2000). Nonetheless, apart from the well-researched R&D activity set, whose value added (or 'quality of innovation') has often been proxied by patent data (Blomkvist et al. 2010; Lahiri 2010; Shan & Song 1997), there have been very few efforts, within large surveys, to infer from factual indicators the degree of value added in a part of the foreign subsidiary's value chain.

In fact, hitherto, subsidiary role typologies have usually classified the role of the subsidiary into two categories, e.g. 'centre of excellence' versus 'non-centre' (Enright & Subramanian 2007). However, this may be too simplistic, given that the subsidiary may exhibit a variety of degrees of value added (Birkinshaw et al. 1998; Cavanagh & Freeman 2012). Indeed, it appears that there exists no consensus in the literature about when (exactly) a high level of competence (or the status as centre of excellence) is achieved (Asmussen et al. 2009; Davis & Meyer 2004; Frost et al. 2002; Schmid & Schurig 2003). Thus, it may be more useful to operationalise high value added in terms of degree, i.e. as a continuous variable. This is the approach taken in this study.

Furthermore, despite the recent advances in location theory, existing research often focuses on technical activities, i.e. R&D and manufacturing (Davis & Meyer 2004; Defever 2006;

Frost et al. 2002). However, in general, little theoretical or empirical work directly investigates the location of MNE service activities. One reason may be that “it is much less clear (in terms of activities) where centres of excellence are likely to develop” (Frost et al. 2002: 1004). This thesis aims to narrow this empirical gap by researching both, primary activities (i.e. R&D and manufacturing) and service activity sets surrounding production (i.e. supply and marketing). As such, this thesis also addresses Enright's (2009) criticism that very few empirical studies exist that focus on the location of various activity sets. In fact, most work on the attributes that are related to activity location focuses on individual activities, such as R&D (Cantwell & Mudambi 2005; Demirbag & Glaister 2010; Song & Shin 2008), manufacturing (Woodward & Rolfe 1993), and marketing (Hewett et al. 2003) rather than cross-activity comparisons.

Another empirical gap concerns the geographical scope of subsidiary literature. Empirical studies examining subsidiary roles and the effect of location factors on the development of these roles over time has been largely limited to Western Europe and North America (e.g. Asmussen et al. 2009; Cantwell & Mudambi 2005; Chang & Rosenzweig 1998; Egelhoff et al. 1998; Holm & Pedersen 2000; Taggart 1998). The result of this narrow geographical scope is that the generalisability of previous findings is limited to the context of developed countries. Consequently, little knowledge exists about the characteristics of foreign-owned subsidiaries in emerging economies. The same holds true for the impact of location factors on the nature of value-added activities of MNE subsidiaries in emerging economies, which differ significantly from developed countries in terms of location factors, particularly in the area of institutions (Gelbuda et al. 2008; Khanna & Palepu 2010; Meyer et al. 2009). Thus, the geographical scope is deemed a significant empirical void in the current stock of literature. In addition, most research on subsidiary typologies and their determinants was carried out in the 1980s and 1990s. However, since then, key changes in the international business landscape have occurred (Anand & Kogut 1997; Bouquet & Birkinshaw 2008; Mudambi

2008). For instance, several facilitators of globalisation such as advanced information and communication technology, supply chain management and regional integration now allow easier MNE access to the distinct location advantages of a larger number of host countries, and improved internal coordination among specialised subsidiaries (Dicken 2011; Kedia & Mukherjee 2009; Rugman et al. 2011). This indicates the need for more current data on the characteristics and value-added activities of foreign subsidiaries. This thesis addresses this need by drawing on a dataset attained in 2012.

1.3 Main contributions of the study

This thesis provides knowledge contributions in the field of subsidiary roles at the conceptual, empirical, managerial, and policy-making level. *At the conceptual level,* it anticipates adding to the existing knowledge about foreign-owned subsidiaries and the effects of the local environment upon the degree of value added within different parts of the value chain. In particular, this thesis develops an integrated conceptual framework that combines an institutional perspective (North 1990; 2005), agglomeration economies (Marshall 1920), and traditional economic facets (Buckley et al. 2008; Dunning 1993). By bringing several perspectives together, the thesis provides a richer account of the complexity of the relationships between the host-country environment and value-added activities of the foreign-owned MNE subsidiary.

The second theoretical contribution the research endeavours to make is to explore potential links between different location factors and high value-added activities in separate parts of the foreign-owned subsidiary. In this thesis, explicit emphasis is put on the recognition that it is not appropriate to examine the impact of the host-country environment through a one-dimensional construct that conceals the fact that different subsidiary activities are related to different location factors (Goerzen et al. 2013; Rugman et al. 2011). In light of the observation that MNE value-added activities are increasingly dispersed and specialised (Hansen et al. 2011; Kedia & Mukherjee 2009), it is well-justified to further advance knowledge in this field. The focus upon high value added activities in specific, instead of viewing certain activity sets (e.g. R&D) as high value added, represents an original contribution, especially regarding the 'non-technical' activity sets, i.e. supply and marketing, of the foreign-owned subsidiary.

Third, this research extends existing literature by discussing theoretical foundations of high value added in the activity sets of the foreign-owned subsidiary. To this end, insights from contributions about the resource-based view of the firm and (dynamic) capabilities are used as theoretical background. The application of the notion of high value-added activities may help reduce the theoretical weakness inherent in the perspective of subsidiary competences. The latter has thus far dominated the subsidiary literature that has analysed the value-added activities in order to determine subsidiary roles. Thus, the core contribution of this study is its focus upon complexity within activity sets as to capture high value added. To the best of the author's knowledge, no study has done this before.

At the empirical level, this thesis contributes in developing complexity-based measures for evaluating the degree of value added in activity sets. These indicators were borrowed from supply chain literature. They allow inferring the degree of value added in three out of the four activity sets examined in this thesis. This complements two strands of research. First, it provides a more objective apparatus to subsidiary studies that have analysed competence levels of the subsidiary by directly asking managers to evaluate such competences. Second, it could help certain strands of literature, such as work on innovation capabilities, to extend research designs from case studies to large-scale surveys.

Furthermore, embarking upon a large-scale subsidiary-level dataset obtained from a survey carried out in 2012, this thesis contributes in extending the geographical reach of existing subsidiary literature. Thus far, this literature has mainly embarked on empirical research in developed countries (Enright & Subramanian 2007; Paterson & Brock 2002). As such, the relevance of findings by previous studies is restricted to advanced market economies. This means that differences between developed and developing countries are ignored. Developing countries, for example, have less advanced market-supporting institutions (Peng et al. 2008). As institutions influence transaction costs, they should have an impact on the nature of activities undertaken by foreign-owned subsidiaries. To this end, emerging economies, a subgroup of developing countries, represent an excellent research setting for extending the knowledge stock on subsidiary roles (Griffith et al. 2008). By using the emerging economy of Brazil as its analytical setting, this thesis thus provides new insights distinct from those obtained in developed countries.

At the same time, the large majority of studies on emerging economies focuses on Central and Eastern Europe and China (Meyer et al. 2009; Wright et al. 2005). Other regions, such as the Middle East or South America, are still seen as under-researched (Cuervo-Cazurra & Dau 2009; Demirbag et al. 2011). Hence, the choice for Brazil as research context and the compilation of a primary survey database means that this study improves our knowledge of an area that has attracted little interest so far. The survey about subsidiaries in Brazil is the only one of its kind.

Moreover, this research contributes through the representative nature of the sample. Other studies analysed only certain subsidiaries, for example those with a certain mandate (Holm & Pedersen 2000) or certain activity sets (Ambos & Reitsperger 2004; Frost 2001; Schmid & Schurig 2003). This thesis imposes no restrictions on subsidiary mandate, activities, age or size. It also considers subsidiaries from a more heterogeneous set of parent firms, due to its reported importance (Dimitratos et al. 2010; Ibeh et al. 2009). This is seen as important, since LSAs are contingent on characteristics of the MNE, such as country of origin, sector, and size (Dunning 2000).

At the managerial level, the thesis aims to make two main contributions. First, it provides headquarters management with a tool to identify subsidiaries that conduct HVAAs, i.e. are likely to be sources of the MNE's competitive advantage. This is important as the ability to effectively manage dispersed value-added activities is considered a main advantage for the MNEs (Frost et al. 2002). However, research has shown that MNE managers often struggle to assess competences in foreign subsidiaries (Denrell et al. 2004). In addition, at times, the parent firm and subsidiary managers have divergent perceptions about the role of the subsidiary in the MNE (Birkinshaw et al. 2000; Chini et al. 2005). The idea of high value added built upon the idea that some activity sets are difficult to imitate, which can be indicated by factual measures, thus may help the parent firm to improve the effectiveness of subsidiary strategy formulation and resource allocation across its entities, and help reduce perception gaps. Particularly, in the area of service activity sets (i.e. supply and marketing), which has received little interest in subsidiary research. Second, a better understanding of how host-country factors affect HVAAs in emerging economies may assist MNE managers and their local partners with strategic decisions (e.g. formation of new alliances, expanding existing operations).

At the policy-making level, the study provides key insights into location factors that need to be considered in order to develop a population of firms that undertakes high value-added activities in the host country. Examining which location advantages are being endogenised with firm-specific assets is important as this helps policymakers to calibrate their incentive mechanisms (Franco et al. 2011). In specific, this thesis provides an integrative framework that analyses location factors that determine the set of activities undertaken by the foreign subsidiary, i.e. its role. One result of the predominant focus on entry studies in research on FDI location is that the understanding about how location factors correlate with the degree of value added in foreign-owned subsidiaries is incomplete (Feinberg & Keane 2001). Yet, to policy makers, the retention and upgrading of existing activities is likely to be as critical as the attraction of new FDI. In fact, broader literature about the impact of MNEs on host country development indicates that HVAAs and formal mandates of a subsidiary foster the long-term development of the host economy (Holm et al. 2003; Jindra et al. 2009; Scott-Kennel 2007). It may therefore be helpful for policy makers to know what location factors correlate with HVAAs in emerging economies.

At the same time, this thesis identifies attributes of foreign-owned subsidiaries that already carry out HVAAs. It thus adds to the examination of determinants for desirable FDI, which has tended to focus on structural factors, including firm size, entry mode, sector, country of origin, export orientation or the functional focus of foreign-owned subsidiaries (Enderwick 2005). If intra-industry differences in the advantages that particular locations provide exist, policies targeted at entire industries may be ineffective (Nachum & Wymbs 2005). Hence, the identification of typical features may help policy makers address foreign-owned firms with 'upgrading potential' more effectively. Having discussed the research background, the outlined knowledge gaps and the proposed contributions, the following section is going to describe the research aims and objectives of this thesis.

1.4 Research aim and objectives

The preceding sections discussed the context of this study, the knowledge gaps within the literature, and the proposed contributions. Drawing upon a set of location perspectives, this thesis endeavours to add to our knowledge of the nature of value chain activities carried out by the foreign-owned subsidiary. The overarching research aim is to examine, describe, and explain the effects of the local environment on HVVAs carried out by the subsidiary in emerging economies. As such, it is the first study of its kind. In order to attain the research aim, the following key objectives were formulated:

1. To critically evaluate the existing theoretical and empirical literature about location determinants for the degree of value added in subsidiary activities;

2. To advance the concept of high value-added activities in the context of the foreign-owned subsidiary;
3. To advance and test research hypotheses about association between several location factors and the degree of value added in different parts of the value chain;
4. To create a primary database from a large-scale survey of a complete set of foreign manufacturing subsidiaries in Brazil;
5. To identify the key characteristics of foreign subsidiaries that carry out high value-added activities;
6. To contribute to the empirical literature on subsidiary activities by extending its geographical reach to an emerging economy context;
7. To propose managerial and policy implications drawn from the empirical results.

Based upon these research aim and objectives, the following research questions can be articulated:

1. To what extent do location factors affect HVAAs in each activity set of the foreign-owned subsidiary in emerging economies?
2. What are the main location factors that affect HVAAs (in general) at the foreign-owned subsidiary in emerging economies?
3. What are key characteristics of the subsidiary for HVAAs?
4. What are the managerial and policy implications that may be derived from this unique research?

1.5 Definitions of key terms

For the purpose of this research, the *foreign-owned subsidiary* is defined as an operational unit wholly-owned by a MNE and situated outside the MNE's home country (Birkinshaw & Pedersen 2009; Cavanagh & Freeman 2012). Here, the term does not refer to the totality of an MNE's holdings in a host country, but to the set of value-added activities carried out in a particular location. In other words, it concerns the establishment level. There may exist one or numerous subsidiaries of the same MNE within a host country (Birkinshaw & Hood 1998a).

The term *activity set* is used in this study to describe a distinct set of value-added activities that a foreign subsidiary conducts to create value (Kogut 1985; Porter & Millar 1985). For example, the activity set of marketing and sales subsumes activities linked with providing a means by which buyers can purchase the product and inducing them to do so. Accordingly, activities may include marketing management, advertising, sales force administration, sales force operations, technical literature, and promotion (Porter 1985). Often, the term *function* is used instead of *activity set*, but the latter is more apposite in this study.

High value-added activities are defined as value chain activities that harness valuable, rare, and difficult-to-imitate resources. Given that such activities cannot be transferred, they are likely to be a critical source of value creation for the MNE (Foss & Pedersen 2002; Frost et al. 2002), where value can be defined as rent-generating ability of those activities (Madhok 1997). Each activity set may consist of several activities that vary in terms of value added. For analytical reasons, value added is evaluated in this study at the activity set level, i.e. at an aggregate level (see also Section 2.2.3 of Chapter 2).

Emerging economies are a subset of developing countries and are defined here as countries that experience rapid economic growth and implement economic liberalisation policies. It differs from the widely cited definition by Hoskisson et al. (2000) insofar that the criterion of low income is ignored (see Section 4.2 of Chapter 4 for more details).

1.6 Outline of the thesis

Following this introduction, *Chapter* 2 provides a critical review of theoretical and empirical literature. It begins with an overview of work concerned with high value added and advances the concept adopted in this study. This is followed by a review of literature about subsidiary roles and their respective determinants. At the end, it justifies the application of high value added, in individual activity sets, as a valuable extension of the subsidiary roles literature stream. The last part of the literature review deals with different location theories and frameworks that have been discussed in the wide IB literature. It identifies the location perspective taken in this thesis and reveals relevant location factors for value-added activities of the foreign-owned subsidiary.

Chapter 3 puts forward research hypotheses that are tested empirically. In specific, it hypothesises associations between relevant host-country location factors and the degree of value added in four individual activity sets of the subsidiary.

Chapter 4 outlines the research setting of this study. This chapter begins with a definition of emerging economies. The emphasis of this chapter, however, is to stress the importance of Brazil as a key recipient of foreign investment. It also provides information on the composition of FDI stock by country of origin and by sector. Moreover, it presents an overview of secondary data about location factors in Brazil and some reference countries.

Chapter 5 details the research design of this study. It commences with the epistemological assumptions. This is followed by a discussion of the research design and the rationale for using questionnaires administered by interviewers (via telephone calls). The chapter then goes on to provide information on sampling, questionnaire development and the operationalisation of key constructs.

Chapter 6 outlines the statistical techniques carried out to analyse the data. It begins with the transformation of variables and goes on to provide detailed information on the data cleaning procedures. This is followed by post-estimation analyses, descriptive statistics and the relevant correlation matrix. The chapter ends with the presentation of the results gained from the set of regression analyses.

Chapter 7 discusses the findings of the statistical analyses and the resulting theoretical and empirical implications. The structure of the discussion chapter corresponds to the order of the hypotheses. In addition to the discussion of the impact of location factors on high value added in individual activity sets there is a section about the effects of subsidiary characteristics.

Chapter 8 is the concluding chapter of this thesis. In particular, it summarises the main findings and contributions. In addition, it highlights the limitations of the study and potential avenues for future research. Some implications and recommendations for managers of MNEs and policy makers are also formulated in this chapter.

2 LITERATURE REVIEW

2.1 Introduction

The purpose of this chapter is to provide a critical review of relevant literature about high value-added activities, location factors and subsidiary activities. As such, it covers the first and second research objective, i.e. reviewing relevant literature and suggesting an alternative notion to identify activity sets of the subsidiary that contribute high value to their MNE and are likely to continue to do so in the long term. It will also lay the ground for the hypothesis development, which is the third research objective. In addition, the chapter pinpoints the thesis subject in the context of international business research. The chapter consists of three parts. First, *Section 2.2* reviews existing concepts to capture high value added (HVA) in the field, and the notion used in this thesis. Second, current literature on subsidiary roles is critically reviewed (*Section 2.3*). This section describes the main strands that emerged in subsidiary research, locating subsidiary roles as a central topic in this research discipline. It also outlines the shortcomings of both, the dimensions used to capture subsidiary roles and the perspectives that aim to explain these roles. The 'environmental determinism' perspective, which is also taken in this study, is reviewed in detail. Third, in *Section 2.4*, a framework is proposed that integrates several location theories and frameworks that are relevant to value chain activities carried out by the foreign-owned subsidiary.

The aims of this literature review are threefold. The first aim is to outline the current state of knowledge on HVA, subsidiary roles (with a focus on their activity sets), and their main drivers. Second, it aims to advocate an alternative method for capturing the degree of value added in individual parts of the value chain. Third, it aims to advance an original approach of analysis to address the research questions, the research aims and the research objectives.

The literature review shows that there is no within activity set-based instrument to examine HVA that may be applied in a large-scale survey. It also highlights that the activity basis of the foreign subsidiary remains a rather under-researched topic. Further, the review reveals a need to analyse the entire, rather than a partial, set of location determinants for subsidiary roles. Following from the above, it becomes clear that research is needed that examines the effects of a broad set of location factors on the degree of value added in individual activity sets of the foreign-owned subsidiary. It also suggests that most of the findings in subsidiary research are based on rather old data, which have a limited geographical scope.

2.2 High value-added activities: justification and conceptualisation

The purpose of subsection 2.2 of this literature review is to firstly, understand the idea of capabilities, and to assess its suitability to identify subsidiaries that contribute high value to the MNE as a whole. Secondly, to advance the concept adopted in this thesis, drawing on insights from the ‘resource-based view of the firm’ (RBV). The third purpose is to review different ideas and concepts of high value added that have been proposed in the theoretical, empirical, and policy literatures. The fourth objective is to propose an original approach that captures the degree of value added within activity sets. The stance taken in this thesis hopes to add to the discussion of subsidiary competence. This section starts with a discuss-ion of the capabilities view and the RBV.

2.2.1 The resource-based view of the subsidiary

It is commonly acknowledged that the ability of MNEs to effectively orchestrate dispersed capabilities is a critical source of competitive advantage (Ghoshal & Bartlett 1990; Hewett et al. 2003; Holm et al. 2005; Nohria & Ghoshal 1997). In this context, the identification of subsidiaries that contribute high value and are likely to continue to do so in the long term is important to MNEs. To this end, the notion of ‘centres of excellence’ has been proposed in subsidiary management literature[1] (Benito 2000; Fratocchi & Holm 1998; Frost et al. 2002; Holm & Sharma 2000). According to Frost et al. (2002), they represent a focus for a super-

[1] This line of research is discussed further in Section 2.3.2.

ior set of *capabilities* within the firm, comprising of tangible resources such as equipment, licenses, patents, and intangible assets such as experience and knowledge. Moreover, it has been claimed that subsidiary-level research in general can draw from the capabilities view of the firm (Birkinshaw & Hood 1998a). It is for that reason that the capabilities view and the resource-based view (RBV) of the firm are reviewed here.

The RBV is the central perspective in strategic management literature (Barney 1991, 2002; Prahalad & Hamel 1990; Wernerfelt 1984). In essence, the RBV conceptualises the firm as a bundle of heterogeneous resources, or factors of production, that can lead to competitive advantage (Barney 1991, 2002; Keupp et al. 2011; Teece et al. 1997). Resources are stocks of tangible and intangible factors possessed or controlled by the subsidiary that allow it to create and utilise capabilities in order to improve its effectiveness and efficiency (Amit & Schoemaker 1993; Capron & Hulland 1999). Such factors encompass assets, organisational processes, firm attributes, information, stocks of human resources, and knowledge (Barney 1991; Nelson & Winter 1982; Penrose 1995). The resource-based argument postulates that competitive advantage arises from unique resources that deliver value to the customer. The value depends on the degree to which it either reduces the cost structure of the subsidiary, or helps to differentiate the subsidiary's product portfolio (Godfrey & Hill 1995). The unique nature of resources derives from resource rarity (i.e. no or few other firms possess the particular resource), non-imitability (other firms cannot replicate or acquire it) as well as non-substitutability (there are no comparable resources available) (Barney et al. 2011; Liouka 2007; Ray et al. 2004). However, resources may be inactive like a sluggish plant, until needed. Hence, a resource is something a subsidiary has access to, rather than something that it can do (Wu et al. 2010). Accordingly, resources, on their own, cannot be a source of competitive advantage, but need to be harnessed. To this end, strategy literature introduced the notion of capabilities.

Capabilities represent the subsidiary's distinctive and superior way of deploying, allocating and coordinating resources, as to achieve planned ends (Amit & Schoemaker 1993; Capron & Hulland 1999; Schreyögg & Kliesch-Eberl 2007). In other words, capabilities focus on the way in which resources are used (Penrose 1959). Capabilities are deeply rooted within a subsidiary's peculiar social structure, routines, and practices (Barney 1991; Liouka 2007; Wernerfelt 1984; Wu et al. 2010). The relevant knowledge and abilities are held at the firm level, supported by social networks, instead of residing in an individual (Nelson & Winter 1982; Pandža et al. 2003; Rugman & Verbeke 2001). Therefore, capabilities are tacit social processes that arise gradually over time, which means that participants are often oblivious of their presence and finally take them for granted (Leonard-Barton 1992; Lippman & Rumelt 1982). As social processes, capabilities are path-dependent, affected by factors such as the subsidiary's particular history (Rugman & Verbeke 2001; Teece et al. 1997), or by its learning process (Schreyögg & Kliesch-Eberl 2007). Often, capabilities span activity sets and hierarchical levels (Grant 1996). Moreover, a capability may generate more value when it is combined with other capabilities of the subsidiary (Ordanini & Rubera 2008). Capabilities facilitates the subsidiary's problem-solving decision making under conditions characterised by uncertainty (Wu et al. 2010), allowing management to deal with ill-structured and ambiguous tasks (Schreyögg & Kliesch-Eberl 2007).

Given their embeddedness in the subsidiary's processes and routines, capabilities cannot be transferred to other firms the way that some resources can and therefore provide a potential source of competitive advantage (Chung & Alcácer 2002; Foss & Pedersen 2002). In that respect, intangible assets are particularly essential for the subsidiary's competitiveness, as they are, in comparison with tangible resources, more tacit, socially complex, subsidiary-specific, as well as path-dependent, and thus difficult to imitate (Gulati 1999; Lippman & Rumelt 1982; Rugman & Verbeke 2001; Santangelo & Meyer 2011).

At first sight, the RBV appears to be a useful perspective to identify subsidiaries that create high value and are likely to do so in the future, particularly given that capabilities meet the call by Andersson and Forsgren (2000) for dynamic and future oriented success criteria. In addition, this thesis aligns with "subsidiary-focused" research acknowledging the existence of distinct subsidiary-specific resources and capabilities (Birkinshaw 1996, 1997; Liouka 2007). However, there are three main reasons to take another perspective, which, however, relates to the RBV. First, to create competitive advantage, the potential of the subsidiary's resources and capabilities needs to be harnessed through value-adding activities (Jensen & Pedersen 2012; Porter 1991; Ray et al. 2004). In fact, if resources and capabilities are not used to 'do something' they might lose their value over time (Coates & McDermott 2002). This caveat is of particular importance in the setting of the MNE subsidiary as the nature of its value-added activities is often determined by headquarter mandates (Ambos et al. 2006; Birkinshaw & Hood 1998b; see also Section 2.3.3). Hence, depending on these mandates, a subsidiary's resources and capabilities may not be fully utilised. Second, there are inherent difficulties relating to the level of analysis. In general, the RBV assumes that resources and capabilities are created and held at a firm level. In the context of the MNE, some resources may reside at the MNE and others at the subsidiary level (Birkinshaw 1994; Birkinshaw & Pedersen 2009). Hence, differentiating between corporate and subsidiary-specific resources and capabilities may be a challenging task, particularly for intangible assets (Liouka 2007). Third, it is widely recognised that capabilities can span activity sets (Grant 1996; Wu et al. 2010). However, this research is interested in individual activity sets. Capabilities that span activity sets do not allow the value creation potential for each activity set of a subsidiary to be determined. For these reasons, the perspective of *high value-added activities* (HVAAs) is considered more suitable in the context of this thesis.

This perspective is based upon the idea that value chain activity sets differ in their scope to contribute to competitive advantage of the MNE. In line with resource-based logic, activity sets that exploit valuable, yet common resources, cannot distinguish one firm from another. Further, activities in certain activity sets that draw on valuable and rare resources may lead to short-term competitive advantage, while activities that harness valuable, rare and costly-to-imitate resources can be a source of sustained competitive advantage (Barney 1991; Ray et al. 2004; Wernerfelt 1984). The latter type of activities is defined as high value-added activities (HVAAs) in this thesis. Due to its nature, this type of activities is inimitable and non-transferable, thus contributing (greatly) to the competitive advantage of the MNE. It is worth emphasising that the concept of capabilities is not rejected altogether, but should be viewed as antecedent to HVAAs. Using the concept of HVAAs has three advantages. First, it will reveal if resources and capabilities are harnessed, which is a prerequisite for competitive advantage. Second, HVAAs can be clearly attributed to the foreign subsidiary. Third, they allow analysing individual activity sets of the subsidiary. Therein, the idea of HVAAs avoids the pitfalls of equating subsidiary competences with capabilities.

The next section discusses alternative ideas, concepts and definitions of high value added that have been put forward in the theoretical, empirical, and policy literatures.

2.2.2 Concepts of high value added

There is no universally accepted idea, concept and definition of high value-added activities (HVAAs) in the theoretical, empirical and policy literatures. HVAAs have been defined in terms of *technology and knowledge intensity of sectors* (i.e. high tech manufacturing and knowledge-intensive service-sector industries), in terms of *products and services* produced (high tech and knowledge intensive products and services; high margin products and services), in terms of *labour productivity* (highly productive labour), in terms of *skill levels* of the workforce (higher skilled labour) or in terms of *activity sets* performed (higher level functions, such as R&D, product and service development). However, as will be discussed in more detail below, such notions are not unproblematic.

2.2.2.1 Aggregate concepts of high value added

In terms of the *technology intensity of sectors*, the most renowned categorisation of manufacturing industries is provided by the OECD (Hatzichronoglou 1997). It classifies sectors according to their R&D intensity[2]. However, no industry consists of homogeneous groups of firms but of a mixture of high-, medium- and low-tech firms (Kirner et al. 2009; Srholec 2007). In addition, activity sets in any group of industrial classification will have different degrees of value added. Therefore, industries are a poor indicator of technological sophistication and, more importantly, of high value added at the activity set level.

Another strand of literature examines HVAAs from the standpoint of *technology-intensive products*. For example, Lall (2000) advanced a classification of goods exports according to the degree of technological content. A main weakness of this approach is that it may group together activities at different levels of technological complexity in the same product category. In the context of this study, however, it is less useful because it does not allow identifying the value added of individual activity sets. Moreover, technology-based approaches in general do not allow for cross-subsidiary comparisons.

Another product-based approach to capture the geography of value added is to decompose specific goods and services into their constituent items and to trace the value added of each stage of production to its source (Ali-Yrkkö et al. 2011; Sturgeon et al. 2012). This procedure generates product-level estimates that identify the largest contributors with regard to value added. Yet, it is not applicable in the context of this study, as it does not allow evaluating the value added of largely intangible 'support' sets such as marketing and R&D.

Other studies have analysed *productivity* using industry-level data (Ferreira & Rossi 2003) or plant-level data (Amiti & Konings 2007; Fernandes 2007). Productivity is calculated as the proportion of total value added to factors of production, for example to the number of

[2] R&D expenditure divided by sales.

employees at the factory (Nassif 2007). Productivity as a proxy for HVAAs is less suitable for this study as it only permits to determine the degree of value added in the area of manufacturing, but not in other activity sets of interest.

Other authors examine the *skills levels* of the labour force to determine the degree of value added (e.g. Levy 2005). However, skilled labour is only a resource that, on its own, cannot create value. Employee skills need to be harnessed through value chain activities (Jensen & Pedersen 2012; Porter 1991). Although skills levels are an important feature of HVAAs, as discussed in the next subsection, they are not considered an appropriate alternative concept for HVAAs in this study.

One common denominator of all these concepts is their aggregate nature. In addition, most of these concepts are inherently limited to one activity set, i.e. manufacturing. However, as outlined above, value can be created across the entire value chain (Porter 1985; Sturgeon et al. 2012) and the degree of value added in each activity set conducted by the foreign subsidiary may vary. Accordingly, these concepts operate at a level that is too aggregate for the purpose of this study.

2.2.2.2 Activity set-based concepts of high value added

The value chain framework is often applied to illustrate and investigate the discrete set of activities that an organisation performs to create value (Kogut 1985; Porter & Millar 1985). The logic behind this model is that inputs are transformed into products that customers value (Jensen & Pedersen 2012; Stabell & Fjeldstad 1998). Porter's (1985) well-known decomposition of the value chain distinguishes between primary activities (inbound logistics, operations, outbound logistics, marketing and sales, and service) and support activities (procurement, technology development, human resources management, and firm infrastructure). The former activity sets are directly involved in creating and bringing value to the customer, whereas support activities enable and enhance the performance of the primary activities, which deal with physical products (Stabell & Fjeldstad 1998). Although the value chain framework shows that a firm may perform all nine activity sets, it has long been recognised that firms, or their subsidiaries, may carry out solely one activity, a set of activities, or the entire value chain of activities (Birkinshaw & Hood 1998b; Gereffi et al. 2005; Kogut 1985; Roth & Morrison 1992). Applying the value chain framework allows pinpointing the actual source(s) of value creation within the foreign-owned subsidiary. Hence, micro-level data, i.e. subsidiary activities, provide a more reliable account of the roles and development of foreign-owned businesses in specific locations (Szalavetz 2012). Some research exists that has measured actors' changes from lower to higher value-added activities. It has revealed generic activity sets and has amassed data on them (Brown 2008; Sturgeon 2008; Sturgeon & Gereffi 2009).

There exists some research where high value added has been linked to certain *activity sets*, most often R&D, per se (Gammelgaard et al. 2009; McCann & Mudambi 2005; UNCTAD 2005). For example, much of the global value chain literature has often equated production with lower value added, due to the labour-intensive nature of this activity set (Gereffi et al. 2005; Maskell & Malmberg 1999; Sato & Fujita 2009). In this literature, it has also been suggested that even skills required for world-class production are so plentiful that the value added is low in comparison to intangible activities, such as R&D, marketing, and branding (Giuliani et al. 2005; Maskell 1998; Navas-Alemán 2011; Schmitz & Knorringa 2000; Scott 2006). In line with RBV logic, ubiquitous resources and capabilities cannot be the source of creating superior value (Barney 1991, Section 2.2.1 of this Chapter). However, some scholars have acknowledged the fact that capabilities in the area of production may be important and critical as a resource in specific sectors, provided they meet the criteria of the RBV, i.e. are unique and hard-to-imitate (e.g. Navas-Alemán 2011).

In contrast, activity sets such as technology development, design, branding, logistics, and marketing have been judged in this literature as higher value added (Kaplinsky et al. 2002; Navas-Alemán 2011). These activity sets are seen as creating high value since they require intensive knowledge and skills, both of which are intangible assets (Contractor et al. 2010; Doh et al. 2009; Kedia & Mukherjee 2009; Reich 1991). Knowledge-intensive activities are defined as creative and specialised, while less knowledge-intensive activities have been often referred to as repetitious and standardised (Mudambi 2008; Nelson & Winter 1982; Sako 2006). The former activities are usually associated with higher value added since the underlying knowledge is unique and difficult to codify, and hence difficult to copy (Navas-Alemán 2011; Teece et al. 1997).

Evidently, this literature draws upon the same argument as the RBV, though this is seldom communicated. Supra-normal returns, or high value added, can only be earned if firms own superior resources (superior activities) that can be protected from diffusing to their rivals in the industry (Barney & Hesterly 2006; Peteraf 1993; Wernerfelt 1984). Literature on high value-added activities has focused on knowledge as underlying resource for high(er) value added. With respect to barriers to its transfer or imitation, tacitness and causal ambiguity of knowledge have been identified as important characteristics (Gupta & Govindarajan 2000; Kogut & Zander 1993; Lippman & Rumelt 1982; Polanyi 2009). Other features of HVAAs have also been advanced in this literature.

An initial overview is provided in Table 2.1 below. HVAAs have been described as more sophisticated and advanced activities (Contractor et al. 2010; Jensen & Pedersen 2012). As indicated earlier, there appears to be a widespread consensus that HVAAs are knowledge-intensive (Buckley & Casson 2009; Kedia & Mukherjee 2009; Mudambi 2008; Navas-Alemán 2011). Moreover, literature suggests that such activities involve an innovative (or creative) element (Doh et al. 2009; Mudambi 2008). Likewise, HVAAs have been defined as specialised and non-repetitious activities (Malecki 1984; Mudambi 2008; Sako 2006). A common view is that HVAAs are likely to be intangible as this means that codification and imitation are rather difficult (Giuliani et al. 2005; Kaplinsky & Readman 2002; Schmitz & Knorringa 2000; Scott 2006). As can be seen in Table 2.1, there appears to be an overall agreement that HVAAs require highly skilled (or sophisticated) labour (Buckley & Casson 2009; Contractor et al. 2010; Doh et al. 2009; Jensen & Pedersen 2012; Mudambi 2007; Sako 2006). Therefore, the literature provides a valuable overview about the characteristics of HVAAs. However, what makes much of this literature problematic is that single activity sets *as such*, e.g. R&D, are equated with high value added.

Table 2.1: Definitions of high value added in relevant literature

Study	High Value-Added Activities (HVAAs)	Low Value-Added Activities (LVAAs)	Conceptualisation
Buckley & Casson (2009)	• Basic research • Innovative production • Development of marketing strategy	n/a	"High level" activities require large inputs of skilled labour. Exchanges of knowledge through teamwork are essential.
Contractor et al. (2010)	• R&D • Product development • Design • Engineering	n/a	More sophisticated and advanced activities (or high-value company activities) involve higher skilled labour.
Doh et al. (2009)	• R&D • Engineering • Software development	• Payroll • Routine benefit reports • Preparing and distributing invoices	Higher value-added functions have a strong innovative component and require more sophisticated skills.
Jensen & Pedersen (2012)	• Prototype or niche production • Systems integration and troubleshooting • Architecture and design of programs • Functional and non-functional needs; (e.g. user interface) ensure consistency with IT strategy • Contact centre (1st contact resolution) • Financial management • Recruitment; training • Supply chain management • Advertisement • Content design, production and management • Basic research; new inventions • User needs assessment	• Volume production • Service operations • Testing; simple coding • Prototypes • Call centre • Bookkeeping • Payroll • Purchasing • Canvas and telesales • Business intelligence; management information • Patenting • Testing	HVAAs (or more advanced tasks) are tasks closer to the core activities of the firm. These are executed by highly educated specialists (knowledge workers).

Kaplinsky et al. (2002)	• Technology • Design • Branding • Logistics • Marketing • After-sales services	n/a	HVAAs (or higher margin activities) are intangible activities.
Kedia & Mukherjee (2009)	• R&D • Product design • Engineering • Sales and marketing	• Data entry work	HVAAs are activities that are knowledge intensive.
Mudambi (2008)	• Basic and applied R&D • Design • Commercialisation • Marketing • Advertising and brand management • Specialised logistics • After-sales services	• Manufacturing • Standardised services	HVAAs are knowledge-intensive activities that require high levels of commercial creativity. High knowledge activities are creative and specialised, while low knowledge activities are repetitious and standardised.
Navas-Alemán (2011)	• Design • Marketing • Branding		HVAAs require knowledge that is not abundant or codifiable. HVAAs are better remunerated and difficult to replicate.
Sako (2006)	• Overall HR strategy • In-Business HR • Labour relations strategy • Compensation & benefit policy/design • Strategic workforce planning & analysis • HR policy	• Employee record keeping • Form submission • Benefits Sign-up • Payroll • Employment changes • Job posting • Benefits administration • Relocation services	HVAAs are customised activities, which go beyond simple standardisation and centralisation. They are executed by high-skilled labour.

The global value chain literature (GVC) in particular has taken a similar stance to the one advanced by Mudambi (2008). Accordingly, it has considered the extension of activity sets in a particular country as quality upgrading (e.g. Navas-Alemán 2011). Usually, the middle segment of the value chain, i.e. production, is seen as the starting point. Functional diversification into activities at the input and output end then allows a subsidiary, or a country, to capture more value. Similar arguments have been advanced in the subsidiary literature. For example, it is often argued that subsidiaries start out with market-seeking responsibilities, i.e. with the objective of selling the MNE products in its host country (Birkinshaw et al. 2005). Contributory subsidiaries, then, have been defined as units that have international responsibilities or world mandates in activity sets such as manufacturing, product management, or R&D (Birkinshaw et al. 1998; Moore 2001). Another strand of research has investigated the value-added scope, i.e. the number of activity sets carried out by the subsidiary (Hogenbirk & van Kranenburg 2006; White & Poynter 1984). Yet, several academics have argued that an increase in the mandate or in the number of activity sets assumed by the subsidiary does not necessarily reveal the value, i.e. the quality of these extensions (Contractor et al. 2010; Rugman et al. 2011; Stehrer et al. 2012).

Neither production nor any other activity set is identical across sectors, firms, or foreign subsidiaries. Instead, there are differences in the complexity and degree of value added in separate activity sets. The explanation is that activity sets are decomposable and comprise of dozens or hundreds of sub-activities (Contractor et al. 2010; Szalavetz 2012). Some of those sub-activities require a lot of creativity (i.e. are knowledge and skill intensive) while others are repetitious and standardised, which makes them rather easy to formalise, codify, and replicate. As a consequence, no large grouping, such as R&D, manufacturing, or after-sales services "can be unambiguously described with a couple of adjectives, (e.g. low-tech and labour intensive and low value-adding; or advanced and knowledge-intensive and high value-adding)" (Stehrer et al. 2012: 9).

In essence, equating high value added with certain activity sets as such ignores the fact that not all sub-activities pertaining to such a set generate equal value. Drawing on the characteristics of HVAAs described above, a number of researchers, thus, propose distinguishing between routine and advanced activities *within* activity sets (Cohen et al. 2009; Jensen & Pedersen 2011, 2012). Accordingly, in terms of R&D, the degree of value added in this set will be higher if sub-activities related to product design or process development are carried out. Conversely, an R&D activity set that consists mostly of sub-activities associated with adapting products or services to local market requirements generates comparatively low(er) value. Regarding manufacturing, a subsidiary may undertake advanced and complex activities, e.g. prototype production, which entails intensive knowledge and high-skilled labour. Such a manufacturing set may be referred to as HVA. On the other hand, a subsidiary may also be restricted to (standardised) large-batch manufacturing, which requires less skilled labour and rather modest levels of knowledge (Pyndt & Pedersen 2006). Such an activity set, in turn, could be considered low(er) value added. Likewise, as shown in Table 2.1, the sales and marketing activity set entails standardised activities, such as canvas and telesales, as well as more advanced tasks like identity building or advertisement (Jensen & Pedersen 2012).

Within subsidiary research, several studies have sought to capture variances within activity sets, as a further indicator of specialisation of the MNE subsidiary. To this end, researchers have concentrated on competence levels in activity sets (Asmussen et al. 2009; Frost et al. 2002; Pedersen 2006). This line of research is most similar to this thesis, as discussed in Section 2.3.2 of this chapter. In adopting a fine-grained perspective of the value chain, the present thesis follows the stance of this body of research. In addition, it follows calls in the literature that the analysis of location decisions should account for the different degrees of value added within activity sets. The reviewed literature, however, provides little guidance on the measurement of HVAAs, or the (overall) degree of HVA within an activity set.

Despite the consensus on the characteristics of HVAAs, rather little attention has been paid to their measurement. Doh et al. (2009), for example, grouped service activities according to the extent to which they are interactive, repetitive, or innovative. Sako (2006) proceeded similarly and classified business services based on their value added and the complexity of interaction. Both studies, however, ignore other essential parts of the value chain, notably manufacturing. Jensen and Pedersen (2011) used a 5-point Likert-scale to measure HVAAs (or advanced tasks), where the lower end of their scale indicated that offshored tasks were non-advanced (or standardised) and the high end that the tasks were highly advanced. It is worth noting that this survey instrument has also been prominent in research on subsidiary roles. Both approaches, i.e. classifying certain sub-activities as HVA and using perceptual survey data, are not ideal for obvious reasons (see Section 2.3.2 of this Chapter). Thus, this research espouses an original approach, as will be discussed in Section 2.2.3.

In essence, characteristics of high value-added activities are in line with properties found in the RBV. However, much of the literature has equated certain activity sets with high value added, which may be deceiving because activity sets usually consist of several sub-activities that differ in terms of value added. Of course, the even more aggregated notions outlined in Section 2.2.2 above, i.e. technology intensity of the sector, high tech products, labour productivity, and skills levels are still less suitable to indicate the extent of value added in separate activity sets of the foreign-owned subsidiary. Hence, the following section is concerned with 'within activity set-based' concepts.

2.2.2.3 Within activity set-based concepts of high value added

As indicated above, there exists work in the subsidiary literature accounting for differences within activity sets, mostly the research on centres of excellence (Holm & Pedersen 2000). Even though this work has touched upon this idea, theoretical foundations have rarely been discussed in detail. To this end, work on technological capabilities (TC) has provided more insights. Lall (1992), for instance, combined three technological activity sets (production, investment and linkage) with capability accumulation. Embarking on Nelson and Winter's (1982) evolutionary theory, Lall (1992) posited that past accumulation of skills and knowledge shapes the firm's ability to absorb and create technical knowledge. It is worth noting that both knowledge and skills were identified as seminal characteristics of HVAAs in the literature reviewed in the previous section. In order to capture differences in capabilities at the firm level, Lall then proposed three degrees of complexity, as measured by the type of activity. In other words, this approach infers from the nature of the activity set the level of capabilities, and the level of skills and knowledge underlying those capabilities. Despite its merit as pioneering study, Lall's (1992) proposal has two main limitations that make it less suitable for this thesis. First, the respective classification is necessarily indicative, as it may be difficult to assess *a priori* whether a particular activity set is simple or complex (Foss & Pedersen 2002). Second, it only contains three functional capability groups and thus omits other value-added activity sets, e.g. sales and marketing. A broader range of activity sets is included in Sato and Fujita (2009).

Similar to the TC approach, Sato and Fujita (2009) suggested to evaluate capabilities at the firm level in two dimensions, i.e. the breadth of activity sets and the depth of capabilities. The breadth of activity sets, which is shown in the columns of the so-called capability matrix, encompasses pre-production, production and post-production.[3] This idea of breadth is termed value-added scope in subsidiary research (see Section 2.3.2). It shows how many activity sets of the value chain are performed by the foreign-owned subsidiary. The second dimension of the matrix is the depth of capabilities. Building on a review of TC literature, Sato and Fujita (2009) consider four capability levels based on the originality of the firm's contribution. These levels are operational, assimilative, adaptive and innovative. Therefore,

[3] *Pre-production* entails market research, concept creation, product development and design, while *post-production* includes branding and marketing. *Production* is divided into equipment-related and production management.

the capability matrix designs levels based on capability development and ranges from the learning of present technology to the generation of innovative elements. This ‘extent of originality’ approach diverges from other typologies in the TC literature that embark upon the extent of complexity of technologies (Bell & Pavitt 1995; Lall 1992). A very similar line of research has investigated capabilities based on the degree of innovativeness.

As presented in Table 2.2, most of this work has focused on firms in developing countries. This is not surprising since the respective literature stream is concerned with the economic development of those countries. In that context, it examines the capability development of domestic firms and foreign-owned subsidiaries, which may result in higher value capture at both the firm- and country-level. This line of research has largely focused on innovation-related capabilities as higher levels of innovative capability are seen as strategic assets that can lead to competitive advantage (Lall 1992; Bell & Pavitt 1995). Concomitantly, the key areas of interest are technological capabilities and capabilities related to production. In order to capture the competence in capability areas numerous innovation-related capability levels have been advanced. There are notable overlaps between the propositions, especially at the lower end of the capability spectrum, which is defined as basic capability level. The number of levels, however, varies from three to seven. As regards the research context, the electronics industry has gained considerable attention from scholars (Ariffin & Figueiredo 2004; Figueiredo 2008; Hobday & Rush 2007; Iammarino et al. 2008). Almost all research has relied on case studies, in-depth interviews, and direct-site observations. One reason is that clear indicators for functional capabilities are contextual or dependent on the types of industry and technology investigated (Möller & Törrönen 2003). For example, Figueiredo (2011) provided a bespoke typology based on ‘revealed capabilities’ in the Brazilian information and communications technology sector as to evaluate the innovative performance of foreign-owned subsidiaries over time. Likewise, Collinson and Wang's (2012) indicators for capabilities in production, design, and marketing are specific to semiconductors firms.

Although the contributions in the TC and related literature are useful, none of them is suitable for this thesis. There are several reasons. As noted in Section 2.2.1 above, capabilities need to be harnessed through value-added activities. If capabilities lie dormant, they might lose their value (Coates & McDermott 2002; Ray et al. 2004). Problems regarding the level of analysis were also highlighted previously. It is a difficult task to differentiate between capabilities at the corporate (MNE) and subsidiary level. In addition, capabilities may span activity sets, though many studies have examined functional capabilities. For these reasons, it is postulated that the desired outcome of capabilities, i.e. high value-added activities, is a more suitable perspective. Moreover, the approaches to measurement in this literature have some limitations. First, studies have usually developed industry-specific indicators to infer levels of capability. Hence, comparisons across foreign subsidiaries from different sectors are infeasible. This research, however, intends to investigate foreign-owned manufacturing firms from several sectors (see Section 5.5 of Chapter 5). Indeed, the TC approach is seen as more suitable for case study research, while this thesis embarks on a large-scale survey. Second, the boundaries between the different levels of capabilities offered in most studies are likely to be somewhat blurred (Collinson & Wang 2012). Third, some activity sets are usually ignored, e.g. after-sales services and procurement, and even if they were included, 'levels of originality' or 'levels of innovativeness' would provide only little insight into the degree of value added within those sets. This study, however, intends to capture the degree of value added in all activity sets covered by the foreign subsidiary. The next section deals with the perspective taken in this study, i.e. high value-added activities.

Table 2.2: An overview of selected studies analysing innovation-related capabilities

Study	Industry	Country	Unit of analysis	Method	Capability areas	Capability levels
Lall (1992)	General	General	Firms	Conceptual	▪ Investment ▪ Production ▪ Linkages	▪ Advanced innovative risky ▪ Intermediate adaptive duplicative ▪ Basic simple routine
Ariffin & Figueiredo (2004)	Electronics	Brazil / Malaysia	Firms	In-depth interviews / direct-site observations	▪ Project management ▪ Production, incl.: - Equipment - Process and production organisation - Product-centred	▪ Research-based (Level 6) ▪ Advanced (Level 5) ▪ Intermediate (Level 4) ▪ Basic (Level 3) ▪ Basic (Level 2) ▪ Basic (Level 1)
Hobday & Rush (2007)	Electronics	Thailand	Firms	Case studies	▪ Technology	▪ R&D capabilities (Level D) ▪ Product development (Level C) ▪ Process engineering (Level B) ▪ Assembly activities (Level A)
Figueiredo (2008)	Electronics / motorcycles	Brazil	Firms	In-depth interviews / direct-site observations	▪ Production, incl.: - Equipment - Process and production organisation - Product-centred	▪ Advanced (Level 6) ▪ High-intermediate (Level 5) ▪ Intermediate (Level 4) ▪ Basic (Level 3) ▪ Basic (Level 2) ▪ Basic (Level 1)
Iammarino et al. (2008)	Electronics	Mexico	Firms /regions	Structured interviews	▪ Technology	▪ Advanced ▪ Intermediate ▪ Basic
Figueiredo (2011)	Information and communications technology	Brazil	Firms	Case studies	▪ Innovation ▪ Production	▪ World leading (Level 7) ▪ Advanced (Level 6) ▪ Intermediate (Level 5) ▪ Basic (Level 4) ▪ Advanced (Level 3) ▪ Intermediate (Level 2) ▪ Basic (Level 1)

2.2.3 The perspective of high value added in this study

Drawing on the resource-based view (see Section 2.2.1 above), high value-added activities are defined as activities that harness valuable, rare, and difficult-to-copy resources (Barney 1991; Peteraf 1993; Ray et al. 2004). These activities cannot be imitated by rivals and thus are likely to create competitive advantage. As such, they are likely to be a critical source of value creation for the MNE (Foss & Pedersen 2002; Frost et al. 2002). In line with insights from the review in Section 2.2.2.2, high value-added activities (HVAAs) can be expected to be intensive in terms of knowledge and skills. Since each activity set consists of dozens or hundreds of activities (or tasks), which vary in terms of value added, it is argued that the higher the share of HVAAs in an activity set, the more value added is generated, on aggregate, by this particular set of the foreign-owned subsidiary. Therein, this thesis differs from research that equates certain activity sets *as such* with high knowledge and skills intensity, and, by inference, high value added.

As discussed earlier, it has long been acknowledged that unique resources and capabilities are somewhat difficult to observe, due to their nature (Godfrey & Hill 1995; Henderson & Cockburn 1994). Indeed, an important proposition of the RBV is based upon the logic that, all other things being equal, the less visible a resource, the higher are the barrier to imitation, and the more sustainable will be the competitive advantage derived from this specific resource (Barney 1991). The same argument is true for HVAAs, and the capabilities underlying those activities. Hence, the degree of value added within a specific activity set cannot be observed and measured directly. Accordingly, this study focuses on observable outcome indicators, as has been done in other studies (e.g. Collinson & Wang 2012; Shi et al. 2014). Rather than trying to measure value added per se (particular types, qualities and quantities of knowledge, skill, expertise and so forth), measurement in this thesis looks at differences in the revealed complexity of activity sets, which plausibly reflects the existence of variances in the degree of value added.

There are several reasons for taking a complexity-based approach to capture value added in individual activity sets. First, complexity has been chosen in previous IB research, because it is an element that can be expected to affect the transfer or imitation of knowledge (Kogut & Zander 1993, 2003). Equally, it should be an effective barrier to the imitation of HVAAs carried out by the foreign subsidiary. Therefore, the more complex an activity set, the more difficult it should be to transfer or to imitate. Further, as discussed in Section 2.2.1 above, capabilities, the antecedent of HVAAs, facilitate problem-solving decision making under situations characterised by uncertainty, allowing the subsidiary to deal with ambiguous and ill-structured tasks (Schreyögg & Kliesch-Eberl 2007; Wu et al. 2010). Such tasks can also be defined as complex tasks. Therefore, the complexity level in an activity set allows inferring the quality of the underlying capabilities, and, subsequently, the degree of value added within a separate activity set. Furthermore, the level of complexity in activity sets has been recommended as a good surrogate for those aspects that characterise HVA, i.e. difficulty to standardise, routinize, and codify activities (Giuliani et al. 2005; Stehrer et al. 2012). Also, complexity (of technology) is used in TC literature, as was noted in the preceding section, and has been identified as one of three elements that influence the organisation and power dynamics within global value chains (Gereffi et al. 2005). In the offshoring literature, it has been highlighted as a main characteristic of HVAAs (Pyndt & Pedersen 2006). Given that complexity has been identified in several strands of literature, it is seen as a useful outcome variable that plausibly reflects the degree of value added. From an empirical point of view, a complexity-based approach provides the opportunity to rely exclusively on objective, i.e. numerical data. Next, the systems complexity literature is briefly reviewed. Then, building upon two concepts resulting from this review, a definition of activity set complexity is put forward.

Although complexity has been subject to debate in a myriad of literatures, including philosophy, the physical sciences, engineering and management (Casti 1979; Choi et al. 2001;

Holland 1995; Simon 1962), there is still a variety of definition regarding what constitutes a complex system (Bozarth et al. 2009; Sivadasan et al. 2006). Several of these definitions have been employed in studying, predicting and controlling ‘chaotic’ systems (e.g. Stewart 1997). As noted by Gerschberger et al. (2012), this stream has also extended to the supply chain management literature. Since organisations display adaptivity and can exist in a complex environment, it is reasonable to identify subsidiary value chains as ‘complex adaptive systems’ (Pathak et al. 2007; Wycisk et al. 2008). Complex adaptive systems are interconnected networks of numerous entities that exhibit adaptive reactions to changes in both the environment and the system of entities itself (Choi et al. 2001). In this section, some of the definitions of system complexity are reviewed, and the working definition of this research is provided. This definition forms the basis of the dependent variables (i.e. value added in activity sets) of the conceptual framework and the empirical analyses.

Simon (1962: 468) defines system complexity as “one made up of a large number of parts that interact in a non-simple way”. These two elements – numerousness and interactions – are recurrent in the literature (Sivadasan et al. 2006). Not surprisingly, a similar definition can be found in the international business literature: “we define complexity as the number of critical and interacting elements embraced by an entity or activity” (Kogut & Zander 1993:633). Casti (1979:41), offer this definition: “complexity refers to two major aspects of a system: (a) the mathematical structure of the irreducible component subsystems of the process and (b) the manner in which the components are connected to form the system”. In general, the complexity of a system can be defined in terms of several interrelated aspects of the system (Gerschberger et al. 2012; Sivadasan et al. 2006). Some aspects identified in relevant literature are listed below (Bozarth et al. 2009; Simon 1962; Vachon & Klassen 2002; Wiendahl & Scholtissek 1994; Yates 1978).

i. Number of elements or subsystems,
ii. Degree of order within the structure of elements or subsystems,

iii. Degree of interaction or connectivity between the elements, subsystems and the environment,
iv. Level of variety, in terms of the different types of elements, sub-systems and interactions,
v. Degree of predictability and uncertainty within the system.

According to Flood and Carson (1988), the last aspect indicates higher-order complexity, which is due to nonlinearity and broken symmetry (Yates 1978). Similarly, Dubois et al. (2004) highlight that in *complex* systems a linear change in one part of a system may cause nonlinear and unanticipated changes in other parts of the system. *Complicated* systems, on the other hand, have many components that interact through predefined coordination rules (Amaral & Uzzi 2007; Waldrop 1994). Another key driver of system complexity emerges when parts of the system are somehow not accessible from other parts of the system. This can be due to system asymmetry or when one or more parts are left outside central control, allowing these parts to act autonomously (Flood & Carson 1988; Yates 1978). An example is a supply chain with various downstream demand points that independently place orders on a centralised supply point disregarding supply constraints or the needs of other demand points. To this end, the same ‘input’ (ordering based on pre-determined inventory policies) can have many different effects, depending on the state of the supply chain (Bozarth et al. 2009).

Based on this literature, two concepts have been revealed that may help indicate the degree of value added in individual activity sets. First, *detail complexity,* which can be defined as the number of components or parts that constitute a system. Second, *dynamic complexity*, which refers to the unpredictability of a system’s adaptation to a given set of inputs, driven partially by the interconnectedness of the many elements that make up the system (Bozarth et al. 2009; Senge 2006; Simon 1962; Sivadasan et al. 2006). For instance, in the context of this research, the foreign-owned subsidiary may deal with a number of suppliers of several components (detail complexity), and face uncertainty in the supply environment (dynamic complexity). Thus, activity set complexity may be defined as the level of detail complexity and dynamic complexity exhibited by the products, processes and relationships that make up an activity set (Bozarth et al. 2009).

Insights from the complex adaptive systems literature have also used as a starting point by several studies that are interested in supply chain complexity. As such, pre-tested measures of complexity exist that can be used in this research. Borrowing indicators from the supply chain literature means that the reliability and validity of survey items are unlikely to pose a worrying concern (see 5.7 of Chapter 5). In particular, a combination of detail complexity and dynamic complexity indicators is used in the present thesis. To the best of the author's knowledge, thus far, no research has inferred from various complexity measures the extent of value added in separate activity sets.

This original approach makes five main contributions. First, it enables comparisons across industries, since the measures are not industry-specific. Second, the proposed measures for complexity allow developing closed-ended questions (see Section 5.8.2 of Chapter 5). This type of questions is required to facilitate a large-scale survey approach and generalisation. Hitherto, case study methods have dominated in relevant literature. Third, the quantitative measures go beyond the indicative nature of activity set classifications that are widespread in the TC literature. Fourth, compared to the research presented in Table 2.2 above, a wider variety of activity sets is investigated, including but beyond R&D and production. Fifth, in comparison to the perceptual data used in much subsidiary research to establish the level of competence within an activity set of the foreign subsidiary (see Section 2.3.2), it uses more objective, i.e. numerical, data.

2.2.4 Summary of high value-added activities

This first part of the literature review briefly reviewed the resource-based and capabilities view, and highlighted that these views are not ideal to examine the nature of value-added activities undertaken by the foreign-owned subsidiary, i.e. its role. Then it was posited that the perspective of HVAAs is (more) suitable to do this. Following this argument, different concepts of high value added, at the industry, firm, and activity set level, were reviewed. It was emphasised that aggregate concepts for high value added deliver an incomplete picture of differences in the value chains of foreign-owned subsidiaries, since not all sub-activities pertaining to a certain activity sets are of equal value added. Therefore, it was argued that a within activity set-based concept is most suitable. Finally, a complexity-based approach to capture the degree of high value added within individual activity sets of the subsidiary was put forward.

2.3 Subsidiary literature

The purpose of subsection 2.3 of this literature review is to present a brief overview of the subsidiary literature, therein pinpointing the thesis subject in the context of the wider international business field. In particular, it reviews dimensions to capture different roles of the foreign-owned subsidiary and the factors determining such roles, from a theoretical as well as empirical point of view. As such, the review shows the need to extend previous research by alternative concepts such as HVAAs. In addition, it reveals relevant location factors that may be related with HVAAs.

2.3.1 Streams within the subsidiary literature

This section reviews the different streams that make up the subsidiary literature. This helps to pinpoint the concept of HVAAs based on a complexity-based conceptualisation of value added within subsidiary-focused research.

Research under the *strategy-structure* stream dealt with the strategies and structures of the MNE, while little attention was paid to the subsidiary itself (Daniels et al. 1984; Egelhoff

1982; Franko 1974; Stopford & Wells 1972). Due to its strong position the headquarter was seen as the decision-making unit regarding strategy, and the structure of the MNE was argued to change in order to fit strategy (Paterson & Brock 2002).

The *headquarters-subsidiary relationship* stream that resulted from new conceptualisations of the MNE started to pay explicit attention to subsidiaries (Birkinshaw & Pedersen 2009). Although subsidiaries were recognised as a discrete unit, research still followed the hierarchical model of the MNE (Figure 2.1). In this model, the foreign subsidiary is subordinate to headquarters, interacts mainly with the parent firm and largely conducts sales and manufacturing activities (Birkinshaw 2000). Most studies focused on the separate headquarters-subsidiary relationships, examining how a centre could control its subsidiaries (Cray 1984; Gates & Egelhoff 1986; Otterbeck 1981; Picard 1980).

Other conceptualisations of the MNE were put forward in the mid-eighties (Ghoshal 1986; Hedlund 1986; Prahalad & Doz 1981). They challenged assumptions underlying the traditional hierarchical view of the MNE and led to a more holistic thinking of the subsidiary as a semi-autonomous unit within a differentiated network. Studies adopting this heterarchical view found that resources and decision-making were dispersed throughout the MNE network. As such, the *MNE process stream* indicated the potential of heterogeneity among subsidiaries within the same firm (Birkinshaw & Pedersen 2009). All the same, the main unit of analysis was the MNE as a whole, not the individual subsidiary (see Figure 2.1).

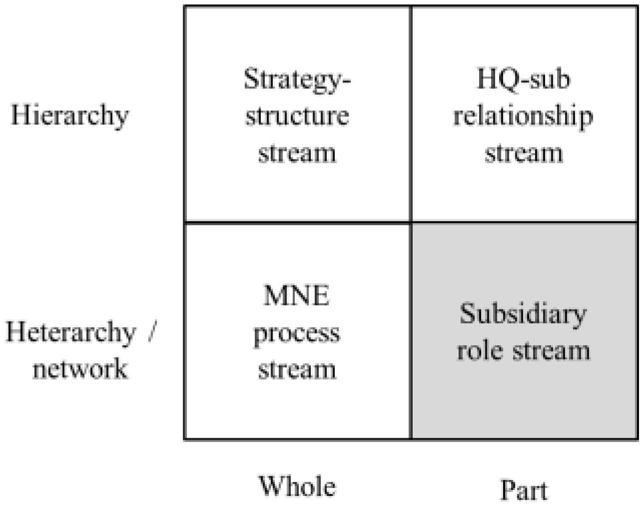
Only the *subsidiary roles* research stream started to concentrate on the subsidiary. Building upon Bartlett and Ghoshal's (1986) pioneering study research has intended to scrutinise the various roles played by different subsidiaries (e.g. Bartlett & Ghoshal 1986; Birkinshaw & Morrison 1995; Gupta & Govindarajan 1991; Jarillo & Martínez 1990; Randoy & Li 1998; Taggart 1997; White & Poynter 1984). Espousing a network view of the MNE, most work assumed that subsidiaries were nodes in a network rather than subordinate units of the head office (Birkinshaw 2000). This study takes this network view and aims to contribute to this specific research stream, which is reviewed in more detail below.

The *subsidiary development* stream is mainly interested in the evolution of subsidiary roles over time (Birkinshaw & Pedersen 2009). It has long been accepted in the IB literature that FDI can be a sequential process (Chang 1995; Kogut 1983), and this phenomenon has also been examined at the subsidiary level. This specific stream is concerned with the questions of how and why the value-added activities of subsidiaries change over time (Birkinshaw & Hood 1998b). It is widely recognised that the nature of value-added activities is driven by factors both internal and external to the subsidiary. Given that the subsidiary development stream is dynamic in nature, i.e. change of roles over time, it is not the right context for this study, which is of cross-sectional, i.e. static, nature. However, the stream provides valuable insights regarding potential drivers of HVAAs conducted by the foreign-owned subsidiary. These are reviewed in Section 2.3.3 below.

Summarising the above, Figure 2.1 depicts the shift from a traditional hierarchical concept-ualisation of the MNE, as represented by the strategy structure and headquarters-subsidiary relationship stream, towards a network view of the MNE, represented by the MNE process stream and the subsidiary role stream. This thesis adds to the last-mentioned stream and, in line with most research on subsidiaries today, views the MNE as a heterarchy. The position of this study is illustrated in Figure 2.1 below.

It is argued that the notion of HVAAs is a topical area of research and a useful extension to the analysis of subsidiary roles. Although some research has classified subsidiaries on their basis for creating value there is, to the best of the author's knowledge, no study examining HVAAs in terms of complexity. The shortcomings of the dimensions used in prior research to identify subsidiary roles, and the absence of exploring HVAAs at the subsidiary in terms of complexity, are presented in the next section.

Figure 2.1: Streams of subsidiary literature



Source: Adapted from Birkinshaw and Pedersen (2009).

2.3.2 Dimensions of subsidiary roles

As noted in Section 2.3.1, there is an overall agreement that subsidiaries increasingly play specialised roles within the MNE network (Birkinshaw & Pedersen 2009). The differences across subsidiaries have resulted in a large body of literature on typologies of subsidiaries. Those typologies are based on several dimensions. One research strand has grouped subsidiaries according to their position in terms of global integration and local responsiveness (Bartlett & Ghoshal 1989; Jarillo & Martínez 1990; Taggart 1998). A second strand has examined the knowledge flows between the subsidiary and other units in the MNE (Gupta & Govindarajan 1994; Harzing & Noorderhaven 2006; Vereecke et al. 2006). Still another approach has been the analysis of inter- and intra-organisational relationships of the subsidiary (Andersson et al. 2007; Boehe 2007; Yamin 2005). Some research has examined the scope of activities in the subsidiary (Hogenbirk & van Kranenburg 2006; White & Poynter 1984). An overview of research concerned with the roles, strategies and characteristics of foreign-owned subsidiaries is presented in Table 2.3 below. In the context of this study, research that explores the value chain activities of the subsidiary in order to classify its role is of specific interest.

Studies that draw on the *scope framework* group MNE subsidiaries based on their activities with regard to the product, market, or value-added scope. Based on several Canadian cases, White and Poynter's (1984) seminal study identified five types of subsidiaries. Thirty years on, scope dimensions remain a prevalent instrument in studies on subsidiary roles and their evolution (e.g. Birkinshaw & Morrison 1995; Delany 2000; Dörrenbächer & Gammelgaard 2006; Hogenbirk & van Kranenburg 2006; Tavares & Young 2006). As regards the degree of value added in separate activity sets, subsidiary scope provides little insight. Regularly, the existence of specific activity sets, so-called 'higher level functions' (i.e. R&D, purchasing and marketing) is linked with high value added (Birkinshaw et al. 2005; Gammelgaard et al. 2009). Yet, a subsidiary may perform rather poorly in those activity sets that have been referred to as 'higher level functions' (Benito 2000; Section 2.2.2.2 of Chapter 2). It has thus been recognised that the level of competence (or the 'depth') of subsidiary activity sets is an important dimension for the study of subsidiary roles that adopt an activity-based perspective (Benito et al. 2003; Pedersen 2006). In other words, the foreign subsidiary may perform different roles in each of its activity sets (Jensen & Pedersen 2011; Rugman et al. 2011). Therefore, it has been argued that activity sets rather than the subsidiary as a whole should be studied (Hewett et al. 2003; Kim et al. 2003).

Research on *centres of excellence* examines subsidiary roles based on the subsidiary's level of competence within its activity sets (Holm & Pedersen 2000). A subsidiary is considered excellent if it has some kind of distinct competence that gives it a competitive advantage in relation to its competitors. Such a competence can only lead to an advantage if it meets the requirements put forward in the resource-based view of the firm (Barney 1991; Wernerfelt 1984; see Section 2.2.1 above). There is a consensus in the centres of excellence literature that such competences may exist in any activity set undertaken by the subsidiary (Holm & Pedersen 2000; Surlemont 1998). High competence levels, in turn, are usually linked with high value added (Benito et al. 2003; Frost et al. 2002). Hence, in this strand of literature, the level of competence is used as a proxy for the degree of value added. While this thesis is closely related to the centres of excellence research, it varies in several ways. First, many authors maintain that a centre of excellence needs to be explicitly recognised or declared as such by the corporate headquarters (Fratocchi & Holm 1998; Frost et al. 2002). This need is ignored in this thesis since headquarter managers have been found to struggle to identify subsidiary competences (Denrell et al. 2004). Second, many studies have focused on particular activity sets, but ignored others (Davis & Meyer 2004; Frost et al. 2002; Furu 2000). In particular, R&D and manufacturing have been studied, as they are suspected to be most likely to exhibit the centres of excellence status (Frost et al. 2002). This study, however, is interested in two additional activity sets, i.e. supply and marketing, because the subsidiary may become excellent in any part of the value chain (Foss & Pedersen 2002; Porter 1985). Third, as concerns the measurement of competences, most research relies upon seven-point Likert-scales to proxy the competence level in various functional areas. Establishing a cut-off point for Likert-scale data, however, is not unproblematic. For example, using the same dataset, Davis and Meyer (2004) apply a lower cut-off point for high levels of competence than Schmid and Schurig (2003). Thus, it may be more useful to conceptualise competence (or high value added) in terms of degree, i.e. as a continuous variable. This thesis does this.

As can be seen in Table 2.3, most subsidiary research, thus far, has relied upon perceptual measures to approximate the competence level of foreign-owned subsidiaries. In particular, researchers have directly asked subsidiary managers to evaluate the level of competence in different activity sets. This, of course, can be problematic as there is a high level of social desirability bias in having higher levels of competence (Birkinshaw & Morrison 1995). In that regard, more objective indicators may add significant value to the study of value chain activities (Birkinshaw & Hood 2000).

Another weakness of empirical subsidiary roles literature is its narrow geographical scope. As shown in Table 2.3, empirical research has mostly been undertaken in Western Europe.

In particular, work on subsidiary typologies was carried out in Belgium (Surlemont 1998), Denmark (Forsgren & Pedersen 1998), Ireland (Delany 2000), the Netherlands (Hogenbirk & van Kranenburg 2006), Sweden (Andersson & Forsgren 1994; Nobel & Birkinshaw 1998), and Spain (Jarillo & Martínez 1990). There are merely a few exceptions that rely on data from other areas (e.g. Majcen et al. 2009; Manolopoulos 2010; Vereecke et al. 2006). To this end, the generalisability of this line of research is restricted to developed countries. Stated differently, only scarce knowledge exists about the nature of value-added activities at foreign-owned subsidiaries located in emerging economies. Since these economies differ significantly from developed countries in terms of location factors this is deemed a critical oversight in existing literature. Furthermore, as can be seen in Table 2.3, most research on subsidiary typologies was done in the 1980s and 1990s. Therefore, most knowledge about subsidiary roles and their determinants is based on rather old data. Aiming to reduce these identified gaps in the literature, this thesis analyses HVAAs with up-to-date data on foreign subsidiaries in Brazil.

Summarising the above, four key weaknesses of the subsidiary role stream were identified. First, much work has only considered aggregate, national subsidiary roles, not allowing for cases where a specific subsidiary performs one activity set with little expertise and another with high skill and proficiency. Second, the centre of excellence literature, which takes into account this competence level, has often taken a one-dimensional view of subsidiary competence by looking at individual activities in isolation. Third, almost all research relied on perceptual data to proxy competence levels. Fourth, questions arise from the timeliness and generalisability of relevant studies. Most of this research is based upon data obtained in the 1990s and largely restricted to a small amount of host countries in Western Europe.

Table 2.3: Dimensions in the subsidiary literature

Study	Dimensions	Activity sets considered	Construct for the value added within activity sets	Measurement of value added	Subsidiary development perspective	Theoretical viewpoint for location pers-pective	Empirical base	Geographic scope
White & Poynter (1984))	Market scope Product scope Value-added scope	Development Manufacturing Marketing	n/a	n/a	n/a	n/a	35 subsidiaries Qualitative	Subsidiaries in Canada
D'Cruz (1986)	Decision-making autonomy Extent of market involvement	n/a	n/a	n/a	n/a	n/a	1 subsidiary Case study	Subsidiary in Canada
Bartlett & Ghoshal (1986)	Capabilities Strategic importance	n/a	n/a	n/a	n/a	n/a	9 firms Case study	Firms from the US, Japan and Europe
Jarillo & Martínez (1990))	Degree of integration Degree of localisation	n/a	n/a	n/a	Headquarter assignment	n/a	50 subsidiaries Interviews	Subsidiaries in Spain
Gupta & Govinda-rajan (1994)	Outflow of know-ledge Inflow of knowledge	n/a	n/a	n/a	Headquarter assignment	n/a	359 subsidiaries Questionnaires	Subsidiaries owned by US, Japanese and European MNEs
Anders-son & Forsgren (1994)	Internal sales Internal purchases	n/a	n/a	n/a	n/a	n/a	59 subsidiaries Interviews	Subsidiaries in Sweden

Study	Dimensions	Activity sets considered	Construct for the value added within activity sets	Measurement of value added	Subsidiary development perspective	Theoretical viewpoint for location perspective	Empirical base	Geographic scope
Birkin-shaw & Morrison (1995)	(Market scope) (Product scope) (Value-added scope)	Purchasing R&D Manufacturing Distribution Promotion Sales Service	Capabilities	Capabilities Perceptual measure	n/a	n/a	115 subsidiaries	Subsidiaries in the US, Canada, UK, France, Germany and Japan
Taggart (1997)	Autonomy Procedural justice	(R&D)	(Capabilities)	(Complexity of capability) Perceptual measure	n/a	n/a	171 subsidiaries	Subsidiaries in the UK
Forsgren & Pedersen (1998)	Autonomy Interdependence External embedded-ness	(R&D) (Sales)	n/a	n/a	Headquarters assignment	n/a	141 subsidiaries Questionnaires	Subsidiaries in Denmark
Nobel & Birkin-shaw (1998)	Nature of activities Geographic scope Linkages to other entities	Basic research Development Product/process improvement Product/process adaptation	n/a	n/a	n/a	n/a	110 subsidiaries	Subsidiaries of Swedish MNEs
Surlemont (1998)	Domain of influence Scope of influence Depth of influence	n/a	n/a	n/a	(Subsidiary initiative)	n/a	662 relation-ships between subsidiaries Questionnaires	Subsidiaries in Belgium

Study	Dimensions	Activity sets considered	Construct for the value added within activity sets	Measurement of value added	Subsidiary development perspective	Theoretical viewpoint for location pers-pective	Empirical base	Geographic scope
Birkin-shaw & Hood (2000)	Autonomy Capabilities Local embeddedness	R&D Manufacturing Sales Marketing	Competence	Competence Perceptual measure	Local environment	Diamond model (Porter 1990)	229 subsidiaries Questionnaires	Subsidiaries in Canada, Scotland and Sweden
Delany (2000)	Market scope Product scope Value-added scope	n/a	n/a	n/a	Subsidiary initiative	n/a	28 subsidiaries Interviews	Subsidiaries in Ireland
Frost et al. (2002)	Competence Formal recognition	Research Development Manufacturing	Capabilities	Competence Perceptual measure	Headquarter assignment Local environment	Diamond model (Porter 1990)	99 subsidiaries Questionnaires	Subsidiaries in Canada
Benito et al. (2003)	Value-added scope Level of competence	Research Development Production Marketing/sales Logistics/distri-bution Purchasing HRM	Competence	Competence Perceptual measure	Local environment	Economic integration (Diamond model)	728 subsidiaries Questionnaires	Subsidiaries in Denmark, Finland and Norway
Holm et al. (2005)	n/a	Production Sales and marketing Logistics and purchasing Product and process develop.	Competence	Competence development Perceptual measure	Local environment	Diamond model (Porter 1990)	501 subsidiaries Questionnaires	Subsidiaries in Denmark, Finland and Sweden

Study	Dimensions	Activity sets considered	Construct for the value added within activity sets	Measurement of value added	Subsidiary development perspective	Theoretical viewpoint for location perspective	Empirical base	Geographic scope
Dörren-bächer & Gammel-gaard (2006)	Market scope Product scope Value-added scope	All primary and support activities as suggested by Porter (1985)	n/a	n/a	Headquarter assignment Subsidiary initiative Local environment	n/a	13 subsidiaries Interviews	Subsidiaries in Hungary
Hogen-birk & van Kra-nenburg (2006)	Market scope Value-added scope	R&D Manufacturing Marketing Sales After-sales Regional HQ	n/a	n/a	(Local environment)	n/a	84 subsidiaries Questionnaires	Subsidiaries in the Nether-lands
Pedersen (2006)	Value-added scope Level of competence Level of integration	Development Production Marketing/sales Logistics/distri-bution Purchasing HRM	Competence	Competence Perceptual measure	Headquarter assignment Subsidiary initiative Local environment	Diamond model (Porter 1990)	2,107 subsidiaries Questionnaires	Subsidiaries in Austria, Denmark, Finland, Ger-many, Nor-way, Sweden and the UK
Vereecke et al. (2006)	Autonomy Investment level Capabilities Performance level	New product development Management	Capability	Capability Perceptual measure	n/a	n/a	59 subsidiaries Interviews and questionnaires	Units in Europe, East Asia, Middle East, the US, Canada, South Africa, and Australia

Study	**Dimensions**	**Activity sets considered**	**Construct for the value added within activity sets**	**Measurement of value added**	**Subsidiary development perspective**	**Theoretical viewpoint for location factors**	**Empirical base**	**Geographic scope**
Majcen et al. (2009)	Sales value Share of exports Productivity level Technology level Quality level	13 business functions in ▪ Operations ▪ Marketing ▪ Strategy	n/a	n/a	Headquarter assignment Subsidiary initiative Local environment	n/a	433 subsidiaries Questionnaires	Subsidiaries in Central and Eastern Europe
Asmussen et al. (2009)	(Value-added scope) Level of competence	Research Development Production Marketing/sales Logistics/distri-bution Purchasing HRM	Competence	Competence Perceptual measure	Local environment	Diamond model (Porter 1990)	2,107 subsidiaries Questionnaires	Subsidiaries in Austria, Denmark, Finland, Germany, Norway, Sweden and the UK
Manolo-poulos (2010)	Market scope Value-added scope	R&D Product design Manufacturing Marketing Sales Service	Importance	Prevalence of each activity Perceptual measure	(Local environment)	n/a	112 subsidiaries Questionnaires	Subsidiaries in Greece

Within the above-mentioned research, three recurrent determinants of subsidiary roles have been recognised. The three sets of determinants are *head-office assignment, local environment determinism* and *subsidiary entrepreneurship*. The following section reviews each of these three determinants.

2.3.3 Main determinants of subsidiary activities

As outlined above, it is widely acknowledged that the roles of a foreign-owned subsidiary are contingent upon three main sets of factors. These factors include the local environment, the structural context imposed by the MNE headquarters, and the entrepreneurial capacity of subsidiary managers (Birkinshaw et al. 2005; Jindra et al. 2009). In particular, the interactions between these factors are supposed to determine subsidiary roles and their changes over time (Dörrenbächer & Gammelgaard 2006; Tavares & Young 2006). In the following paragraphs, each of the three sets of factors and their relevance to the present research are discussed.

Headquarters assignment perspective

The first set of MNE headquarters factors builds on an important stream of literature that has traditionally focused on the parent firm influence on the behaviour and nature of value-added activities. As mentioned above, the main assumption has been that the head office controls and allocates power within the multinational firm and thus determines subsidiary activities (Bartlett & Ghoshal 1989; Prahalad & Doz 1987; Roth et al. 1991). In essence, this literature stream discerns subsidiary roles as recipients and implementers of the head office's strategic choice and thus has been denoted the "headquarter assignment" perspective (Birkinshaw & Hood 1998b). Drivers within this sphere encompass factors such as the allocation of resources to the specific subsidiary, changes in subsidiary responsibilities and the head office's position in terms of autonomy versus control (Bartlett & Ghoshal 1986).

As the headquarters assignment perspective concentrates on facets of the parent-subsidiary relationships, mainly taking a parent perspective (Birkinshaw & Morrison 1995), it is not suitable for this research. Yet, the influence of the structural context imposed by the headquarters on subsidiary resources, and thus on the scope and value added of activity sets, is duly acknowledged.

Subsidiary choice perspective

The second determinant driving the set of activities executed by the subsidiary, i.e. its role, is internal to the subsidiary. Research under the subsidiary choice perspective has emphasised entrepreneurial efforts of the subsidiary as a crucial aspect for subsidiary survival, roles and their evolution (Birkinshaw et al. 2005). The pivotal argument is that the mandates and resources assigned by the parent may not be enough for successful subsidiary development (Madhok 1997). Accordingly, the subsidiary needs to develop resources and capabilities on its own (Young et al. 1994), through *subsidiary initiative* (Birkinshaw 1996, 1997), which is "essentially an entrepreneurial process" (Birkinshaw 1997: 207). For example, the subsidiary might independently develop new products or services, organise acquisitions of other firms, or attract major investments (Ambos et al. 2010). This perspective is less appropriate given that this thesis focuses upon location factors. However, as with the structural context imposed by the headquarters, the influence of entrepreneurial endeavours by local management upon HVAAs is duly accepted.

Local environment perspective

Several scholars had long stressed that corporate activities are dependent on the features of the host environment in which the organisation resides (Aldrich & Pfeffer 1976; Hannan & Freeman 1977; Pfeffer & Salancik 1978). Accordingly, the nature of the local environment has been well-established as a key factor in the subsidiary literature that will determine the role of the foreign subsidiary (Bartlett & Ghoshal 1986; Birkinshaw & Hood 2000; Benito et al. 2003; Cantwell & Piscitello 2005; Enright & Subramanian 2007; Feinberg & Gupta 2004; Rosenzweig & Singh 1991).

A central argument in this research is that high levels of competence (or value added) can be created through the bundling of subsidiary resources and external resources that exist in the local context of the subsidiary (Andersson et al. 2014; Meyer et al. 2011). As this study is concerned with location factors for HVAAs in emerging economies, it is obvious that, of the three perspectives that could be applied, the local environment perspective is the most appropriate. It is reviewed further in Section 2.3.4 below.

2.3.4 Local environment and subsidiary activities

As can be seen in the overview presented above (Table 2.3, in Section 2.3.2), scholars have applied different perspectives to help explain the influence of the local environment on the nature of value-added activities conducted by the foreign subsidiary. Research belonging to the subsidiary literature, in particular, has applied Porter's diamond model, which sums up the key arguments of competitive strategy (Porter 1990). According to this model, competitive advantage is created in interplay between industry rivalry, the quality of related and supporting sectors, factor conditions and demanding customers. In the context of the subsidiary, the argument is that in a host-country industry with various competitors, demanding customers, and excellent suppliers, the focal subsidiary must become extremely competitive in order to just survive (Birkinshaw et al. 2005; Holm et al. 2005). Thus, at least part of its value chain ought to create high value added.

A second prevalent perspective is the "relational view" of competitive advantage. It is built on the idea that each subsidiary is engaged in relationships with external actors (Andersson et al. 2001; Forsgren & Johanson 1992). Hence, in this view, the external impact is specifically created and mediated through exchange in relationships between the focal subsidiary and organisations outside its boundaries (Dyer & Singh 1998; Holm et al. 2005). Inter-firm relationships provide to the subsidiary access to rare and inimitable resources and capabilities (Gulati 1999; Holm et al. 2005). The underlying (tacit) knowledge is both country and firm-specific (Chen et al. 2004). Such knowledge can only be absorbed and exploited by a subsidiary through active learning within a relationship (Boehe 2007; Forsgren et al. 2005; Holm et al. 2005). Accordingly, it has been shown that subsidiaries must be closely embedded in networks of their host country to develop competences there (e.g. Andersson & Forsgren 2000; Cantwell & Mudambi 2005; Figueiredo 2011; Holm & Pedersen 2000). Thus, inter-organisational relationships mediate the access to, and benefit from, resources available in the host country, facilitating the subsidiary's creation of resources and capabilities, both of which were identified as antecedents of HVAAs (see Section 2.2.1 above). In general, this body of studies has primarily focused on immediate business relationships and not dealt with other relevant location factors. However, subsidiaries vary in their ability to form relationships, disguising the fact that the local context theoretically provides the same advantages to all MNEs. Given that inter-organisational relationships mediate the access to locally available resources (Gammelgaard et al. 2012; McDonald et al. 2008) and are created through a path-dependent process, which makes them difficult to copy (Andersson et al. 2002), they are considered an (internal) resource in this thesis (Dunning & Lundan 2008a; Liouka 2007). In turn, the presence and quality of competitors, suppliers, or other external organisations, i.e. potential partners for relationships, is seen as the actual location advantage. This study, thus, concentrates on the local environment.

In Benito et al. (2003), economic integration was analysed as an exogenous determinant of subsidiary roles. The interest in integration schemes, such as the EU or Mercosur, is based on the recognition that they may offer economic gains, which include improved economies of scale and scope, increased efficiency through the rationalisation, and reallocation of firm activities (Eden 2002). In that respect, two distinct arguments have been advanced. Firstly, the scope of a particular subsidiary's activities increases if the amount of MNE subsidiaries is rationalised in the focal region (Birkinshaw 1996). Secondly, the scope of activities may be reduced in order to build expertise in certain parts of the value chain (Surlemont 1998). Benito et al. (2003) provided support for their hypothesis that subsidiaries residing outside an integration scheme operate in fewer activity sets. Yet, as regional integration is only one facet of the local environment that may affect business activities, this study is subject to the overall criticism on subsidiary studies, i.e. that the richness of the local environment is not captured.

Another prevalent shortcoming of most research is the use of aggregate concepts, most notably diamond *strength*. There is a general consensus that different activity sets are attracted to different location factors (Enright 2009; Kim et al. 2011; Rugman et al. 2011). Hence, it is not suitable to evaluate the strength of the local environment through a one-dimensional construct that does not recognise variances across activity sets. Essentially, this means that not only subsidiary roles (see Section 2.3.2) but also the local environment that determines these roles needs to be examined from a disaggregate view (Asmussen et al. 2009). Yet, it has been recognised in the literature that, to date, there is a dearth of empirical research that explores the relationship between different location factors and different parts of the value chain undertaken by the foreign-owned subsidiary (Enright 2009; Paterson & Brock 2002). While some research exists that examines activity location, most of it has focused on single activity sets (Davis & Meyer 2004; Furu 2000; Hewett et al. 2003; Woodward & Rolfe 1993).[4] Contributions by Enright (2009) and Asmussen et al. (2009) are exceptions.

Two aspects in particular make the Asmussen et al. (2009) study a valuable contribution to subsidiary research. First, it considered that the subsidiary can specialise in a narrow range

[4] A great deal of work concerning location determinants for single activity sets, esp. R&D, can be found in the wider IB literature. Given the focus of this study, the review only presents empirical research pertaining to the subsidiary literature. A good starting point for relevant research of the wider IB literature is Enright (2009). The shortcomings of this body of literature have been summarised in Figure 2.2 below.

of activities in the value chain (Birkinshaw & Hood 1998b; Pedersen 2006). Three distinct competences (i.e. supply, market, technical) were considered. Second, it advanced the idea of "unbalanced diamonds", positing that a country might be strong in some aspects but less strong in others. Accordingly, Asmussen et al. (2009) separated Porter's diamond into the supply, market and technical environment. The statistical analysis supported the hypothesis that the strength of each environment positively affects the respective competence of the subsidiary. Yet, aside from the weaknesses regarding the measurement of competence (see Section 2.3.2), the study's limited scope concerning location factors is seen as a key drawback. Notwithstanding the effort to unpack the host-country environment, it is still *industry* specific.

All the studies aforementioned have made substantial contributions, from various points of view, to our knowledge about location factors that elucidate post-entry roles of the foreign-owned subsidiary. However, the review in this subsection has shown that relevant research is largely limited to exogenous factors that operate at the industry level, as has been stressed elsewhere (Benito et al. 2003; Chidlow et al. 2009). It provides an incomplete picture of the local environment as determining factor for subsidiary roles and activities, because it is widely accepted in the field of IB that country-level, industry-level, and firm-level location factors affect the behaviour and performance of the MNE (Peng 2001; Rugman & Verbeke 2001; Tüselmann et al. 2006). Moreover, most research has espoused an aggregate view of the local environment, which overlooks the fact that different activities are associated with different aspects of such an environment. Hence, research is needed that conceptualises the host-country environment in a multi-dimensional way.

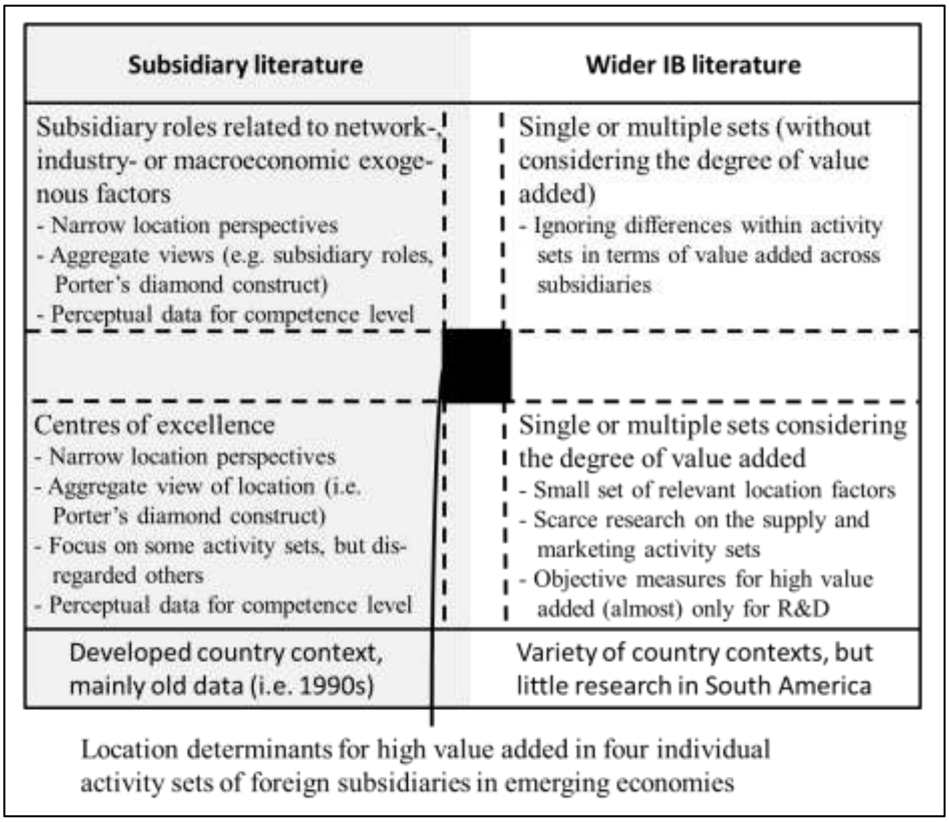
As noted in Section 2.3.2, there are also some weaknesses regarding the generalisability of prior findings in the subsidiary literature. These findings are heavily based upon developed economies (Asmussen et al. 2009; Birkinshaw & Hood 1998b; Frost et al. 2002; Schmid & Schurig 2003) and stem from data collected in the late 1990s, e.g. in the case of the centres of excellence project. This is considered a weakness, particularly in view of recent changes in the global business landscape (see Beugelsdijk et al. 2009; Dicken 2011). As a result, our knowledge on the current roles and activities of the foreign-owned subsidiary and their location determinants in emerging economies is limited.

Following the review in this section, it is clear that research that took a local environment perspective has considered only a subset of relevant location factors. The present research sets out to narrow this gap in the literature. In order to identify potentially relevant location factors Section 2.4 below reviews a number of location theories that can be found in the broader IB literature.

2.3.5 Summary of subsidiary literature

Section 2.3 included four parts. The *first* part introduced the different streams of subsidiary research and pinpointed the topic of this thesis, i.e. HVAAs, to the subsidiary roles stream. The *second* part provided a review of the different dimensions used in existing research to capture the roles of the subsidiary. It was concluded that the idea of centres of excellence is most similar to the notion of HVAAs. This part also emphasised that the subsidiary level is too aggregate a unit of analysis, which is why this study examines high value added within separate activity sets. The *third* part reviewed three sets of determinants that are recognised to affect the set of activities undertaken by the foreign-owned subsidiary. Of these sets, the local environment was seen as most suitable. The *fourth* part dealt with subsidiary research that has looked at this environment. It was concluded that most of this line of research has failed to capture the richness of the subsidiary's local context. Figure 2.2 below provides a summary of the weaknesses of both the subsidiary and the wider IB literature that has dealt with location determinants for activity sets of the foreign-owned subsidiary. It also justifies the need to carry out this research.

Figure 2.2: Mapping the gap in the literature



Section 2.2 put forward the concept of HVAAs as a useful tool to examine the activity sets conducted by the foreign subsidiary. The review in this section showed that there is a need to identify (more) potentially relevant location factors for HVAAs. Section 2.4 below does this, by reviewing a number of location theories and frameworks.

2.4 Location theory in international business

2.4.1 Introduction

The purpose of this part of the literature review is to discuss prevailing academic thinking on the location of MNEs' value chain activities. In specific, it reviews theoretical concepts applied in the IB literature with respect to the location of activities executed by the foreign-owned subsidiary. Based on this review, relevant location determinants are revealed, which capture the richness of the local context. In order to integrate the different location theories and frameworks, this part advocates an updated framework based upon Dunning's (2000) widely adopted envelope paradigm. This section is organised as follows. Firstly, the contributions of Dunning (1977, 2000, 2006) are reviewed. Secondly, a number of location theories and frameworks relevant to the study of HVAAs will be reviewed: Classical trade theory (Section 2.4.3), product life cycle theory (2.4.4), knowledge-enhancing theories (2.4.5), agglomeration economies (2.4.6), and institutional theory (2.4.7). The location factors that result from this review are summarised in Section 2.4.8.

2.4.2 Dunning's envelope paradigm

This part reviews the eclectic (OLI)[5] paradigm (Dunning 1977, 1980, 1993) and its refined version, the envelope paradigm (Dunning 2000). This paradigm is the dominant framework for examining MNE value chain activities (Buckley & Hashai 2009; Demirbag & Glaister 2010; Stoian & Filippaios 2008). Dunning (1977) advanced a comprehensive argument in combining a number of theories of MNE activities. The eclectic paradigm suggests that the decision to get involved in international production via FDI is determined by the interaction of three types of advantage (Dunning 2000; Galan et al. 2007).

Firstly, ownership advantages, which result in competitive advantage vis-à-vis competitors, are related to the degree to which a firm possesses a set of internal factors or resources and capabilities that rivals (or potential rivals) lack. The notion of ownership advantage mirrors the thoughts of Hymer (1976), and the RBV of the firm advanced in the field of strategic management (Barney 1991; Wernerfelt 1984; see Section 2.2.1).

Secondly, location advantages stem from the favourable conditions offered by the potential host country. The MNE will conduct specific value-added activities in a particular location according to the capabilities and resources in the host country (Demirbag & Glaister 2010; Meyer et al. 2011). These advantages entail political, economic, social, technological, legal and environmental elements. Dunning (2000) claimed that the more immobile the location

[5] OLI stands for ownership, location, and internalisation.

factors, which firms combine with their own resources and capabilities, and the more they favour production abroad, rather than in the home country, the more value-added activities of the MNE are carried out in the geographical location in question.

Thirdly, internalisation advantages are related to the choice whether it is more efficient to organise the ownership advantages across borders within the firm boundary through FDI or to alternatively transfer them to local firms in the host markets, i.e. to do offshore outsourcing (Dunning 2000). Internalisation relates to the existence of market imperfections and the resulting differences in transaction costs. MNEs intend to exploit their internalisation and ownership advantages to maximise their competitive advantage (Buckley & Casson 2009; Buckley & Ghauri 2004).

MNEs with different motives choose locations with different location advantages (Chidlow et al. 2009; Kang & Jiang 2012). Based on the nature of advantages that the firm is seeking foreign value-added activities are usually categorised along four main motives (Chen et al. 2004; Dunning 1998): (1) To seek natural resources, (2) to seek new markets, (3) to restructure existing value-added activities through rationalisation, (4) and to seek strategically related created assets.

Resource seeking refers to foreign-based value-added activities that are established in order to acquire specific resources in the host country at a lower real cost than could be obtained in other host locations (Dunning 1993; Zaheer & Manrakhan 2001). Thus, relevant location factors are low labour costs and the availability, price, and quality of natural resources (Galan et al. 2007; Narula & Dunning 2000). Such cost-related factors have also been revealed in trade theory (see Section 2.4.3 below) and Vernon's (1966) original product cycle hypothesis (Section 2.4.4). It is often assumed that the possession of certain natural resources is a comparative advantage generally associated with developing countries (Galan et al. 2007; Makino et al. 2002; Noorbakhsh et al. 2001).

At the other end of the value chain, *market-seeking* motives are related to the host country market (Campos & Kinoshita 2003; Kang & Jiang 2012). A large market size offers more opportunities for MNEs to improve cost effectiveness and to realise economies of scale by producing and distributing locally products sold in the host market (Globerman & Shapiro 2003; Mataloni 2011). Furthermore, rapidly growing countries provide more profit-making opportunities than those countries that have slower economic growth. High growth rates in the host country lead to a high level of aggregate demand. Thus, MNEs will be attracted by high economic growth rates (Billington 1999; Flores & Aguilera 2007). Often, subsidiaries are set up to supply more than their host markets. In this case, access to adjacent markets is a key location factor (Dunning 1998; Marinova & Marinov 2003). In specific, subsidiaries within integration schemes (e.g. EU) or trading blocs have easier access to a larger market and may profit from economic gains such as economies of scale and scope (Dunning 1993; Eden 2002).

The main purpose of *efficiency-seeking* is to exploit differences in the availability and cost of factor endowments in different locations (Boehe 2010; Ghemawat 2007). Accordingly, a firm organises its value-added activities in line with the comparative advantage of different locations (Zaheer & Manrakhan 2001). Location factors associated with efficiency seeking are mainly production cost related (e.g. labour, land, materials, machinery, etc.). Other factors entail the freedom to trade intermediate and final products, the existence of agglomerative economies (see also Section 2.4.6 below), institutional and cultural differences as well as time zones (Arregle et al. 2009; Dunning 1998). A main advantage of efficiency seeking is that it leads to economies of scale and scope and risk diversification (Benito et al. 2003).

Finally, value-added activities related with *strategic asset seeking* are carried out to sustain and advance the firm's competitive position (Narula & Dunning 2010). As outlined in Section 2.2.1 above, strategic assets are resources and capabilities that may lead to competitive advantage (Amit & Schoemaker 1993). Examples of strategic assets are management experience, learning experiences, technical knowledge, or organisational competence (Dunning & Lundan 2008b). Thus, relevant location factors are knowledge-related assets, such as advanced technological resources and capabilities, highly skilled human resources and exceptional management, and organisational skills (Dunning 1998; Galan et al. 2007). This set of strategic assets is generally embedded in local networks and almost impossible to obtain in the open market. As a result, geographical proximity and strong linkages are pre-requisites to accessing them (Chen et al. 2004; Makino et al. 2002).

Dunning's (2000) envelope paradigm is considered most appropriate as framework for the analysis of location factors determining the set of activities executed by the foreign-owned subsidiary. The main reason is that it is suitably broad and flexible to include a wide range of location theories or frameworks. As such, it allows the researcher to capture the *richness* of the local environment. To remind the reader, the failure to do this was identified as a critical shortcoming in current research that investigates the influence of location factors upon subsidiary roles (see Section 2.3.4 above). As this study is interested in the local environment, it focuses on the L sub-paradigm. Focusing on just one sub-paradigm of the envelope paradigm, as to accommodate for a particular research problem, is not uncommon in the IB field (e.g. Buckley et al. 2012; Galan et al. 2007; Kang & Jiang 2012).

2.4.3 Classical trade theory

Until the 1950s most theories focused on the distribution of natural resources to explain location patterns of international economic activity (Dunning 2009; Galan et al. 2007). For instance, the concept of comparative advantage refers to the ability of a country to produce a particular good at a lower marginal and opportunity cost over another. In the Heckscher-Ohlin trade theory it is argued that different sets of resource endowments across countries, e.g. land, labour, and capital, explain differences in manufacturing efficiency and comparative advantage (Ohlin 1933). Therefore, a relatively labour-abundant country would have a comparative advantage in goods that need intensive labour. It would export these goods to other countries, while capital- or land-intensive goods would be imported from countries with better respective endowments (Buckley & Casson 2009).

Concerning multinational strategies, trade theory entails that the foreign-based subsidiaries of MNEs carry out specific activities in countries that provide the best comparative advantage for these activities. For example, the headquarters could be located in the country best endowed with skilled labour to develop firm-specific advantages. Production, on the other hand, would be undertaken in a country with low-cost, unskilled labour.[6] This means that a single-plant MNE would arise. Hence, the vertical expansion of firms is essentially contingent upon differences in factor endowments. Despite some shortcomings (see Faeth 2009; Krugman 1993), classical trade theory includes relevant location factors that can be applied to the study of value-added activities in foreign-owned subsidiaries, namely the availability and quality of basic factors of production. These factors entail cheap labour, raw materials, natural resources, or energy, provided at a lower real cost than in other locations (Dunning 1993; Ghemawat 2007).

Moving away from the economics tradition, the new and interdisciplinary field of international business (IB) emerged in the 1960s to illuminate the location of MNE activities. Since then, this field has taken into account country-level, industry-level, and firm-level location advantages (Rugman & Verbeke 2001). Specific location theories found in the IB literature are reviewed in the following sections, i.e. Section 2.4.4 to Section 2.4.7.

2.4.4 Product life cycle theory

Vernon's (1966) article on the product cycle and international investment was one of the first contributions in the IB area. Based on the idea of trade theory, Vernon integrated firm-

[6] This, of course, assumes the absence of tariffs and transport costs.

level factors such as economies of scale and the timing of innovation, which had previously been ignored by comparative advantages theories, to help explain the location of value-added activities. Vernon (1966) contended that the investment decision was one between exporting and investing, as products move through three distinctive life cycle stages (new, mature, and standardised). In essence, Vernon's product cycle hypothesis rested on a cost-based rationale for the switch from exporting to manufacturing in foreign-based MNE subsidiaries (Faeth 2009). This means that the parent firm carries out innovative-intensive stages of the production cycle in a country with innovative capabilities. As products become more standardised, they become more price-sensitive, subject to competitive pressures, and thus likely to be produced by subsidiaries located in low-cost countries (Vernon 1979).

Although Vernon's (1966) theory fails to explain why some MNE activities were relocated to developed countries, which did not offer low-cost factors of production and is judged to only enlighten the internationalisation of US firms in the 1960s and 1970s (Dunning 1988), it outlines the importance of innovative capabilities for the creation of firm-specific advantages. However, it is now widely established that MNEs may seek such capabilities both at home *and* abroad (Andersson et al. 2002; Cantwell & Mudambi 2005). This location factor is relevant for HVAAs and is further discussed in Section 2.4.5.

2.4.5 Knowledge-enhancing theories

Many traditional theoretical lenses mainly treat situations where firms have already created ownership advantages and where host countries are primarily seen as markets or as sources of cheap labour (Almeida & Phene 2004). However, as noted in Section 2.4.1, firms undertake certain value-added activities overseas in search of resources, knowledge and capabilities, not available in the home country, that result in ownership advantages (Chidlow et al. 2009; Dunning & Lundan 2008b). Particularly, this view manifests itself in the knowledge-based view of the MNE (Cantwell 1989; Cantwell & Mudambi 2005; Grant 1996), where a geographically dispersed network of affiliates is considered to enable the access to a wide range of different, locally embedded, knowledge, resources and capabilities. Such assets, in turn, can be used by the MNE to create firm-specific advantages and improve its long-term competitiveness (Ambos et al. 2006; D'Agostino & Santangelo 2012). In fact, creating advantages by combining location-specific advantages and the specific resources of the focal subsidiary is often deemed the main route of value creation in the modern MNE (Forsgren 2008; Meyer et al. 2011; Rugman et al. 2011). Activities associated with this approach are referred to as 'technology-seeking' or 'knowledge-seeking' (Chung & Alcácer 2002).

Knowledge-seeking in host-country locations has been suggested to include two types, distinguishing between firms from leading compared to lagging technical locations (Cantwell & Janne 1999). The latter firms need to catch up to compete at a global level and thus carry out value-added activities in locations with strategic assets in order to compensate for their competitive weaknesses (Buckley et al. 2008; Chen & Chen 1998; Kang & Jiang 2012). In contrast, firms from leading locations may perform activities in foreign countries to source more diverse knowledge (Chung & Alcácer 2002; Rugman et al. 2011). Knowledge from local organisations is conducive for generating new knowledge since it improves the depth breadth of competencies that exist in a subsidiary. This, in turn, increases opportunities for re-combining various types of knowledge areas (Cohen & Levinthal 1990; Colakoglu et al. 2014).

Given that knowledge is a critical antecedent of HVAAs (see Section 2.2.2) it is considered essential to integrate location factors that are associated with knowledge seeking. Such factors entail the number of scientists, the abundance and quality of human capital, previously established innovations, R&D intensity, the education system and linkages between educational institutions and firms (Bunyaratavej et al. 2008; Cantwell & Piscitello 2005; Doh et al. 2005; Ito & Wakasugi 2007).

According to Cohen and Levinthal (1990), absorptive capacity is essential to a subsidiary's ability to learn. One prerequisite of this capacity is that the subsidiary needs prior related knowledge. Thus, it is a premise of tapping into valuable sources of knowledge in the local environment (Mu et al. 2007; Petersen et al. 2008).

2.4.6 Agglomeration economies

A large body of literature has examined the location of MNE value chain activities through the lens of agglomeration economies (Doh et al. 2009; Goerzen et al. 2013). Economies of agglomeration refer to the benefits that firms obtain by locating in close proximity to other actors (Mariotti et al. 2010). Based on Marshall (1920), three types of external economies have long been recognised: (1) the existence of a pooled market for specialised workers, (2) the availability of specialised inputs from suppliers and service providers, and (3) a relatively rapid flow of business-related knowledge between organisations, which result in local knowledge spillovers (Birkinshaw & Hood 2000; Iammarino & McCann 2006). Clusters of economic activity thus have the potential to increase productivity and performance of firms within such a cluster (Shaver & Flyer 2000; Zhu et al. 2012).[7] The incentives, knowledge and resources residing in a geographical concentration of interconnected actors may also lead to entrepreneurship, innovation, firm growth and, by inference, the performance of HVAAs in the subsidiary (Delgado et al. 2010; Porter 1990). According to this perspective, relevant location factors are the availability of skilled labour, the availability of suppliers and other external actors such as customers, competitors, universities and scientific institutions (Alcácer 2006; Collinson & Wang 2012). These organisations have received ample interest in subsidiary research that draws on network theory (see Section 2.3.4). Moreover, the kinds of linkages that grow up between these

[7] A cluster consists of a proximate group of ''interconnected companies and associated institutions linked by commonalities and complementarities'' (Martin & Sunley 2003:10). Though various types of agglomerations exists, including innovative milieu, industry clusters, industrial districts and cities, all types exhibit a notable similarity with Marshall's (1920) original notion (Goerzen et al. 2013).

actors are, in large part, idiosyncratic for that regional district. Since knowledge is often tacit and requires continuous interactions to transfer (Kogut & Zander 1993, 2003), MNEs need to be on-site with their value-added activities to properly benefit from external knowledge sources (Cantwell 1989; Jaffe et al. 1993).

In line with previous arguments, agglomeration is included in the envelope paradigm in the present study (Buckley & Ghauri 2004; Dunning 2006).

2.4.7 Institutional theory

Another important element of the foreign subsidiary's local environment is the institutional environment (Dunning 2006; Pajunen 2008). There are three broad perspectives that can be found in the field of international business: (1) Macro-institutionalism, which draws upon socio-economic and political science (Hall & Soskice 2001; Whitley 1999), (2) neo-institutionalism, which is based upon sociology (DiMaggio & Powell 1983; Rosenzweig & Singh 1991; Scott 1995), and (3) new institutional economics (North 1990, 2005). While the first perspective focuses on institutional varieties to explain a country's success in a particular sector, neo-institutionalism deals with the way in which institutions influence organisational structure and business practice (Hall & Soskice 2001; Kang & Jiang 2012). In line with most IB literature, this thesis focuses on the new institutional economics branch of institutional theory. This branch is concerned with the rule and governance systems that develop to regulate economic exchanges (North 1990; Williamson 1999). Hence, new institutional economics highlights economic efficiency, i.e. the reduction of costs associated with transactions, as primary driver of location decisions. Within this branch, institutions are defined as "the rules of the game in a society" (North 1990:3). These rules entail formal rules, such as constitutions, laws and property rights, and informal constraints (e.g. sanctions, taboos, customs, traditions and code of conduct). They both facilitate and restrict the way in which firms are able to interact and hence influence the relative transaction and coordination cost of the firm's value-added activities (Dunning & Lundan 2008a; Gelbuda et al. 2008). It is argued that the closer the institutional environment is able to approximate zero transaction costs for foreign firms, the more likely the host country is to receive FDI and, by inference, more high value-added activities (Grosse & Treviño 2005; Peng 2003).

Another line of argument in the literature regarding the institutional environment concerns institutional arbitrage (Gaur & Lu 2007; Ghemawat 2007). The rules of the game of doing business differ across countries (North 1990). Such differences provide opportunities to the MNE for the exploitation or exploration of firm-specific advantages (Dunning 1993; Rugman & Verbeke 2001). Therefore, certain value-added activities may be drawn to the institutional environment of a host country. For example, many firms have been shown to carry out R&D in the United States, due to the great importance devoted to technology and innovation among US firms and the advanced regulatory regime for property right protection in the country (Almeida 1996; Jensen & Pedersen 2011).

A wide variety of institutional factors has received consideration in research related to the location of value chain activities of the MNE. These factors include, for example, financial market development (Bevan et al. 2004), labour regulations (Javorcik & Spatareanu 2005; Pajunen 2008), corruption (Egger & Winner 2005; Wei 2000), the protection of intellectual property rights (Ali et al. 2010; Javorcik 2004), political risk (Galan et al. 2007; Kaufmann et al. 2008) and government policies (Edmiston et al. 2003; Zanatta & Queiroz 2007).

MNEs view the institutional environment as an important element of the subsidiary's local context (Bevan et al. 2004). Hence, it is argued that there is a need to integrate institutional facets in the envelope paradigm (Dunning & Lundan 2008a; Sethi et al. 2003). Considering an institution-based view is even more important for the case of emerging countries (Estrin et al. 2008; Kang & Jiang 2012). This study, thus, includes institutional factors.

2.4.8 Summary of location theory in international business

The preceding subsections, i.e. Sections 2.4.1 to 2.4.7, discussed different location theories and frameworks that can be found in the IB literature. It was posited that Dunning's (2000) envelope paradigm is most suitable as a location framework for the analysis of value-added activities of the foreign-owned subsidiary. The other theories, on their own, are seen as less appropriate. However, integrating those under the envelope paradigm allows capturing the richness of the subsidiary’s local environment. A number of relevant location facets can be derived from this set of theories and frameworks. Of course, some of those have already been analysed in subsidiary studies (see Sections 2.3.2 and 2.3.4), but the entire set of them has not yet been investigated simultaneously. Table 2.4 below provides an overview of the location factors relevant to the study of HVAAs. It also identifies the respective theory and framework from which they were derived. Finally, it reveals the type of location factor (i.e. resource seeking, market seeking, efficiency seeking or strategic asset seeking) that is associated with a particular location factor.

Table 2.4: Relevant location factors for HVAAs

Location factor	**Location theory/ framework**	**Type of location factor**
Cost advantages	Trade theory Vernon’s product life cycle Dunning’s ‘L’ sub-paradigm	Resource-seeking Efficiency-seeking
Market attractiveness	Dunning’s ‘L’ sub-paradigm	Market-seeking
Competitors in close proximity	Agglomeration economies Dunning’s ‘L’ sub-paradigm	Strategic asset-seeking
Supply conditions	Agglomeration economies Dunning’s ‘L’ sub-paradigm	Efficiency-seeking Strategic asset-seeking
Existence of scientific institutions	Knowledge-enhancing theories Dunning’s ‘L’ sub-paradigm	Strategic asset-seeking
Availability of skilled employees	Agglomeration economies Knowledge-enhancing theories Dunning’s ‘L’ sub-paradigm	Strategic asset-seeking
Institutional environment	Institutional theory Dunning’s ‘L’ sub-paradigm	Efficiency-seeking Strategic asset-seeking

2.5 Summary

This chapter sought to address research objectives 1 and 2. Firstly, it provided a review of theoretical and empirical literature on subsidiary roles and their determinants. Secondly, it advanced the concept of high value-added activities as an alternative to capture the roles of the foreign-owned subsidiary.

The first part of this review showed that it is useful to investigate the degree of value added to determine subsidiary roles within the MNE. It was emphasised that a within activity set-based concept of value added is required to consider differences in activity sets across subsidiaries. Accordingly, the idea of high value-added activities was advanced as a promising alternative to existing notions (e.g. capabilities and competences). This idea is rooted in the resource-based view of the firm. It was further argued that the degree of complexity within a particular activity set of the foreign subsidiary represents a good substitute for high value added in this set.

Second, this chapter contended that a number of location factors should be integrated into a framework as to capture the richness of the subsidiary's local context, which influences the degree of value added in its activity sets. It was argued that an extended version of Dunning's (2000) envelope paradigm represents such a framework.

This review identified five major limitations in existing literature. First, previous studies on high value added have largely relied on aggregate concepts. Even though both dormant and nascent ideas exist to investigate the extent of value added within activity sets (i.e. taking a disaggregate view), research has not yet advocated an approach that is suitable for a large-scale survey. Moreover, the focus has been on manufacturing and R&D, much to the detriment of other activity sets (e.g. marketing, after-sales and procurement).

Second, much subsidiary research has only considered aggregate, national subsidiary roles, not allowing for cases where the focal subsidiary undertakes one activity set with high skill and proficiency and another with little expertise. Research on centres of excellence, which accounts for the competence level, has mainly taken a one-dimensional view of subsidiary competence by analysing individual activity sets in isolation, rendering the activity basis of the subsidiary a somewhat under-researched topic (Enright 2009; Paterson & Brock 2002). Thus, a fine-grained empirical analysis of value added in each activity set of the subsidiary is still lacking in the field.

Third, the focus of most research investigating the impact of location factors on the roles of the foreign subsidiary has been upon industry-level factors. In the context of research on subsidiary roles, a study that considers the whole set of relevant location factors has not yet been undertaken.

Fourth, little has been said about potential links between different location factors and high value added in individual activity sets of the foreign subsidiary. This, however, is seen as a major shortcoming as location-specific advantages and the opportunities for bundling these with internal – subsidiary or parent firm – resources needs to be investigated separately for each part of the value chain (Kim et al. 2011; Rugman et al. 2011). This study narrows this gap by formulating theoretical arguments for the relationship between different location factors and the degree of value added within four individual activity sets.

Fifth, within subsidiary research, some issues exist about the measurement of competence levels in activity sets, given its perceptual nature. This thesis, in contrast, draws on objecti-ve, i.e. numerical, data to assess the degree of value added. Concerns have also been raised about the timeliness and the geographical scope of this body of research. The present study uses current data on foreign-owned subsidiaries in Brazil.

The next chapter discusses the hypotheses of this thesis.

3 CONCEPTUAL BACKGROUND AND HYPOTHESES

3.1 Introduction

Following from the identification of gaps in the literature this chapter is concerned with the development of research hypotheses that allow narrowing these gaps. As such, this chapter is in line with research objective 3 and advances hypothesised associations between several location factors and the degree of value added within individual activity sets of the foreign subsidiary. As discussed in Section 2.4.1 of Chapter 2, this research draws on an extended version of Dunning's (2000) envelope paradigm. This allows including a variety of relevant location factors, all of which were derived from the location theories and frameworks that were reviewed in Section 2.4.

To re-emphasise, the over-arching assumption of this study is that each value chain activity set is drawn by different location aspects of the host country (Enright 2009; Goerzen et al. 2013; Kim et al. 2011). Thus, a key point is that location advantages and the opportunity for bundling these with internal competences need to be evaluated separately for each part of the value chain (Jensen & Pedersen 2011; Rugman et al. 2011). Furthermore, this thesis focuses on high value-added activities (HVAAs). Thus, hypotheses regarding associations between location factors and HVAAs are formulated separately for each activity set.

In line with most subsidiary research (e.g. Ambos et al. 2010; Asmussen et al. 2009; Davis & Meyer 2004; Frost et al. 2002), six activity sets were considered in this study: R&D and product development (PD); procurement; manufacturing; logistics and distribution; sales and marketing; after-sales services.[8] Following Asmussen et al. (2009), related sets were aggregated, leaving four activity sets:

- R&D/PD
- Manufacturing
- Supply (procurement and logistics and distribution)
- Marketing (sales and marketing and after-sales services)

[8] An overview of activity sets considered in different subsidiary studies can be found in Appendix B.

The hypotheses for the associations between the degree of value added in these four individual activity sets and the seven location factors identified within Chapter 2 (see Table 2.4 on page 75) are discussed in Section 3.2 below. Recognising that non-location factors may affect the nature of activities undertaken by a subsidiary, structural factors are discussed in Section 3.3. Section 3.4 provides a summary of the chapter.

3.2 Hypothesis development

3.2.1 Cost advantages

Cost advantages form part of several location theories/frameworks, e.g. Dunning's (2000) envelope paradigm (Section 2.4.2), trade theory (2.4.3), or product life cycle theory (2.4.4). This type of location factor is sought by MNEs that want to secure specific resources, such as natural resources and cheap labour, at a lower real cost than could be obtained in their home country (Ghemawat 2007; Nachum & Zaheer 2005).

In line with R&D literature, the nature of foreign *R&D/PD* is divided into “competence (or home base) exploiting” and “competence (or home base) creating” in this study (Blomkvist et al. 2010; Cantwell & Mudambi 2005; Kuemmerle 1997). Activities of the latter type are generally more complex, ambiguous and tacit and thus difficult to copy, i.e. they are more likely to generate high value added. An overview of activities in both types of R&D/PD is provided in Table 5.3 (on page 135, in Chapter 5).

One reason for R&D/PD in foreign subsidiaries is to rationalise R&D/PD according to cost considerations. Availability of trained R&D personnel or other resources required for technological activities at relatively lower cost than elsewhere may result in more activities in a MNE subsidiary (Demirbag & Glaister 2010; Kumar 2001). In particular, R&D wage costs in the host location are an important determinant in this respect (Doh et al. 2009; Lewin et al. 2009). Competence-creating R&D/PD, however, will be more probable if the country’s knowledge base is large and the quality of knowledge is high (Cantwell & Mudambi 2005;

Kuemmerle 1999). Countries that exhibit cost advantages often do not provide this kind of knowledge and are still catching up (Ramamurti 2009). Such countries, e.g. emerging markets, have developed knowledge and capabilities in technologies that are easy to codify and display a lower degree of complexity (D'Agostino & Santangelo 2012). Accordingly, these conditions are more conducive to lower value-added activities in the area of R&D/PD such as adaptation (Fifarek & Veloso 2010; Mudambi 2008).

Cost advantages may play a role for HVA within the *manufacturing* set. Manufacturing in the foreign subsidiary is related with efficiency-seeking types of location factors (Dunning 1993; Goerzen et al. 2013). In general, low-cost locations are commonly seen as conducive to repetitious (e.g. Doh et al. 2009; Sako 2006), standardised (Gereffi et al. 2005), and non-competence creating (Santangelo 2012), value-added activities. As these kinds of activities are relatively easy to imitate, they are of low value added (see Section 2.2.2 of Chapter 2). HVAAs in the production sphere may be less cost-sensitive, but increasing cost pressures – in view of globalisation trends – are likely to compel MNEs to undertake all manufacturing activities, i.e. of variant degrees of value added, in locations that provide cost savings. As a result, some low-cost locations are able to attract HVAAs if skilled personnel are available to the foreign MNE subsidiary (Jensen & Pedersen 2011).

As indicated above, cost advantages are important for low value-added activities conducted by the foreign subsidiary (D'Agostino & Santangelo 2012; Mudambi 2008). However, this objective is of limited importance for HVAAs in both the *supply* and the *marketing* activity set (Jensen & Pedersen 2012). Instead, MNEs are more likely to assign HVAAs in the two sets to their foreign-based subsidiaries in locations that provide knowledge-intensive inputs such as large pools of talented people (Cantwell & Mudambi 2011). This results in the first set of hypotheses:

Hypothesis 1a: Cost advantages will have a significant negative effect on the likelihood of high value added in the R&D/PD activity set, if compared to low value added.

Hypothesis 1b: Cost advantages will have no significant association with the degree of value added in the manufacturing activity set.

Hypothesis 1c: Cost advantages will be significantly negatively associated with the degree of value added in the supply activity set.

Hypothesis 1d: Cost advantages will be significantly negatively associated with the degree of value added in the marketing activity set.

3.2.2 Market attractiveness

As noted in Dunning's (2000) envelope paradigm, market-seeking types of location factors, e.g. market size, market growth, and access to adjacent markets, are essential drivers for the location of value-added activities (see Section 2.4.2 of Chapter 2). However, the impact of market attractiveness on the degree of value added will vary across activity sets.

Once again, competence-exploiting and competence-creating *R&D/PD* units are subject to different location facets (Huggins et al. 2007; Ivarsson & Jonsson 2003). The main purpose of the former is to serve the local market. Hence, the higher the market attractiveness (i.e. potential sales) in a location, the more likely is the subsidiary to carry out process improvements and to adapt products to bolster margins (Doh et al. 2005; Kumar 2001), resulting in more R&D/PD activities for the adaptation of the firm’s output to local requirements. Yet, the major purpose of competence-creating R&D/PD units is to tap into the local knowledge and resource base. This role is thus driven by supply-side location factors (Achcaoucaou et al. 2014; Huggins et al. 2007). Accordingly, market attractiveness (higher or lower output) in their location should not affect the likelihood of competence-creating R&D/PD activities carried out by the MNE subsidiary (Cantwell & Mudambi 2005).

As elaborated in Section 2.4.2 of Chapter 2, both a large market size and favourable market growth provide the subsidiary with improved opportunities to reach cost effectiveness and to realise economies of scale through local *production* for products sold in the host market and in adjacent markets (Kang & Jiang 2012; Mataloni 2011). To achieve this, the foreign subsidiary needs to extend its activities, irrespective of their degree of value added (Enright 2009; Woodward & Rolfe 1993). However, HVAAs in this activity set should be driven by external knowledge residing in the local environment (see hypotheses below) and by local competition, since the subsidiary then needs to be very competitive in order to survive (see Section 2.3.4 of Chapter 2). Thus, market attractiveness should not influence the degree of value added in the manufacturing set.

The degree of value added within the *supply* set (procurement, logistics and distribution) is expected to be positively influenced by market attractiveness. Distribution activities have a direct relation with the market and thus the arguments offered for the marketing set below should apply. Although procurement and logistics are not directly related to market factors, they are linked to the marketing activity set of the foreign subsidiary (Enright 2009; Porter 1985). In view of the expected association in this set, one can expect that market attractiveness has a positive relationship with HVA within the supply set.

Market attractiveness is related to the extent of downstream activities, i.e. marketing, sales, after-sales services (Defever 2006; Dunning 1998). There are two main reasons to expect a similar relationship for the degree of value added in the *marketing activity* set. First, larger – host-country and adjacent – markets imply a larger number of customers, a wider variety of customer needs and higher levels of demand fluctuation. Thus, dynamic complexity (i.e. demand fluctuation) and detail complexity (i.e. number of customers, diversity of customer needs) are higher in larger markets than in smaller markets. Moreover, in an effort to better respond to heterogeneous needs many firms enlarge their product variety, adding further to complexity (Bayus & Putsis Jr. 1999; Salvador et al. 2002). If it successfully deals with the higher levels of complexity, the subsidiary is likely to create HVA. Second, the subsidiary needs to be proficient in the marketing activity set to enhance learning from the market environment. Without proficiency, the subsidiary lacks the ability to assimilate knowledge. A subsidiary would thus need an excellent sales force, which can interact with customers, is able to convey relevant market information, and pressures up the value chain (Asmussen et al. 2009). The above discussion suggests the following:

Hypothesis 2a: Market attractiveness will have no significant effect on the likelihood of high value added in the R&D/PD activity set, if compared to low value added.

Hypothesis 2b: Market attractiveness will be significantly positively associated with the degree of value added in the manufacturing activity set.

Hypothesis 2c: Market attractiveness will be significantly positively associated with the degree of value added in the supply activity set.

Hypothesis 2d: Market attractiveness will be significantly positively associated with the degree of value added in the marketing activity set.

3.2.3 Competitors in close proximity

Competitors in close proximity were identified as a relevant location aspect in the envelope paradigm (Section 2.4.2) and in agglomeration economies (2.4.6). It has also been part of two distinct, albeit related arguments in subsidiary research (see Section 2.3.4). The first looks at the strength of the industry 'diamond' in an area as an opportunity for the foreign subsidiary to derive a learning benefit (Frost et al. 2002). The second argument is related to inter-organisational relationships that facilitate the development of HVAAs through learning processes. Instead of developing a single cluster (or external network) hypothesis, three separate hypotheses are formulated for its constituents, i.e. competitors, suppliers (Section 3.2.4 below), and scientific institutions (Section 3.2.5). As such, it accounts for the fact that each activity set is associated with different location factors (Defever 2006; Enright 2009; Kim et al. 2011).

The foreign-owned subsidiary may conduct HVA *R&D/PD* activities in order to learn from the innovative activity of competitors in close proximity (Feinberg & Gupta 2004; Huggins et al. 2007). The opportunity to access and use knowledge spillovers from competitors will also be an important location factor for HVA within the *manufacturing* set, which is also knowledge-driven (e.g. Chung & Alcácer 2002; Head et al. 1995; Shaver & Flyer 2000). In addition, HVA may evolve in related areas, such as business activities (i.e. *supply* and *marketing*). This is supported by research that classified value chain output into the technological and business dimensions (Andersson et al. 2001; Mudambi 2008). In line with the arguments above for HVA in the technological area, it is reasonable to assume that competitors in close proximity will also have a positive effect on the degree of value added in the marketing and supply activity set of the foreign-owned subsidiary (Andersson et al. 2014). The subsidiary may pool knowledge inflows from competitors with their own knowledge base, make novel associations between the two sources of knowledge, and create new or amended services, systems, processes, organisational forms, and by inference HVAAs (Colakoglu et al. 2014; Todorova & Durisin 2007, see Section 2.4.5).

The greater the knowledge base in the local environment, the greater is the opportunity set presented to firms residing in it to tap into knowledge (Gulati 1999). Thus, a large number of competitors is expected to increase the amount and variety of knowledge potential available to the subsidiary and is expected to lead to more HVAAs (Phene & Almeida 2008). In addition, high levels of competition force the foreign subsidiary to upgrade its value-added activities (Holm et al. 2003; Porter 1990). Drawing on the arguments above, the following hypotheses are derived:

Hypothesis 3a: Competitors in close proximity will have a significant positive effect on the likelihood of high value added in the R&D/PD activity set, if compared to low value added.

Hypothesis 3b: Competitors in close proximity will be significantly positively associated with the degree of value added in the manufacturing activity set.

Hypothesis 3c: Competitors in close proximity will be significantly positively associated with the degree of value added in the supply activity set.

Hypothesis 3d: More competitors in close proximity will be significantly positively associated with the degree of value added in the marketing activity set.

3.2.4 Supply conditions

Supply conditions, i.e. the amount and quality of local suppliers, are the second element of the industry diamond that is integrated in this study (see Section 2.3.4). It is also mentioned in agglomeration economies (2.4.6) and in Dunning's envelope paradigm (2.4.2). Based on the assumption that the subsidiary has the required ability to access and absorb knowledge, suppliers in the host region can be important sources for the development of HVAAs in the foreign-based subsidiary (Forsgren et al. 2005; Mu et al. 2007). As noted above, this ability differs across the four activity sets examined.

The key role of suppliers in developing innovations has long been recognised (e.g. Davis & Meyer 2004; Von Hippel 1988). Conducting *R&D/PD* activities enables the foreign-owned subsidiary to benefit from the skills, knowledge, and contacts of local suppliers (Gerybadze & Reger 1999; Hollenstein 2009). This eases both the adaptation of products developed in other parts of the MNE to domestic needs and better learning. However, the kinds of skills and knowledge provided by local suppliers can be expected most valuable for competence-exploiting R&D/PD. The types of knowledge needed for competence-creating R&D/PD resides in local R&D organisations such as research universities, public research institutes, or innovative competitors, rather than in local suppliers (Cantwell & Piscitello 2005; Huggins et al. 2007).

HVAAs in *manufacturing* should be positively related with superior supply conditions. For example, firms could exchange ideas on how to augment the quality of their products or on how to reduce production costs (Lall et al. 2004). In addition, the foreign-owned subsidiary may gain more flexibility in important areas, such as meeting manufacturing schedules and the rapid adjustment to changing demand patterns (Gerybadze & Reger 1999; McDonald et al. 2008).

The association between supply conditions and HVAAs should be most pronounced for the *supply* set. The subsidiary that intends to understand the products, processes and abilities of local suppliers requires advanced knowledge and capabilities in the supply area to do so (Goerzen et al. 2013). Hence, a subsidiary needs to undertake HVAAs, which involve high levels of knowledge (see Section 2.2.2.2 of Chapter 2). Equally, skilled procurement specialists need to work with excellent suppliers as to allow for tight integration and knowledge-sharing within the supply chain (Asmussen et al. 2009).

Activities in the *marketing* activity set can be expected to benefit rather little, if at all, from the amount and quality of local suppliers. In this set, the required absorptive capacity is not existing (Asmussen et al. 2009; Cohen & Levinthal 1990). Activities at the downstream of the value chain are generally linked with market-seeking types of location factors and thus should be affected mainly by demand-side aspects of the host environment (Dunning 1998; Enright 2009; Kim et al. 2003). This leads to the following hypotheses:

Hypothesis 4a: Favourable supply conditions will have a significant negative effect on the likelihood of high value added in the R&D/PD activity set, if compared to low value added.

Hypothesis 4b: Favourable supply conditions will be significantly positively associated with the degree of value added in the manufacturing activity set.

Hypothesis 4c: Favourable supply conditions will be significantly positively associated with the degree of value added in the supply activity set.

Hypothesis 4d: Favourable supply conditions will have no significant association with the degree of value added in the marketing activity set.

3.2.5 Existence of scientific institutions

Scientific institutions are identified as location factor in knowledge-enhancing theories (see Section 2.4.5), in the envelope paradigm (2.4.2) as well as in subsidiary studies that adopt a network view (2.3.4). They are seen as potential sources of knowledge that can be accessed by the foreign-owned subsidiary (Carlsson 2006; Phene & Almeida 2008). The bundling of external knowledge with its own knowledge and resources then facilitates the development of (more) HVAAs (Hennart 2009; Rugman et al. 2011).

Knowledge created by scientific institutions is basic and difficult to appropriate (Alcácer & Chung 2007). In order to benefit from this type of knowledge the foreign-owned subsidiary requires absorptive capacity (Cohen & Levinthal 1990; Mariotti et al. 2010). Consequently, Asmussen et al. (2009) posit that competences in R&D and/or manufacturing are necessary to access knowledge residing in scientific institutions. If the firm wants to tap into research synergies with local universities or public research centres, it will need personnel with the skills required to assimilate this research (Asmussen et al. 2009; Goerzen et al. 2013). As a result, competence-creating *R&D* and HVA in the *manufacturing* set will be more probable if there are several scientific institutions in the subsidiary's local environment (Cantwell & Mudambi 2005; Chung & Alcácer 2002; Kuemmerle 1999).

Both the *supply* and the *marketing* activity set of the foreign-owned subsidiary are unlikely to benefit from this specific type of knowledge, because they lack the necessary capacity to detect and absorb this knowledge (Cohen & Levinthal 1990; Todorova & Durisin 2007). In other words, there is a poor fit between the characteristics of the activities and this location advantage (Jensen & Pedersen 2011). Based on the arguments above, the hypotheses are as follows:

Hypothesis 5a: The existence of scientific institutions will have a significant positive effect on the likelihood of high value added in the R&D/PD activity set, if compared to low value added.

Hypothesis 5b: The existence of scientific institutions will be significantly positively associated with the degree of value added in the manufacturing activity set.

Hypothesis 5c: The existence of scientific institutions will have no significant association with the degree of value added in the supply activity set.

Hypothesis 5d: The existence of scientific institutions will have no significant association with the degree of value added in the marketing activity set.

3.2.6 Availability of skilled employees

The availability of skilled employees is another essential element of a country's knowledge infrastructure (Furman et al. 2002; Kuemmerle 1999). This location factor is considered in Dunning's (2000) "L" sub-paradigm (Section 2.4.2), knowledge-enhancing theories (2.4.5), and agglomeration economies (2.4.6). It is seen as a strategic asset-seeking type of location factor (Rugman et al. 2011).

The availability of skilled employees is important since it may foster the generation of new knowledge and HVAAs in the foreign-owned subsidiary (Belderbos 2003; Ito & Wakasugi 2007). Given that HVAAs rely heavily on human capital, as discussed in Section 2.2.2.2 of Chapter 2, the abundance of skilled personnel is an important location factor (Bunyaratavej et al. 2008). As emphasised by Dimitratos et al. (2009), subsidiaries that carry out complex activities require high levels of related advanced skills. For example, skilled employees are better able to cope with complex production processes, manufacturing schedules, and highly developed technology (Campos & Kinoshita 2003; Carstensen & Toubal 2004). Skilled employees can also improve the efficiency of the manufacturing stage by becoming engaged in overseeing the production process, such as noting and fixing defects (Mataloni 2011). This line of argument should be valid in each of the four activity sets (e.g. Doh et al. 2009; Jensen & Pedersen 2012).

As mentioned above, absorptive capacity is critical to assimilate knowledge. Consequently, the strength of human capital specific to the local subsidiary determines the extent to which externally sourced knowledge can be exploited within the subsidiary to help create HVAAs in its value chain (Colakoglu et al. 2014; Kang & Snell 2009). Likewise, MNEs often want to transfer knowledge to their foreign affiliates operating in emerging economies (Delios & Beamish 2001). The transfer of knowledge from other parts of the MNE is difficult and requires skilled local personnel with high levels of absorptive capacity (Gupta & Govindarajan 2000; Ma et al. 2013; Minbaeva et al. 2003).

In addition to hiring skilled employees, the foreign subsidiary might benefit from accessing the expertise and amassed experience that resides in the local base of highly qualified engineers, scientists, software developers, after-sales staff, etc. (Boehe 2010; Kuemmerle 1997; Lewin et al. 2009). According to agglomeration economies logic, a high density of skilled employees is also likely to result in more chance meetings, which might lead to knowledge spillovers (Alcácer & Chung 2007).

It has been recognised that emerging markets possess a rapidly growing pool of skilled employees (Demirbag & Glaister 2010; Kedia & Mukherjee 2009; Zhao 2006), particularly in larger cities (Mataloni 2011; Zanatta & Queiroz 2007). This relative abundance of skilled employees has attracted knowledge-based activities by foreign multinationals (Franco et al. 2011; Hegde & Hicks 2008). All this results in the following hypotheses:

Hypothesis 6a: The availability of skilled employees will have a significant positive effect on the likelihood of high value added in the R&D/PD activity set, if compared to low value added.

Hypothesis 6b: The availability of skilled employees will be significantly positively associated with the degree of value added in the manufacturing activity set.

Hypothesis 6c: The availability of skilled employees will be significantly positively associated with the degree of value added in the supply activity set.

Hypothesis 6d: The availability of skilled employees will be significantly positively associated with the degree of value added in the marketing activity set.

3.2.7 Institutional environment

Based upon institutional theory (Section 2.4.7), it is expected that the institutional environment sets the political and legal rules under which the foreign-owned subsidiary may carry out its value-added activities in the host country. In particular, it influences the subsidiary's ability to interact and thus the relative transaction and coordination costs of its value-added activities (Dunning 1993; Mudambi & Navarra 2002).

A weak institutional environment affects the resource base of the foreign subsidiary, which is a key precursor of HVAAs (see Section 2.2.1 of Chapter 2) in two ways. First, the MNE might invest less or not invest at all in such an environment, or invest only in those projects that may yield higher and more immediate returns (Demirbag et al. 2007; Feinberg & Gupta 2009). However, the development of HVAAs requires valuable resources and is a long-term effort. Second, in a weak institutional environment, a subsidiary shifts resources from economic to political activity (Henisz 2000). Both of these actions impede the performance of HVAAs.

Furthermore, a weak institutional environment not only obstructs potential transactions, but also implies problems of establishing new business relationships (Bevan et al. 2004; Meyer 2001). However, inter-organisational relationships are essential in order to tap into external sources of knowledge that can then be used to develop HVAAs (see Section 2.3.4 of Chapter 2). Conversely, in a superior institutional environment location-specific advantages are more accessible to the foreign subsidiary (e.g. Ali et al. 2010; Dunning & Lundan 2008a; Gelbuda et al. 2008).

Another line of argument concerns institutional arbitrage, i.e. the exploitation of institutional differences across host countries of the MNE (Demirbag et al. 2011; Gaur & Lu 2007; Zhao 2006). As stated in Section 2.4.7, some locations may provide better opportunities for the exploitation and exploration of some types of firm-specific advantages (Dunning 1993; Rugman & Verbeke 2001). Accordingly, the MNE may assign certain HVAAs to the focal subsidiary because the institutional setting in which the subsidiary operates is most suitable for these activities.

There is a consensus in IB research that strong institutional environments positively affect the scope of all value-added activities, i.e. of varying degrees of value added (e.g. Delios & Henisz 2003; Flores & Aguilera 2007; Pajunen 2008; Slangen & Beugelsdijk 2010). Yet, it is expected that an advanced institutional environment is even more important for HVAAs, since they rely more on inimitable resources and knowledge. In order to protect their assets MNEs seek to carry out their HVAAs in host countries where the institutional environment enables the protection of knowledge assets.

Based on the theoretical argument that the host country may provide an institutional framework in which subsidiary activities can be executed as to minimise the transaction costs for the MNE as well as to develop new (or to transfer) knowledge, it is expected that the institutional environment has a positive effect on HVA in each of the four sets:

Hypothesis 7a: A favourable institutional environment will have a significant positive effect on the likelihood of high value added in the R&D/PD activity set, if compared to low value added.

Hypothesis 7b: A favourable institutional environment will be significantly positively associated with the degree of value added in the manufacturing activity set.

Hypothesis 7c: A favourable institutional environment will be significantly positively associated with the degree of value added in the supply activity set.

Hypothesis 7d: A favourable institutional environment will be significantly positively associated with the degree of value added in the marketing activity set.

3.3 Structural factors

This study concentrates on the analysis of location factors to investigate MNE subsidiaries' value-added activities in emerging economies. Nevertheless, as discussed in the literature review, other perspectives do exist to elucidate these activities, e.g. head-office assignment and subsidiary initiative (Birkinshaw et al. 1998). Moreover, the population of subsidiaries is heterogeneous, both within and across multinationals (Ghoshal & Bartlett 1990; Paterson & Brock 2002). Hence, identical location factors vary in terms of value for each individual subsidiary. The multinational literature thus proposes several factors that may be correlated with the set of activities carried out by the subsidiary. In this study, the 'structural' factors consist of subsidiary age, subsidiary size, export share, origin of the parent firm, industrial sector, subsidiary location (within Brazil), and the subsidiary's market scope.

The influence of subsidiary *age* has been acknowledged in numerous studies. For example, age has an effect on the number of value-added activities (Benito et al. 2003; Hogenbirk & van Kranenburg 2006). In this thesis, it is postulated that more established (i.e. older) subsidiaries will be more likely to conduct HVAAs. This is in accordance with the theoretical argument that the development of knowledge and capabilities and subsequently HVAAs in foreign-owned subsidiaries is the result of a cumulative, path-dependent process (Benito et al. 2003; Birkinshaw 1997; Frost et al. 2002).

It is important to include the *size of the subsidiary,* because it is an indicator of subsidiary resources (Penrose 1995; Yamin & Andersson 2011). Equally, larger subsidiaries are better equipped to create knowledge themselves than smaller units in the MNE (Foss & Pedersen 2002; Gupta & Govindarajan 2000). Resources and knowledge are essential antecedents of HVAAs (see Section 2.2.1 of Chapter 2). Thus, in line with prior research (e.g. Birkinshaw 1997; Frost 2001), it is predicted that HVAAs are more likely in larger units.

There are some arguments about the effect of the *export orientation* of foreign subsidiaries on the nature of value-added activities. For example, if manufacturing is geared predominantly toward exporting then the market size in the host country is of little relevance to the subsidiary (Demirbag et al. 2007; Enright 2009). At the same time, subsidiaries with a high export orientation are more likely to hold a regional or global product mandate (Roth & Morrison 1992). Those subsidiaries should conduct a fair share of HVAAs across the value chain. This line of argument is corroborated by empirical research on centres of excellence: centres of excellence (in research, development or manufacturing) are more export oriented than non-centres (Frost et al. 2002).

The MNE's *country of origin* has been recognised as having some effects – both direct and indirect – on the set of activities carried out by the subsidiary. First, it is generally accepted that MNEs from small countries, such as Belgium, Sweden, and Switzerland, demonstrate a higher propensity to internationalise their value-added activities than those from larger home countries (Filippaios et al. 2009; Petersen et al. 2008; Niosi & Godin 1999). In turn, they may be more likely to perform HVAAs in their subsidiaries abroad. Second, there is a large body of literature dealing with the fact that the country of origin has a big impact on the propensities of MNEs in terms of the choice of global strategies, control systems and organisational structures (Bartlett & Ghoshal 1989; Egelhoff 1984; Frost & Zhou 2005). Lastly, subsidiaries with parent firms that reside in rather close distance have been found to differ from subsidiaries whose headquarters are located at a further distance (Hogenbirk & van Kranenburg 2006; Taggart 1996).

The *industry-sector* of the subsidiary is another important structural factor (Dunning 2000). For example, industries differ in terms of their R&D intensity (Athukorala & Kohpaiboon 2010; Enright & Subramanian 2007), or in terms of the level of knowledge transfer among MNE units (Gupta & Govindarajan 2000). Birkinshaw and Hood (2000) found that foreign subsidiaries in leading edge industries are more likely to have autonomy and exhibit higher levels of inter-organisational relationships. It is expected in this thesis that units pertaining to sectors with higher technology intensity conduct more HVAAs.

Most host countries consist of many regions, which vary considerably from each other with regards to wage levels, infrastructure, technology bases or formal institutions, especially in emerging economies (Chan et al. 2010; Chang & Park 2005; Ma et al. 2013). Hence, the *subsidiary location* within a host country (e.g. São Paulo or Rio de Janeiro) might be more important than the choice of the host country. In fact, the significance of sub-national areas for MNE activities is increasing (e.g. Buckley & Ghauri 2004; Chidlow et al. 2009; Meyer & Nguyen 2005).

It has been claimed that the *market scope* of a subsidiary influences the scope and nature of value-added activities (Hogenbirk & van Kranenburg 2006). For example, subsidiaries that hold a world product mandate have the responsibility to develop, manufacture, and market a product-line globally (Crookell 1987). This type of subsidiary owns specialised resources and is thus likely to perform HVAAs (Birkinshaw 1996; Birkinshaw et al. 1998).

3.4 Summary

In this chapter, hypotheses between seven location factors and HVA within four individual activity sets of the foreign-owned subsidiary have been put forward. These hypotheses are summarised in Table 3.1 below. In Section 3.3, structural factors were discussed.

Through the integration of more than one location perspective, the conceptual framework in this thesis intends to stress that a wider set of location factors shapes the set of activities conducted by the foreign-owned subsidiary than previously considered in the large body of subsidiary literature.

Particular emphasis is put on the notion that the individual activity set, rather than the subsidiary as a whole, is the principal level of analysis. This is useful for two reasons. First, it allows for cases where the foreign-owned subsidiary undertakes one activity set with HVA and another with less value added. Second, it accounts for the fact that different activities are drawn by different facets of the local environment. The more disaggregated view taken in this thesis is hoped to advance thinking on subsidiary roles.

The hypothesised relationships between location factors and HVAAs in four separate activity sets will be empirically tested in the emerging market Brazil. The choice for Brazil as research context is justified in the next chapter.

Table 3.1: Summary of hypotheses

Hypothesis	**Predictor variable**	**High value added within activity set**	**Hypothesised relationship**
H1a	Cost advantages	R&D/PD	-
H1b		Manufacturing	0
H1c		Supply	-
H1d		Marketing	-
H2a	Market attractiveness	R&D/PD	0
H2b		Manufacturing	0
H2c		Supply	+
H2d		Marketing	+
H3a	Competitors in close proximity	R&D/PD	+
H3b		Manufacturing	+
H3c		Supply	+
H3d		Marketing	+
H4a	Supply conditions	R&D/PD	-
H4b		Manufacturing	+
H4c		Supply	+
H4d		Marketing	0
H5a	Existence of scientific institutions	R&D/PD	+
H5b		Manufacturing	+
H5c		Supply	0
H5d		Marketing	0
H6a	Availability of skilled employees	R&D/PD	+
H6b		Manufacturing	+
H6c		Supply	+
H6d		Marketing	+
H7a	Institutional environment	R&D/PD	+
H7b		Manufacturing	+
H7c		Supply	+
H7d		Marketing	+

4 RESEARCH CONTEXT

4.1 Introduction

The previous chapters reviewed relevant literature (Chapter 2) and put forward the hypotheses to be tested (Chapter 3). The aim of this chapter is to illustrate the context in which the empirical analysis of the thesis is carried out. Some of these observations will be useful when interpreting the results gained from the statistical analyses. This chapter is structured as follows. First, Section 4.2 defines emerging economies. Second, Section 4.3 provides an overview of the general FDI pattern in Brazil. Third, Section 4.4 compares Brazil with five other countries along relevant location factors based on publicly available data. Section 4.5 briefly outlines the evolution of FDI and foreign firms in Brazil.

4.2 Defining emerging economies

Despite the ubiquitous use of the term emerging economies (or markets), there is no universally approved definition. In the wider international business literature the definition by Hoskisson et al. (2000) is often quoted. Accordingly, emerging economies are low-income countries that have rapid economic growth and implement economic liberalisation policies. Other popular criteria are the openness to foreign investment (Khanna & Palepu 2010) or the degree of industrialisation, which is inherent in the term ‘newly-industrialising economies’ (Chan et al. 2008; Makino et al. 2002). However, many scholars stress that the most salient aspect of emerging economies is their weak market supporting institutional environment (Bevan et al. 2004; Gelbuda et al. 2008; Meyer 2004; Meyer et al. 2009). As Khanna and Palepu (2010:13) put it: *“what is emerging in emerging markets is not only their forecast potential or liberalizing investment environments but also the institutional infrastructure needed to support their nascent market-oriented economies.”*

This study lends itself to Hoskisson et al.'s (2000) definition of emerging economies. However, due to the amount of high- and medium-income countries that have been described as emerging in the literature, it ignores the criterion of income. There exist different country classifications put forward by international institutions, such as the World Bank Group, the International Monetary Fund (IMF), the United Nations (UN) or the Organization for Economic Cooperation and Development (OECD). An overview of these classifications can be found in Table 4.1 below. The IMF is the only institution that uses the term emerging economies explicitly and has published a list of countries that pertain to the group of emerging economies (IMF 2012: 3).[9] All these 25 countries have been referred to as emerging in the wider IB literature. This list includes Brazil.

Table 4.1: Country classification systems in selected institutions

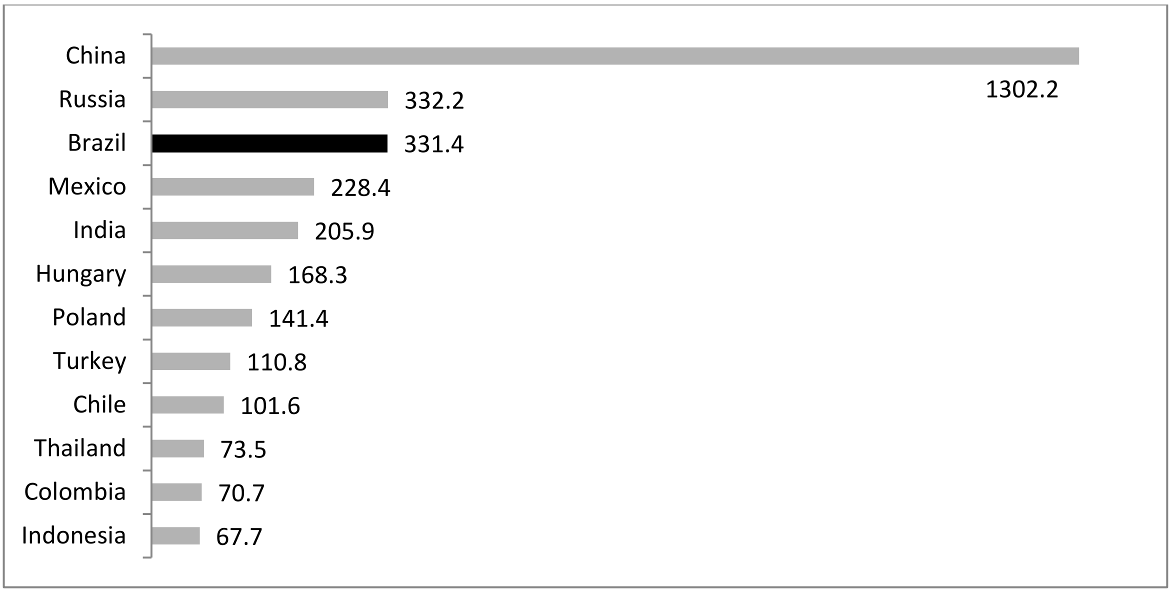
World Bank	IMF	United Nations	OECD
1. High income countries* 2. Upper middle income countries 3. Lowe middle income countries 4. Low income countries	1. Advanced economies 2. Emerging and developing economies*	1. Developed countries 2. Transition economies 3. Developing economies*	1. OECD countries 2. Non-OECD countries*

Source: Adapted from Kutschker and Schmid (2008).
*denotes the respective category for Brazil.

Notwithstanding the difficulties to define emerging economies, their heterogeneity means that they are an excellent testing ground for existing theories (Akbar & Samii 2005). Out of the large group of emerging economies, Brazil is one of the largest recipients of FDI in the past ten years (see Figure 4.1 below). China, Russia, Brazil and India have been predicted to dominate the shares of world GDP by 2050 (Kedia et al. 2006; Khanna & Palepu 2010). The other emerging economies in Latin America, Mexico ($US228bn), Chile ($US101bn), Argentina ($US53bn), Peru ($US46bn) and Venezuela ($US13bn) attracted less FDI than Brazil (World Bank 2013). Given its importance as destination for FDI within the group of emerging economies Brazil is an ideal setting for this thesis.

[9] These 25 emerging economies are: Argentina, Brazil, Bulgaria, Chile, China, Colombia, Estonia, Hungary, India, Indonesia, Latvia, Lithuania, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Romania, Russia, South Africa, Thailand, Turkey, Ukraine and Venezuela.

Figure 4.1: FDI flows to Top-12 emerging economies in $US billion, total (2002-2011)



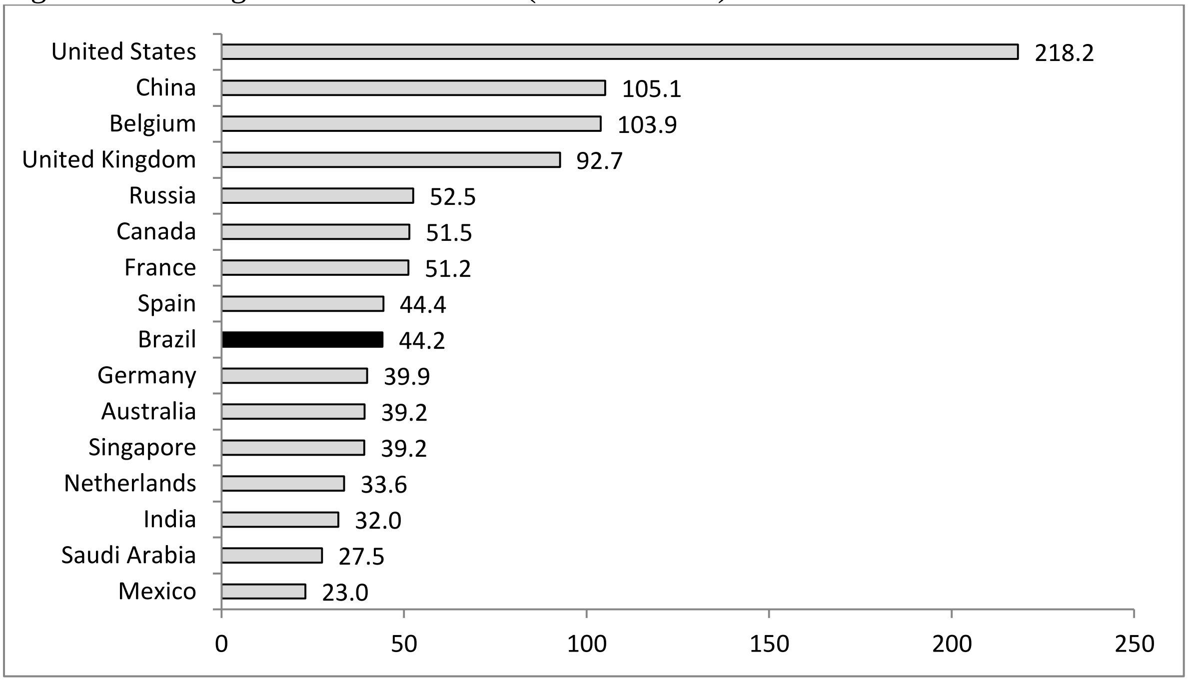
Source: Own compilation based on data extracted from World Bank 2013.

4.3 General overview of FDI in Brazil

4.3.1 FDI inflows and stock

Brazil has been a principal destination for FDI in recent years. This is a logical response to various neo-liberal policies, renewed macroeconomic stability, privatisation and changes in the legal status of FDI (e.g. Baer & Rangel 2001; Pinheiro et al. 2005; Silber 2011). As can be seen in Figure 4.2, Brazil was the ninth largest recipient of FDI in the world between 2007 and 2011, with average inflows of US$44 billion. Among the developing countries, it ranked third during this period, behind China and Russia. In 2011, Brazil attracted US$66 billion, making it the fourth highest recipient of FDI behind the United States, China and Belgium.

Figure 4.2: Average annual FDI inflows (in US$ billion) between 2007-11



Source: Own compilation, based on UNCTAD FDI database.

In the 20 years to 2011, the Brazilian share in world FDI inflows almost doubled. The peak of 2.9 per cent in the late 1990s was a result of substantial privatisation efforts, attracting many foreign firms (Baer 2008). Brazil has also been the main destination of FDI in South America, as can be seen in Table 4.2.

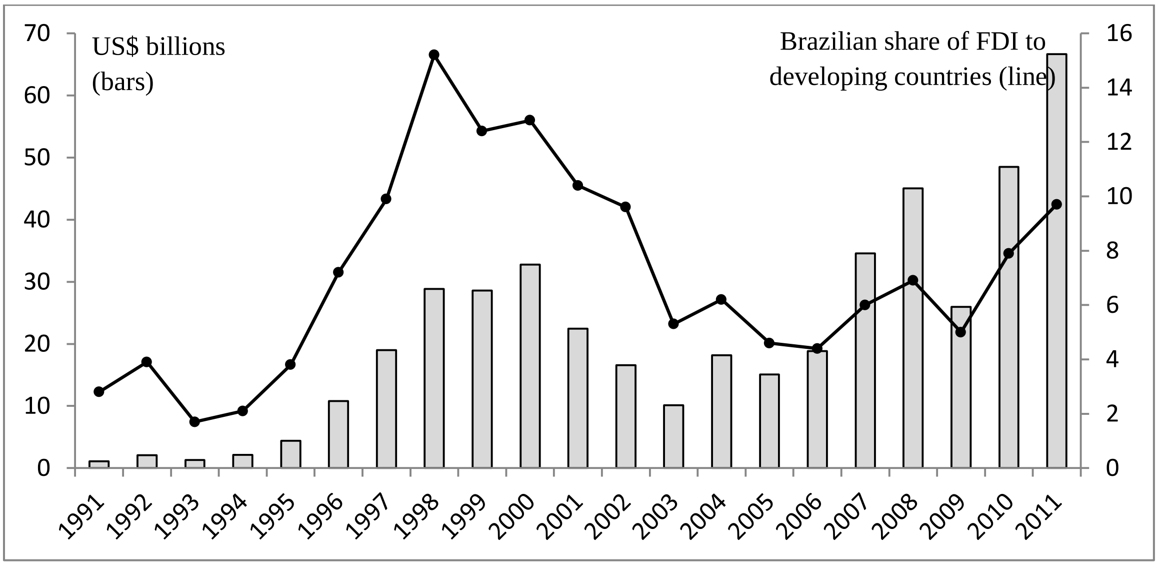
Table 4.2: Brazilian share on FDI flows

	1992-96	1997-2001	2002-06	2007-11
World	1.5	2.9	1.8	2.8
Developing countries	4.2	12.1	5.6	7.3
South America	24.4	49.4	45.0	51.0

Source: Author’s calculation, based on UNCTAD FDI database.

As shown in Figure 4.3, Brazil had a steady rise of FDI inflows after 2005 (except in 2009, a result of the financial crisis). In general, Brazil has remained a primary recipient country for foreign investment. The Brazilian share of inward FDI to developing countries almost amounted to ten per cent in 2011, and reached at least five per cent every year since 2007. The overall picture, therefore, is clear. Brazil’s prominence as location for FDI has grown continuously in the past two decades. Not surprisingly, most of the world’s largest MNEs have been found to have majority-owned subsidiaries in the country (Baer & Rangel 2001; Gonçalves 2005; UNCTAD 2005).

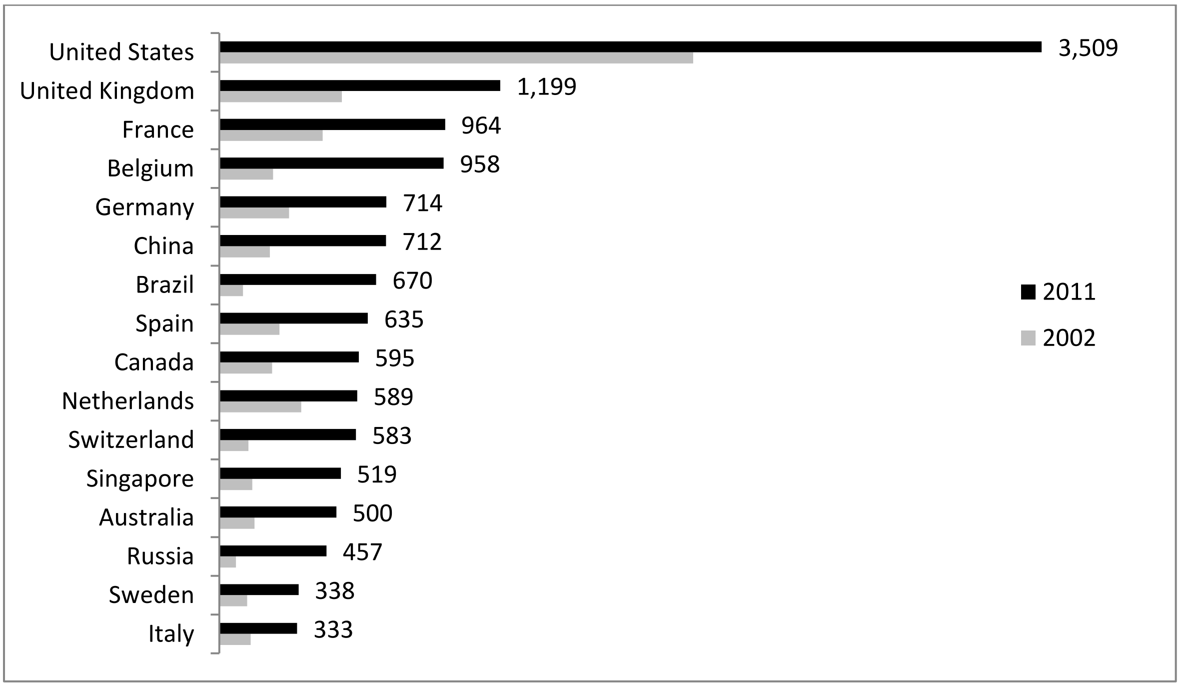
Figure 4.3: FDI inflows to Brazil and percentages of FDI flow to developing countries



Source: UNCTAD FDI database

This observation is also reflected in Brazil's stock of FDI. The stock of FDI, in nominal terms, increased from US$39 billion in 1991 to US$669 billion in 2011. In 2011, Brazil had the seventh highest FDI stock in the world (see Figure 4.4).

Figure 4.4: FDI stock (in $US billion) in 2011 and 2002



Source: UNCTAD FDI database.

To provide a more complete overview, the characteristics of FDI in Brazil are discussed in more detail in the next two sections. Section 4.3.2 discusses the geographical origin of FDI investments in Brazil and Section 4.3.3 provides information on the distribution of FDI in a number of sectors.

4.3.2 Composition of FDI stock in Brazil by country of origin

Table 4.3 provides an overview of the FDI stock in Brazil by country of origin in the past 20 years. In 2010, the countries with the biggest FDI stocks in Brazil were the Netherlands, the US, Spain, France, Japan, the UK, Mexico and Germany.[10]

Table 4.3: FDI stock and inflows in $US million by country of origin, 1995-2010

	FDI stock				FDI inflows			
	1995	2000	2005	2010	2006	2007	2008	2009
Americas								
Argentina	394	758	683	..	125	71	126	80
Canada	1819	2028	6690	13896	1286	818	1438	1371
Chile	238	228	638	7554	27	716	263	1027
Mexico	45	132	15051	19258	782	409	220	166
United States	10852	24500	27097	125412	4434	6039	6918	4878
Europe								
France	2031	6931	12238	30479	745	1214	2856	2136
Germany	5828	5110	7251	16130	848	1757	1037	2459
Netherlands	1546	11055	27012	169505	3495	8116	4624	5722
Spain	251	12253	17589	79494	1514	2164	3787	3415
United Kingdom	1863	1488	3491	19581	395	1004	641	1025
Asia-Pacific								
Australia	65	78	166	6030	117	494	1153	707
India	0	459	19	..	18	28	20	16
Japan	2659	2468	3261	27461	648	465	4099	1673
South Korea	4	180	296	..	110	265	631	132

Source: Own compilation, based on Banco Central do Brasil FDI census.

[10] The FDI stock from Luxemburg amounted to $US33.3bn in 2010. However, the country was disregarded because of its taxation regimes and the respective interest in establishing holding corporations in this location. In addition, British overseas territories (Bermuda, Cayman Islands and British Virgin Islands), which have considerable FDI stock in Brazil, were excluded for the same reason.

While the US is traditionally a key investor in many countries, Spain's stock of US$79.5 billion is unusual. In 2010, Spain accounted for 12 per cent of the total FDI stock in Brazil. The relatively high FDI stock from Spain, Mexico ($US19.3bn) and Portugal ($US7.4bn) can be attributed, in large part, to cultural similarities. Overall, the composition of the FDI stock by geographical origin is differentiated (Baer 2008).

Given that the focus of the present study is on the manufacturing sector (see Section 5.5 of Chapter 5), the next section provides more information on the composition of FDI stock in Brazil by sector.

4.3.3 Composition of FDI stock in Brazil by sector

To provide the study with additional focus, only foreign-owned establishments in the manufacturing sector are considered. There are four reasons for this. Firstly, the majority of theories used in this study emanate from research in the manufacturing sector. It may thus enhance the comparability with prior work on both theoretical and empirical grounds. Second, only manufacturing firms have the potential to cover the entire value chain. This offers a better basis to analyse the fit between different value-added activities and location factors. Third, manufacturing firms have a long tradition of FDI activity. This activity has also been notable in Brazil, mainly because of its import substitution era (1930-1980). Not surprisingly, foreign-owned firms today contribute substantially to value creation in this sector (Costa 2005; Gonçalves 2005; Kaufmann et al. 2006). Fourth, the manufacturing sector's share on Brazilian economic output is significant (see Table 4.4 below). The rationale for this focus is going to be discussed further in Chapter 5. This section offers an overview of FDI patterns into the manufacturing sector in Brazil.

Table 4.4: Stock of total foreign investment by sector (percentage)

	1976	1991	2005	2010
Mining & Agriculture	**3**	**3**	**4.50**	**16.86**
Manufacturing	**81**	**76**	**35.90**	**39.80**
Non-met. Minerals	3	2	0.08	0.74
Metal Products	8	8	0.55	1.17
Machinery	8	10	2.47	1.93
Electrical Machinery	9	8	1.83	0.71
Transport Equipment	13	13	6.28	4.65
Paper & Paper Products	3	2	0.77	1.33
Rubber	2	2	1.50	1.26
Chemicals & Pharmaceuticals	18	17	3.53	5.95
Textiles & Clothing	8	7	0.74	
Food & Beverages	7	6	7.95	10.29
Tobacco	2	1	[a]	2.14
Other Manufacturing			8.2	9.63
Public Utilities	**3**	**0**	**6.8**	**4.25**
Finance			**8.1**	**16.55**
Other	**13**	**21**	**44.7**	**22.54**
TOTAL	**100**	**100**	**100.00**	**100.00**

Source: Baer (2008) for 1976, 1991 and 2005, author for 2010 based on data from Banco Central do Brasil.
Note: a) For 2005, Tobacco is included in Food & Beverages.

In the early 1950s the government started to provide various types of incentive to foreign capital (Amann & Baer 2002). Subsequently, foreign investment shifted to the manufacturing sector. As shown in Table 4.4, the manufacturing sector in Brazil peaked in 1976, with 81 per cent of total foreign investment stock. Since then the distribution of foreign capital across sectors has changed markedly. In particular, two changes are noteworthy. First, the relative increase of mining and agriculture between 2005 and 2010. One explanation is that Brazil has shifted towards commodity-based exports, reflecting its comparative advantage (Silber 2011). Second, the relative fall of the manufacturing share between 1991 and 2005. However, in absolute terms, the foreign investment stock of manufacturing firms amplified notably, from $US28 billion in 1995 to $US263 billion fifteen years later (Banco Central do Brasil 2012).

Table 4.4 shows that within the manufacturing sector food and beverages, chemicals, transport equipment and machinery have a remarkable share. It is widely accepted that foreign-owned MNEs contribute heavily to value creation in the manufacturing sector (Baer 2008;

Costa 2005; Gonçalves 2005; Kaufmann et al. 2006). Silber (2011) suggests that a mixture of efficiency-seeking and market-seeking motives attracts FDI to this sector in Brazil. The large FDI stock in food and beverages has been linked with Brazil's large natural resource endowments (Grosse 2006).

As outlined above, the location factors of a host environment are related to the value-added activities of a foreign-owned subsidiary. The next section compares the location profile of Brazil with those of other countries.

4.4 Location factors in Brazil and other FDI host countries

This section compares Brazil with three other emerging countries (Chile, China and India) and two developed countries (Germany and the US) along several location factors based on secondary data from a variety of sources. Table 4.5 provides an overview of this data. It is ordered in line with the structure of Chapter 3. This data will be used when interpreting the results of the empirical analysis.

As regards *labour*, Brazil (US$11.7) displays lower compensation costs per hour than both Germany (US$47.4) and the US (US$35.5). Although no comparable data exists for Chile, China and India, it has been recognised that costs in Asian countries are usually lower than in Brazil (Boehe 2010). Its *infrastructure*, another aspect of basic location factors, is rather weak in comparison to other FDI host countries (Schwab 2012).

As indicated earlier, Brazil's *market size* represents a key location factor for foreign investment (Gouvea 2004; Kaufmann et al. 2006). With a population of 197 million inhabitants, Brazil is the sixth most populous country in the world. Both China and India exhibit larger populations but create lower GDP per capita with US$5,445 and US$1,489 respectively, if compared to Brazil (US$12,594). It should be noted that geographic regions vary markedly in terms of GDP per capita (Fally et al. 2010; Lall et al. 2004). Out of 144 countries, Brazil is ranked seventh in the global competitiveness report in terms of domestic market size and 25th for foreign market size (Schwab 2012).

Table 4.5: Cross-country comparison of location factors

	Brazil	**Chile**	**China**	**India**	**Germany**	**United States**
Labour costs (US$), 2011[a]	11.7	..	..	..	47.4	35.5
Population (million), 2011[b]	196.7	17.3	1,344.1	1,241.5	81.7	311.6
GDP ($US billion), 2011[b]	2,087.9	248.6	7,318.5	1,848.0	3,600.8	14,991.3
GDP per capita ($US), 2011[b]	12,594	14,394	5,445	1,489	44,060	48,112
Percentage of population that holds…						
upper secondary degree, 2010[c]	41	71	18	..	86	89
tertiary degree (in%), 2010[c]	11	27	5	..	27	42
Political risk index, 2013[d]	medium	low	high	high	low	low
Corruption perception index, 2012[e] (rank out of 180 countries)	69	20	80	94	13	19
Global competitiveness, 2012[f] (rank out of 144 countries)	48	33	29	59	6	7
Infrastructure	70	45	48	84	3	14
Domestic market size	7	42	2	3	5	1
Foreign market size	24	42	1	4	3	2
State of cluster development	28	27	23	29	8	12
Local supplier quantity	13	61	28	10	2	14
Local supplier quality	36	45	66	69	4	14
Qual. of scientific research inst.	46	42	44	39	10	6
Higher education and training	66	46	62	86	5	8
Institutions	79	28	50	70	16	41

Source: a) Bureau of Labor Statistics (2013), b) World Bank (2013), c) OECD (2012), d) Maplecroft (2013), e) Transparency International (2012), f) World Economic Forum (2012).

Regarding the prevalence of well-developed and deep *clusters* Brazil ranks 28th, very close to Chile (27th), China (23rd) and India (29th), whereas both Germany (8th) and the US (12th) are far better placed in the competitiveness report.

The quantity of local *suppliers* in Brazil is ranked 13th in the global competitiveness report, one place above the US, whereas the quality of local suppliers is ranked 36th. This is better than in the other emerging economies, but well below the ranks of the developed countries, i.e. Germany (4th) and the US (14th).

In terms of *labour quality*, the share of the population that holds an upper secondary degree in Brazil (41%) is low compared to Chile, Germany and the US. The picture is very similar for the share of tertiary degrees. Only 11% of Brazilians held this degree in 2010, while the corresponding figures were higher in Chile (27%), Germany (27%) and the US (42%), but lower in China (5%). In the competitiveness report, Brazil is ranked 66th in terms of higher education and training.

The *quality of scientific research institutions* in Brazil is ranked 46th in the global competitiveness report. Although the other emerging countries achieved higher positions, the gap is rather small. The US and Germany both rank in the top ten.

Brazil's *institutional environment* is ranked 79th in the global competitiveness report, in a similar zone as other emerging economy counterparts, such as India (70th) and China (50th), but distant from developed countries, e.g. Germany (16th). To remind the reader, the institutional environment is a big part of what is emerging in emerging economies (see Section 4.2 above, Khanna & Palepu 2010). To sum up, this specific set of economies has a weaker institutional infrastructure than developed countries. However, the emerging economies are a heterogeneous set of economies and societies (Akbar & Samii 2005). For Brazil, matters such as property rights protection, overlapping authority of regulatory agencies, recurrent alterations in legislation on private investments, political risk and corruption are well documented in both academic and public literature (Cheng et al. 2007; Kedia et al. 2006; World Bank 2013). Besides, with reference to the structural, bureaucratic and economic obstacles that impede foreign and domestic investment in the country, the generic term 'custo Brasil' (Brazil cost) is widely recognised (Kaufmann et al. 2006; Mendes 2009).

4.5 Evolution of FDI and foreign-owned firms in Brazil

In the late 19th century, most foreign investment targeted Brazil's infrastructure to integrate the country in the world economy as exporter of primary products (Baer 2008). There was also a high flow of immigrants with industry skills (Katz 2001). In the 1920s, foreign firms commenced to produce goods instead of exporting to the country. However, little FDI was directed at the manufacturing sector (Baer & Rangel 2001; Treviño & Mixon 2004).

In the 1950s, various foreign firms founded subsidiaries in Brazil and influenced the industrialisation process by import substitution (Katz 2001). In the era of import substitution, i.e. from the 1950s to the 1980s, the manufacturing sector was the principal destination of FDI. Most foreign MNEs pursued market-seeking motives, due to comfortable profits that could be earned in a highly protected market (Kaufmann et al. 2006). Hence, most foreign-owned subsidiaries were truncated miniature replicas. Such a subsidiary produces and sells locally established products of the MNE (Manolopoulos et al. 2005; Pearce 1999). Many foreign firms carried out engineering and supplier development programs (Costa 2005; Katz 2001). While this introduced technologies and organisational routines hitherto unknown to Brazil, this set of subsidiaries utilised less advanced technologies and less efficient machinery than other units of the MNE network in more advanced economies (Baer & Rangel 2001; Costa & Queiroz 2002).

In the early 1990s, Brazil adopted neo-liberal policies including liberalisation, deregulation and macroeconomic stabilisation (Gonçalves 2005; Grosse 2006). In addition, the common market of the South (Mercosur) was founded. These changes led to rapid economic growth and to a considerable growth of FDI inflows (Kaufmann et al. 2006; Roett 2010). In 2009, Brazil was host to more than 4,000 subsidiaries (UNCTAD 2010). Many of those affiliates rank among the largest firms in Brazil and contribute substantially to value added in manufacturing. Gonçalves (2005) showed that foreign-owned subsidiaries created 57 per cent of the revenues in this sector in 2000.

Costa (2005) argued that, since the beginning of the 21st century, foreign affiliates in Brazil have increasingly conducted R&D, though it is usually recognised that most of this R&D is of adaptive nature (Ariffin & Figueiredo 2004; Costa & Queiroz 2002). However, Consoni and Quadros (2006:91), in a case study about General Motors found that *"there has been a change on the quality, complexity and responsibility of the activities the Brazilian engineering has carried out"*. Hence, since neo-liberal policies led to more competition it is fair to assume that the degree of value added within activity sets undertaken by the foreign-owned subsidiary has gradually increased.

4.6 Summary

This chapter provided a general overview of FDI in the world and in Brazil. In particular, it has been shown that Brazil has been one of the most prominent destinations for FDI in the past decade. Moreover, the long tradition of FDI and the high level of foreign ownership in the Brazilian economy were outlined. Accordingly, value chain activities by foreign-owned subsidiaries may be more evolved in Brazil than in many other emerging economies. Thus, findings from the Brazilian experience may presage experiences in other locations. In sum, Brazil is an ideal research context for the analysis of HVAAs carried out by foreign-owned subsidiaries in emerging economies.

Having discussed the research setting, the following section outlines the research design of this thesis.

5 RESEARCH DESIGN

5.1 Introduction

The preceding chapters identified the knowledge gap in the literature, put forward testable hypotheses and described the context of this thesis. The purpose of this chapter is to justify the research design applied to examine the suggested associations between location factors and HVAAs in the foreign-owned subsidiary. In specific, the chapter is concerned with the consistency of research objectives, existing literature and the method applied.

The chapter is structured as follows. *Section 5.2* provides a brief overview of the epistemological debate and explains the philosophical position taken in this study. *Section 5.3* deals with the research design and strategy. The choice of the particular research method is then discussed in *Section 5.4*. *Section 5.5* and *Section 5.6* discuss the sampling and the data collection procedure, respectively. *Section 5.8* concerns the design of the questionnaire. Then, *Section 5.6* presents the complexity measures for value added, describes the indicators used for the location factors, and outlines the control variables. *Section 5.9* provides information on the response rate, non-response bias and characteristics of the foreign-owned subsidiary in Brazil. Then, in *Section 5.10,* the statistical instruments used in this thesis are discussed. *Section 5.11* summarises this chapter.

5.2 Philosophical background of the research

This section elaborates on the philosophical position of the present research. Most of the arguments among philosophers deal with *ontology* and *epistemology* (Easterby-Smith et al. 2012). Ontology is concerned with the nature of reality and existence, i.e. the basic assumptions made in terms of basic elements of reality (Parkhe 1993). Epistemology is about the best ways of investigating into the nature of the world (Blaikie 2007). The third element of research philosophy is methodology, which deals with the combination of techniques used to examine a specific reality (Lincoln et al. 2011; Robson 2011; Parkhe 1993).

In examining different philosophical schools, this thesis assumes the organising means of a spectrum, with positivism lying on one end and constructivism at the other. Positivism, in essence, refers to the idea that there is an objective reality out there, which can investigated by employing scientific methods (Baronov 2004; Kidd 2002). As such, the main approach of enquiry is theory testing based on deduction (Blaikie 2007). Using deduction allows for statistical testing and generalisation (Lincoln et al. 2011). Data collection instruments that are typically associated with positivism are experiments and surveys (Easterby-Smith et al. 2012). Finally, during the data collection process the researcher is considered objective and detached from the phenomenon under scrutiny (Crotty 1998). *Constructivism,* at the other end of the spectrum, assumes reality to be subjective, socially constructed and multiple, i.e. each social being has its own reality (Baronov 2004). In other words, each individual constructs its own reality and each of these realities is equally valued. At the epistemological level, the individual understanding of each reality is emphasised, hence rejecting the notion of objectivity (Easterby-Smith et al. 2012; Robson 2011). Consequently, under the constructivist paradigm, the idea of the objective and detached researcher is rejected. Commonly used methods include grounded theory, ethnography and case studies (see Table 5.1), all of which are associated with inductive reasoning.

This study lends itself to *realism*. As stressed by Sullivan and Daniels (2005), the positivist school is still prevalent in the international business literature. However, one major shortcoming of this stance renders it less suitable for this research; unobservable variables that cannot be investigated through scientific methods (Godfrey & Hill 1995). Concerning this study, institutions and value added are examples of this type of variable. These variables are difficult to observe directly, inherently excluding them from the assumptions made by strong positivism. To this end, it has been suggested that a realist position would be more suitable (Mir & Watson 2000). Realism can be placed somewhere between the ends of the philosophy spectrum mentioned above (Ackroyd & Fleetwood 2000). Easterby-Smith et al.

(2012) stress that the key feature of realism is the notion of a 'structured ontology', which means differentiating between three levels: the *empirical* level, which entails the experiences and perceptions that individuals have; the *actual* domain, which comprises events and actions that happen whether or not they are observed or detected; and the *real* level, which entails causal powers and mechanisms that cannot be detected directly, but which have real consequences for individuals and society. Summarising the above, realism can be seen as a less strong version of positivism. As reality cannot be accessed directly, the present thesis needs to infer the nature of this reality indirectly, through a large-scale survey of foreign-owned subsidiaries.

More recently, an evolving point of view has maintained that research methods ought to be guided by substantive research questions, at least to the same degree as by epistemological and methodological considerations (Kelle 2006). This thesis is heavily influenced by this pragmatic line of thought. The next section discusses methodological considerations.

5.3 Research design and research strategy

Following the discussion of the epistemological stance adopted in this research, the current section reconciles the research design and strategy with this stance in order to add to knowledge in the field of international business, as well as to address the research questions put forward in this study. Thus, this section describes the fit between the research aims and the methodological position (Easterby-Smith et al. 2012). The research question, or "research problem" as Van de Ven (2007) terms it, determines the research design.

The research design can be either inductive, developing theory as a result of data analysis, or deductive, developing hypotheses and crafting a research strategy to test it. There is also the option to use a mixed methods design that combines induction and deduction (Saunders et al. 2012). Deduction can be seen as a highly structured approach accentuating strongly the necessity to generalise conclusions. Somekh and Lewin (2011) considered it a process of using an already established theory as the basis for formulating research hypotheses that are tested empirically. In fact, as stated by Bordens and Abbott (2008), the key attribute of the deductive logic is the ability to formulate precise and testable hypotheses. In reviewing location theories and deriving hypotheses from them, this study takes a deductive research approach. This approach allows analysing associations between location factors and value-added activities of the foreign-owned subsidiary. Though the choice for the deductive logic was guided primarily by the research questions of this study, it is obvious that both realism and positivism contain many attributes of deduction.

Induction, on the other hand, provides the researcher with the option to account for meanings participants attach to events. When following this approach, the researcher is actively involved within the research process (Blaikie 2007; Saunders et al. 2012). Since the pattern between complexity and HVAAs is still in its infancy, induction could have represented a useful addition to the deductive approach. In particular, it seemed suitable to better identify proxies or constituents of constructs for HVA within separate activity sets. However, given time constraints it was decided to focus upon hypothesis testing and thus upon a deductive research design.

There is often a cursory comparison between *quantitative* and *qualitative* research designs, which is summarised in Table 5.1 below. Quantitative research is often associated with the positivist paradigm. This design is most helpful when there is a need to determine specific factors, or patterns and causal relations between factors, which cannot be accessed directly (Easterby-Smith et al. 2012). Qualitative research designs, however, explore topics in more depth and detail and are most suitable when the goal is to explore a topic or idea in more detail. As such, qualitative research primarily addresses ‘how’ or ‘why’ types of questions, while a quantitative methodology offers an answer to the ‘what’, or ‘how many’, questions (Van de Ven 2007; Yin 2009). As outlined in Section 1.4 of Chapter 1, the overall research question of this research could be put as *what location factors determine HVAAs in foreign subsidiaries*? Thus, a quantitative research design seems most suitable for this study. Likewise, the quantitative approach is closely linked with deduction (Creswell 2009; Singleton Jr. & Straits 2005; see Table 5.1 below).

Table 5.1: Characteristics of quantitative and qualitative research methods

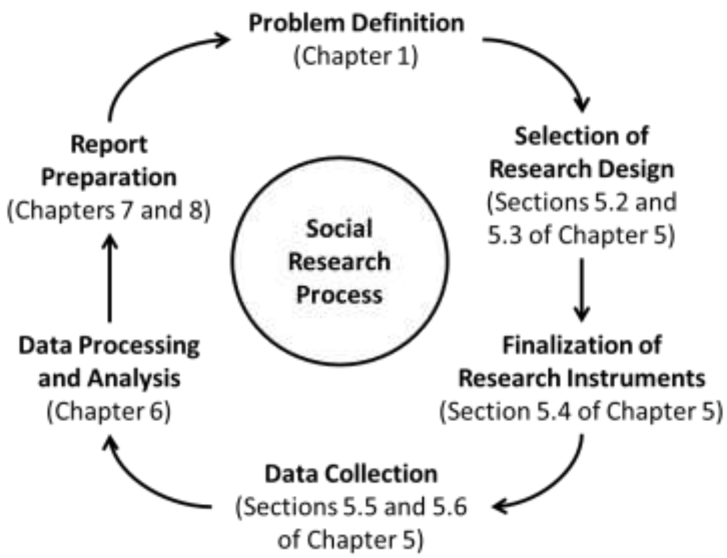
Criteria	*Quantitative methods*	*Qualitative methods*
Epistemology	Positivism	Constructivism
Common research methods	Experiment Quasi-experiment Survey	Action research Archival research Ethnography Narrative methods Case study Grounded theory
Key characteristics	Primarily deductive process used to test pre-specified concepts, constructs, and hypotheses that make up a theory	Primarily inductive process used to formulate theory
	More objective: provides observed effects (interpreted by researcher) of a problem or condition	More subjective: describes a problem or condition from the standpoint of those experiencing it
	Based on numbers	Based on text
	Less in-depth but more breadth of information across a large number of cases	More in-depth information on a few cases
	Closed-end questions	Unstructured or semi-structured response options
	Statistical tests are used for analysis	No statistical tests
	More generalisable	Less generalisable

Source: Adapted from Creswell (2009), Easterby-Smith et al. (2012), Kelle (2006), Liouka (2007), Van de Ven (2007) and Yin (2009).

The quantitative and explanatory nature of this study means that a set of predictor variables is expected to explain statistically variations in some outcome, or dependent, variable. This thesis looks at several location factors (predictor variables) that are expected to have a probabilistic causal effect on various dependent variables that proxy the degree of value added in individual activity sets of the foreign subsidiary. This research design should also reduce the endogeneity problem, through the wary choice of predictor and outcome variables. For example, it is less likely that complexity within activity sets will cause changes in the local environment of the subsidiary, especially in terms of macro-level factors such as the institutional framework of Brazil. As a result, a large number of foreign-owned subsidiaries are examined in a cross-sectional study. In using a cross-sectional design multiple factors may be measured simultaneously and can therefore be used to analyse relationships between the variables of interest (Easterby-Smith et al. 2012). As mentioned above, established location theories and frameworks guided the formulation of hypotheses, meaning that deduction is most appropriate. To this end, it was decided to follow Singh's (2007) model of the process of social research (see Figure 5.1 below).

In addition to the arguments above, from the literature review in Chapter 2 it has become apparent that most previous empirical research in the subsidiary literature has relied upon a deductive research design (e.g. Andersson et al. 2005; Bouquet & Birkinshaw 2008; Moore 2001; Schmid & Schurig 2003). The principal reason for its dominance is that the field has a long tradition and a large body of knowledge, making it less prone to induction.

Figure 5.1: The social research process



Source: Adapted from Singh (2007).

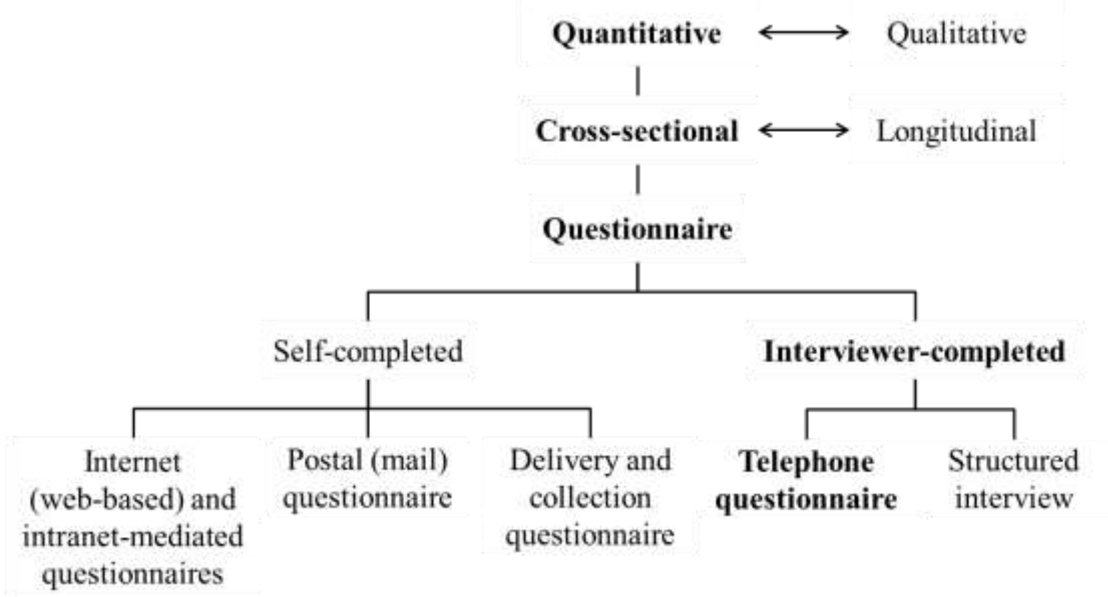
The particular research method for testing the hypotheses of the present thesis is discussed in the next section.

5.4 Research method and instrument

This section follows from the discussion of the research design and strategy. The most suitable approach to address the research questions of this thesis is a large-scale survey. Based on the decision-making process suggested by Saunders et al. (2012), which is visualised in Figure 5.2, this section discusses the chosen research instrument.

As discussed earlier, testable hypotheses were derived from relevant location theories, thus following the deductive research logic. This facilitated the development of questions that can be designed in a closed-ended fashion. Close-ended questions, however, render investigations conducted through semi-structured interviews or observations less suitable (Blaikie 2009; De Vaus 2001). At the same time, quantitative data carries the advantage of allowing for the generalisation of research findings by means of statistical analysis. Also, this data is appropriate to capture variances in foreign subsidiaries, e.g. sector, size, age and country of origin. As indicated in the literature review, most recent empirical research on subsidiaries has applied a survey method (see Table 2.3 in Section 2.3.2 of Chapter 2). Several studies have utilised interviews or mixed methods (e.g. Andersson & Forsgren 1994; Athreye et al. 2014; Bartlett 1986; Hansen & Løvås 2004). However, these studies focus on a small number of larger MNEs. Surveys, on the other hand, facilitate the inclusion of a wide range of units, without being restricted by certain MNE characteristics.

Figure 5.2: Decision-making process for research instrument



Source: Adapted from Saunders et al. (2012)
Note: Bold denotes the path taken in this research

As indicated above, this research is cross-sectional in nature. There are three main reasons. First, data for longitudinal studies at the subsidiary level are scarce. Second, the cross-sectional design, in line with the research objectives, facilitates the measurement of several factors simultaneously as to analyse relationships between the variables. Third, given that a large number of studies has relied on this particular design, the use of this approach should help improve the comparability of this study with other work in the field.

The decision to analyse statistically the relationships between location factors and HVAAs in individual activity sets of foreign subsidiaries, and to develop possible conclusions with regards to the generalisability of the resulting findings, dictated that a large enough sample of foreign subsidiaries had to be attained. However, this means that face-to-face interviews and self-delivery and collection questionnaires are less suitable, particularly given the wide dispersion of the target population. In such cases, and if resources (i.e. financial funds and time) are rather limited, postal surveys are seen as most suitable (Blaikie 2009; Oppenheim 2000). In recent years, web-based surveys have experienced a growing popularity in social science studies (Dillman, Phelps, et al. 2009; Gosling et al. 2004). However, given the lack of email addresses of subsidiary managers or even of some subsidiaries as such, this option had to be disregarded. In addition, web-based surveys have been found to yield even lower response rates than mail surveys (Crawford et al. 2001; Schuldt & Totten 1994; Shannon & Bradshaw 2002; Yun & Trumbo 2000). Table 5.2 below summarises the advantages and disadvantages of using the remaining option, i.e. telephone survey, in comparison to postal surveys, face-to-face interviews and web-based surveys.

The telephone survey method was preferred as most suitable for addressing the purpose of this thesis for the following reasons. First, the response rate is relatively higher in the telephone survey than in self-completed questionnaires (Bourque & Fielder 2003; Schaefer & Dillman 1998). In the context of Brazil, postal surveys are considered ineffective due to the unreliable mail service in the country (Kumar 2009). Second, telephone interviews are seen as more suitable to self-administered means for more complex questions (Miller & Salkind 2002). Third, the use of telephone interviews reduces order effects as the interviewer determines the sequence and questions presented to each of the respondents (Bourque & Fielder 2003; De Leeuw 1992). This should also minimise the length of the interview and improve questionnaire effectiveness as the interviewers can ignore questions that are not relevant to a specific subsidiary. Fourth, telephone interviews often lead to more complete information since respondents at times do not fill in questionnaires completely or accurately. Fifth, telephone interviews are relatively better in ensuring that the targeted person has responded to the survey. This is essential given the key informant approach adopted in this research (see Section 5.5 of this Chapter).

Furthermore, to identify the most promising method as regards the response rate for survey research in Brazil, feedback was also sought from various subsidiary managers, academics and employees of the German-Brazilian Chamber of Commerce who had spent significant time in São Paulo. The insights from this process confirmed the decision to embark on telephone interviews. This makes the study a special case as telephone interviews are the least frequently used technique in international business research (Li & Cavusgil 1995; Yang et al. 2006). The application of this technique in this study is discussed in Section 5.6 below.

Despite all the benefits of telephone interviews, there are also several disadvantages. These disadvantages were sought to be minimised in this study through the following steps. First, the potential issue of a smaller sample size, compared to postal and electronic surveys, was remedied by employing a team of six telephone interviewers, whose experience meant that the need for training and supervision were not a strong disadvantage (Sheehan & McMillan 1999). Second, as respondents often struggle to understand questions on the telephone only pre-tested measures from previous research were used. Third, as outlined by Saunders et al. (2012), interviewers may occasionally invent responses. To reveal any invented interview all cases were verified along the 'sector variable' (by comparisons with secondary data).

The steps described above follow from the decision to undertake quantitative research (see Section 5.3 above). However, if a different research design and strategy had been chosen, it would have been useful to rely upon alternative methods. In a mixed-method approach, for example, qualitative data collection (e.g. semi-structured interviews) could have come first, before conducting a large survey. This could have helped detecting proxies or constituents of HVA in individual activity sets (Creswell 2009; Dillman et al. 2009). However, due to a lack of resources, i.e. time and money, this idea had to be rejected.

Table 5.2: Comparisons between other survey modes and the telephone survey

	Postal (mail) questionnaire	*Internet (web-based)questionnaire*	*Face-to-face interview*
Administrative	Less costly to implement, compared with telephone survey	More cost-effective than telephone survey	More costly to implement, compared with telephone survey
Response rates	Lower response rates, compared with telephone surveys	Lower response rates, compared with telephone surveys	Higher response rates, compared with telephone survey
Sample size	Larger, compared to telephone survey, but depends on number of interviewers	Larger, compared to telephone survey, but depends on number of interviewers	Smaller, compared to telephone survey, but depends on number of interviewers
Geographic coverage	Less problematic in coverage, compared with telephone survey	Likely more problematic in coverage, compared with telephone survey	Likely more problematic in coverage, compared with telephone survey
Length of questionnaire	Less problematic, compared with telephone survey (4-8 A4 pages)	Less problematic, compared with telephone surveys	Less problematic, compared with telephone surveys
Suitable types of questions	Likely more closed questions, less complex questions, compared with telephone surveys	Likely more closed questions, less complex questions, compared with telephone surveys	More appropriate for more complex and sensitive questions, compared with telephone survey
Sequencing of questions	Likely more problematic, compared with telephone survey	Likely more problematic, compared with telephone survey, but fine if it uses IT	Similar level, compared with telephone survey. Complicated sequencing fine
Social desirability	Less problematic, compared with telephone survey	Less problematic, compared with telephone survey	Likely more problematic, compared with telephone survey
Confidence that right person has responded	Lower, compared with telephone surveys	Lower, compared to telephone survey but less problematic if using email	Higher, compared to telephone survey

Source: The author based on relevant literature.

5.5 Sampling decisions

This section discusses sampling decisions for this study. It includes the unit of analysis, the sampling frame and sampling process, the reasons for the focus on the manufacturing sector and the rationale for espousing a key informant approach.

Unit of analysis

In line with the subsidiary research stream (Birkinshaw 2000; Dimitratos et al. 2009), it is argued that the subsidiary is the main entity that has to be analysed when examining MNE value-added activities in a host country. There are three major reasons to use the subsidiary as unit of analysis. First, this study includes questions concerning the number of customers, suppliers or active part numbers of items. This kind of knowledge is very detailed and unlikely to be available at the headquarters or divisional level (Harzing 1999). Also, empirical research indicates that local managers are better in assessing the characteristics and capabilities of their subsidiaries (Denrell et al. 2004). Second, the empirically observed effect of location factors may vary, depending on whether they are assessed by managers from the parent firm or the subsidiary. Even though the initial location decision is made at the parent firm, subsidiary managers, embedded in the host country (specifically in the case of acquired affiliates), might have a better understanding of the local context in practice (Asmussen et al. 2009; Foss & Pedersen 2002). Third, not all subsidiaries report to the corporate headquarters, but may be reporting solely to a regional centre or the divisional level (Andersson et al. 2007). Fourth, as the field generally struggles to accomplish reasonably high response rates matching up subsidiaries with their headquarters was deemed unfeasible.

Sampling frame and sampling procedure

The purpose of sampling is to construct a representative subset of the entire population (De Vaus 2001; Easterby-Smith et al. 2012). This facilitates the process of deriving generalisations from the sample to the overall population. The sampling frame comprises of the units from which the sample is going to be drawn (Singleton Jr. & Straits 2005). In this research, it is based on all identified foreign-owned manufacturing subsidiaries in Brazil.

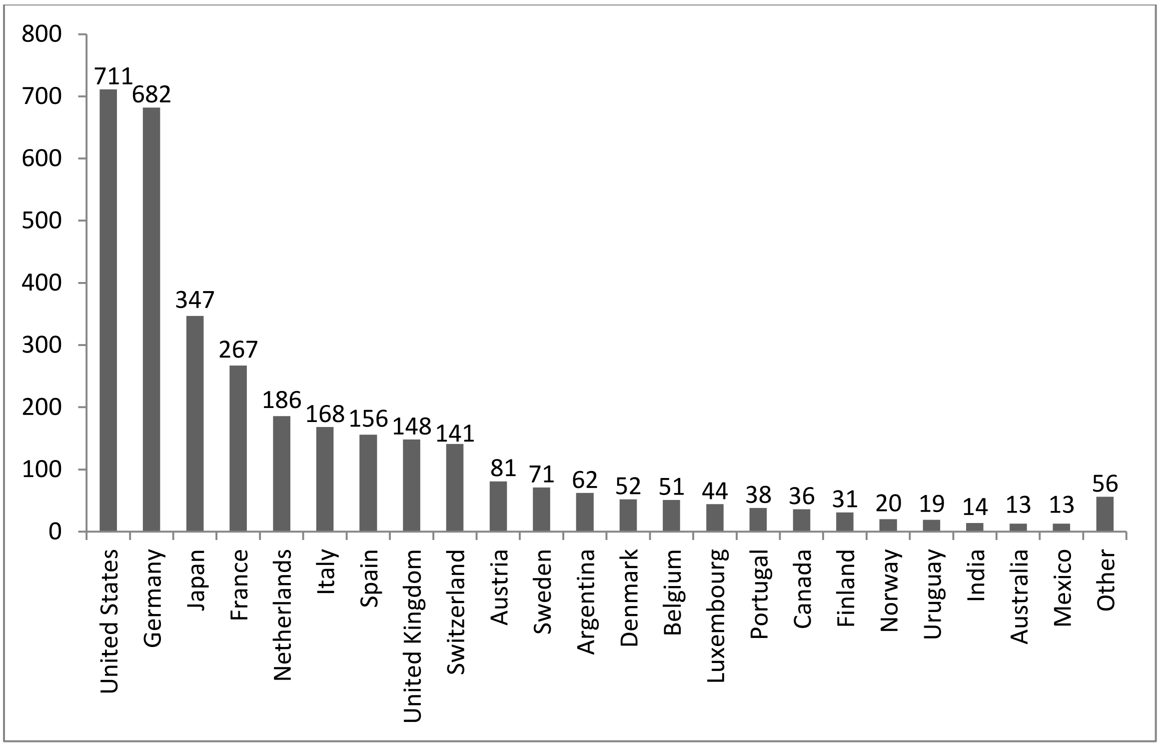
Since no suitable source was publicly available that included foreign-owned manufacturing subsidiaries in Brazil, the author amassed a database during a 12-week period (June until August 2011). This database was created from different sources, specifically the Dun & Bradstreet directory *who owns whom?* for North and South America (Dun & Bradstreet 2010)[11] and member lists of a wide range of Chambers of Commerce. Moreover, the author visited the website of all the firms identified through this process in order to find all organisational units controlled by these firms. This search led to a database of 4,174 foreign-owned (greater than 50% equity) manufacturing subsidiaries in Brazil. This equity figure was chosen because controlling firms that hold at least 50% equity can be expected to have both long-term interest and strategic autonomy in the subsidiary. To this end, the study's focus on majority-owned or wholly owned subsidiaries follows the prevalent stance in the subsidiary literature. However, firms controlled by foreign holding companies were disregarded. Out of the 4,174 identified subsidiaries, those without required data (i.e. country of origin, subsidiary location in Brazil and telephone number) were deleted from the original database. This procedure reduced the sampling frame to 3,407 foreign-owned subsidiaries from 37 different home countries. To the best of the author's knowledge, the bespoke database has the largest and most comprehensive, current data of foreign subsidiaries in Brazil.

As presented in Figure 5.3, the population of foreign-owned subsidiaries in Brazil is rather heterogeneous. The four most frequent countries of origin are the US, Germany, Japan and France. It should be noted that many studies restrict their analysis to subsidiaries with these geographical origins (e.g. McDonald et al. 2008; Papanastassiou & Pearce 1999; Taggart & Hood 1999). This is mainly based on two considerations. First, these countries often are

[11] The Dun & Bradstreet directory has often been used by international business scholars (e.g. Benito et al. 2003; Cantwell & Mudambi 2005; Galan et al. 2007; Harzing & Noorderhaven 2006; Le Bas & Sierra 2002; Mudambi & Navarra 2004; Tavares & Young 2006; Venaik & Midgley 2005).

the most important source of FDI in a particular country. Second, contact details and other information are usually easier obtainable. In addition, prior studies have often relied upon lists provided by single third parties that frequently seem to be rather outdated (Yang et al. 2006). The database of this research, on the other hand, can be considered rather comprehensive and is thus predestined for survey research. In particular, it avoids problems with non-coverage bias, which can arise when using incomplete lists, or limiting the variety of home countries (Dillman 1991; Singleton & Straits 2005). In addition, the present database used in this thesis may have a positive effect on the response rate as it also includes firms that are not over-researched, i.e. those firms that are not listed on the Fortune 500.

Figure 5.3: Number of foreign-owned subsidiaries per country of origin



Source: Created by the author.
Note: The category 'Other' contains 14 countries, all of which have less than 10 firms in Brazil.

As with all statistical instruments, statistical power increases with sample size (Tabachnick & Fidell 2006). With regards to the calculation of the required sample size for the present study, the population of 4,174 foreign-owned subsidiaries, a ±6% precision level (or margin of error) and a 95% confidence level demanded a sample size of at least 260 cases. As suggested by Israel (2009), sample size was calculated based on the following formula:

$n = \frac{N}{1+N(e)^2}$, where n is the sample size, N is the population size and e is the desired level of precision. A 95% confidence level and variability in the population of 50% are assumed. Assuming a conservative overall response rate of 15% for this research would signify that a minimum of 1,733 subsidiaries needed to be targeted. Another 10% was added to the target size to compensate for potential non-response (Israel 2009). Therefore, 1,907 foreign-owned affiliates were randomly selected from the sampling frame. The respective selection procedure is discussed in the next paragraph.

As shown in Figure 5.3, the population of foreign-owned subsidiaries in Brazil is different for each country of origin. Since the present study intends to identify also potential country of origin effects, it was deemed appropriate to use proportionate stratified sampling. This method provides an increased chance of accuracy by ensuring that all countries of origin of the population are represented in the sample in the same proportions as they are in the population (Burns & Burns 2008; Levy & Lemeshow 2009). As various strata are considerably small, disproportionate sampling was considered. However, the main line of enquiry is not to investigate variations between firms from different HQ countries of origin. In addition, unless more countries are included in the 'other' category, the minor subgroups would not comply with the guideline of minimum sample sizes of 20 to 50 elements (Sudman 1976). The required sample size of 1,907 cases means that 56% of the 3,407 cases in the database need to be targeted. Thus, 56% cases of each *country of origin* subgroup were selected.

Sector

In order to provide the thesis with additional focus, only foreign-owned subsidiaries in the manufacturing sector were considered. This approach has three main advantages. Firstly, it facilitates comparisons of the present study with previous research since the manufacturing sector remains the most widely examined sector in international business research (Yang et al. 2006). This is justified by the sector's key role in providing high levels of employment and the fact that many service industry firms depend on the manufacturing sector (Dunning 1996; Young et al. 1988). Secondly, solely manufacturing firms may cover the entire value chain and thus provide a better ground to analyse the relationships of different value-added activities and location factors. Similarly, the "servitization" of manufacturing firms, i.e. the shift from selling goods to selling integrated goods and services that deliver value (Baines et al. 2009), inherently means that service activities are included. Thirdly, most of the location theories and variables that form the basis for statistical analysis in this study emerged from manufacturing sector observations. Fourthly, most FDI in Brazil is undertaken in this sector (see Sector 4.3.3 of Chapter 4).

Key informant approach

The team of interviewers intended to deliver the questionnaire to the managing director of each selected subsidiary. Managing directors are key informants who are expected to be knowledgeable given their position in the firm (Bagozzi et al. 1991; Phillips 1981). Within the subsidiary literature, the key informant approach is well-established, and generally the managing director is contacted (Andersson et al. 2014; Birkinshaw et al. 1998; Holm et al. 2003; Keupp et al. 2011; Taggart & Hood 1999). The practice of targeting only one individual subject at one point in time, however, means that the obtained survey data are susceptible to common method bias (Chang et al. 2010; Lindell & Whitney 2001). This is further discussed in Section 6.2.4.1 of Chapter 6.

5.6 The data collection process

In order to improve the effectiveness of the data collection process it was deemed useful to travel to Brazil. The author was invited as a visiting fellow to the Insper Instituto de Ensino e Pesquisa (São Paulo), which provided an office and academic support (e.g. panel reviews of questionnaire, translation of questionnaire, etc.). In the course of this fieldtrip, the author undertook enormous efforts to augment data collection. Firstly, all Chambers of Commerce operating in Brazil were contacted to update and amplify the bespoke database on foreign-owned affiliates (see Section 5.5). Secondly, the leading European Chambers of Commerce were called in order to identify the most suitable way of administering a large-scale survey in Brazil. Third, the author called various foreign-owned subsidiaries residing in São Paulo to arrange a meeting with the managing director in order to pilot-test the questionnaire (see Section 5.7 below). Fourthly, several organisations (i.e., market research firms, universities and Chambers of Commerce) were contacted as to recruit interviewers who could carry out the telephone interviews (see next paragraph). Finally, the author briefed and supervised all members of the interview team.

The success of telephone surveys is in large part based on interviewer quality (Bourque & Fielder 2003; Chen & Huang 2006). For example, prior experience has been shown to have an impact on response rates (Durrant et al. 2010; Groves & Fultz 1985). Both response rate and reliability of the study were expected to be higher if data collection was carried out by an organisation located in the underlying research setting. It was thus decided to assign the task of interviewing to an experienced research group at the *Centro de Estudos e Pesquisa em Administraçao (CEPA)* of the *Universidade Federal de Rio Grande do Sul (UFRGS)* in Porto Alegre, Brazil.

The team of interviewers contacted all sampled subsidiaries six or seven times by phone at regular intervals during the 4-week data collection period (March and April 2012). At the beginning of each phone call, the purpose of the study was clarified. The interviewers then asked to be put through to the managing director of the subsidiary. If the person in question was not available at the time, the interviewer offered to call back later. In case a subsidiary indicated the willingness to participate, but no arrangement for an interview with the managing director could be agreed, the next-best key informant was interviewed. This group of respondents included controllers, financial managers, marketing managers and production managers, all of which pertained to the top management level.

At the start of the actual interview both the anonymity of the respondent and the confidentiality of the data collected was guaranteed. Moreover, the team of interviewers emphasised that all answers related to the establishment that had been contacted. This emphasis was important since the sample included several subsidiaries (or establishments) that pertained to the same MNE.

Substantial efforts were undertaken to ensure that the data were as accurate as possible. For example, the interviewers explained questions or called the respondent a second time when responses were left blank or needed to be revised. For example, somewhat expected, question 2.1 turned out to be rather difficult, as the activities did not always amount to 100. In cases where a manager was unable to answer some questions, another senior manager was contacted in order to complete the questionnaire.

The data were registered in the survey database by the interviewers themselves. The length of the interviews varied from 20 minutes to 30 minutes.

Response rate

A significant challenge in survey research is to incorporate steps to increase response rates. Despite a growing interest in the topic, there is a general consensus that non-response rates have been increasing over time (Couper & De Leeuw 2003; Jobber et al. 1991; Harzing & Noorderhaven 2006). Low levels of response rate are especially pronounced if members of senior management are targeted (Baruch 1999; Cycyota & Harrison 2006).

Several steps were carried out as to increase the response rate. First, the interviewers called each subsidiary six to seven times (Jobber & Saunders 1993; Yammarino et al. 1991), even though this required a large amount of time and effort. Follow-up phone calls have been used in previous IB research (e.g. Dimitratos et al. 2009; Nell et al. 2011) and proved to be highly successful in this study. As outlined above, in case a subsidiary agreed to participate but the managing director was unavailable another member of the senior management team was interviewed. Second, confidentiality was assured to managers (Dillman 1991; Harzing 2000b; Jobber & Saunders 1993). Third, a tailored report of the findings as well as a copy of the study was promised. Fourth, the study was presented as cooperative project between the *Insper Institute of Education and Research* (São Paulo, Brazil), the *Federal University of Rio Grande do Sul* (Porto Alegre, Brazil) and the *Manchester Metropolitan University*, thus demonstrating credible sponsorship of the study (Green et al. 1998; Jobber & O'Reilly 1998). Fifth, the research team consisted of experienced (at least three years) interviewers who are affiliated with the *CEPA* research institute. The design of the questionnaire, which is discussed next, has also been related to response rates (De Vaus 2001).

5.7 Development of the questionnaire

This section outlines the considerations for the creation of the questionnaire and provides a detailed overview of the steps taken to enhance its validity. While the first part justifies the design of questions and their order, the second part deals with validity and hence discusses the pilot testing procedure.

The final questionnaire, which was utilised during the interviews, was three pages long and contained only closed-ended questions. This length is within the advised limit for questionnaire length (Dillman, Smyth, et al. 2009; Yammarino et al. 1991). The questionnaire used in this study was divided into five sections: subsidiary characteristics, subsidiary activities, drivers of complexity, market scope and quality of location factors. The scope of this thesis and the necessity of parsimony limited the amount of variables that could be chosen. While the variables are not exhaustive, they are seen as representative in relation to prior empirical studies in both supply chain management and subsidiary literature. Much consideration was directed at minimising the complexity of questions and the extent of time and effort to complete the survey. Thus, questions were asked in the local language (Portuguese), as not all managers in Brazil are proficient in English (Khanna et al. 2005). The questionnaire, in its English version, can be found in Appendix A.

Question design

The majority of survey items were taken from previous studies. The use of identical instrument items intended to increase the validity and reliability of the questionnaire (Dillman, Smyth, et al. 2009; Dimitratos et al. 2012). As advised by De Vaus (2001), questions were kept short, simple and free of ambiguity. Most items are closed-ended, which might reduce the richness of data but is more efficient and allows for using statistical analysis (Dillman, Smyth, et al. 2009; Schuman & Presser 1979). The questionnaire comprises of two types of questions, i.e. those that obtain numerical values and those that measure the level of (dis-) agreement through Likert-scales. Six of the items measuring complexity in the value chain are objective indicators, which have been identified as potentially adding value to the study of value chain activities (Birkinshaw & Hood 2000). These items can be found in Section 3 of the questionnaire.

Several items included in the questionnaire were 7-point Likert-scales. Thus, this study fits well into IB research, given that this scaling method is widely used in the field (Yang et al. 2006). Likert-scales have three main advantages. First, they are relatively easy to construct, and easy to read and to complete for participants (Grover & Vriens 2006). Second, they are relatively likely to produce a highly reliable scale (Cargan 2007). Third, they are subject to statistical analysis (Jackson 2012). Disadvantages, however, include central tendency bias, acquiescence bias, social desirability bias and lack of reproducibility. Also, validity may be difficult to demonstrate. As regards the latter point, and based on good practice in the literature, this research aimed to rely on multi-item measures to augment validity (Scandura &

Williams 2000). The use of both objective and attitudinal items should reduce any potential artifactual co-variation between independent and outcome variables (Podsakoff et al. 2003; McDermott & Corredoira 2009). Four Likert-scale items of Section 3.1 were reverse-coded to reduce further the threat of common method variance (Bozarth et al. 2009; Crampton & Wagner 1994).

Scalar questions can be formatted or designed differently and two main features were taken into account in this research. First, as regards the range of values for the Likert-scale it was decided to use seven points to reduce potential extreme responses. Some previous research within the subsidiary literature has also espoused this approach (e.g. Andersson et al. 2005; Pedersen 2006). Second, generally there is no visual aid for respondents of telephone interviews (Bourque & Fielder 2003). Thus, intending to enhance effectiveness, the Likert-scale was simplified by reading out merely the polar endpoint labels (Christian et al. 2008). This eases the cognitive and memory burden placed on respondents.

Question ordering

One distinctive feature of questionnaires that are administered by face-to-face or telephone surveys is the locus of control. The interviewers control both speed and flow of the conversation as well as the order in which questions are read out to respondents (De Leeuw 1992; Dillman, Smyth, et al. 2009). Following Dillman (2000), the first set of questions was kept interesting, easy to answer and non-threatening. Questions were ordered as to minimise the chance of consistency effects (Salancik & Pfeffer 1977). For example, questions about the subsidiary's market scope and export intensity were positioned between those items related to complexity drivers (Section 3) and those items intending to proxy the quality of location factors (Section 5). Also, predictor and dependent variables were located at different places to reduce this threat (Chang et al. 2010; Podsakoff et al. 2003). In Section 5, location factor items that are later used for constructs were placed apart.

Questions were grouped according to their topic to help the respondent keep his mind upon the subject matter (Dillman 1991). For example, all questions in Section 5 are related to the quality of locational factors. The comprehensibility, design and sequence of questions were all tested in a pilot study in São Paulo, Brazil (see below).

In order to reduce the length of the questionnaire and the interview, respectively, which has been stressed particularly for industrial surveys (Jobber & O'Reilly 1998), the interviewers were asked to skip questions that were not applicable to a specific subsidiary. For example, when a respondent had given a zero-value for manufacturing in question 2.1 of Section 2 it was redundant to ask question 3.2, i.e. for the type of production.

Pilot test

As indicated above, the majority of questions originate from previous research. Most of the items regarding subsidiary characteristics (Section 1) and location factors (Section 5) were adapted from the 'centres of excellence' project (Holm & Pedersen 2000). Almost all items for capturing complexity (Section 3) were adapted from Bozarth et al.'s (2009) study about complexity within supply chains.

This study relies on pre-existing scales, constructs and questions because it should improve both validity and reliability of research instruments. This is common practice in the field of international business (Dimitratos et al. 2012). However, there are some reasons to conduct a pilot test. First, pilot tests are deemed general good practice in survey research (De Vaus 2001; Dillman, Smyth, et al. 2009). Second, the items adapted from previous studies were solely addressed to respondents in the US, Japan, South Korea and Western Europe. Given that Brazil, the context of this study, may vary on several grounds from these countries, not least in terms of culture, the questions could have been inappropriate for the sample of this research. Third, the pilot test aimed to confirm that respondents were capable of answering questions that were considered rather difficult, for example question 2.1. This testing of the questionnaire included three stages.

The first two stages were panel reviews with two separate groups of academics, one in the UK[12] and the second in Brazil[13]. Both questionnaire design and the wording of questions were discussed to ensure face and content validity. After the first review, the questionnaire, originally created in English, was translated into Brazilian Portuguese by local researchers who were familiar with international business. Then two researchers (one in Brazil and one in the UK) back translated the questions into English to assure accuracy in translation. As a result of the panel reviews, the questionnaire had been modified before carrying out pilot tests with subsidiary managers. These pilot tests involved face-to-face interviews of the envisaged telephone interview process. In total, eight test sessions with managing directors of foreign subsidiaries, all situated in São Paulo, took place. These sessions had durations of twenty to forty minutes and comprised of firms that operated in different sectors and varied in size and country of origin. All tests were carried out in February 2012. Both the purpose of the study and the pilot task were described in detail before imitating the telephone interview. Although the author had studied Brazilian Portuguese as to undertake this research, a native-speaking research assistant from the cooperating university, the well-known Insper Institute in São Paulo, was employed to assist the author during the eight pilot test sessions and reduce potential language problems.

The pilot test procedure resulted in the rewording of a few phrases and some alternations in the options from which respondents had to choose. For several items, clarification notes for the interviewers were prepared. For example, three managing directors enquired about the meaning of the term *customer* in the question asking how many customers the subsidiary

[12] This group consisted of S. Horsburgh, S. Golesorkhi and H. Tuselmann (all at the Manchester Metropolitan University Business School)
[13] This group included D. Boehe, L. Yeung and L. Ferreira (all at Insper Institute of Education and Research, São Paulo, Brazil).

serves (question 3.3). As a result, interviewers were advised to clarify the term “customer” as listed in the subsidiary’s accounting system, rather than the amount of end customers. In general, the pilot test did not reveal any significant difficulties regarding the understanding of individual questions. Five subsidiary managers said that one item, a proxy for turnover, was problematic since the information was too sensitive. As this could be a major source of non-response bias (Liu et al. 2011), it was decided to drop the item from the questionnaire. Additionally, the pilot tests confirmed the estimated duration, i.e. 20 minutes, for one interview.

5.8 Definition and operationalisation of the constructs

This section presents the definitions and operationalisation of the different constructs of the present thesis. Section 5.8.1 starts with a justification of how to measure the extent of value chain activities carried out by the subsidiary. Section 5.8.2 is concerned with the items that approximate the degree of value added in activity set. Section 5.8.3 justifies the constructs and items that measure location factors, while Section 5.8.4 discusses the control variables included in this study.

5.8.1 Scope of value-added activities

For this thesis, it is of particular interest to gain an understanding about the scope of value-added activities in the foreign-owned subsidiary. It allows deriving the extent of each separate activity set, which is later used to analyse if the extent of a set and the degree of value added in that set differ as regards relationships with several factors. Value-added scope in a subsidiary relates to the ways (e.g. marketing, sales, etc.) a subsidiary adds value (White & Poynter 1984). Value-added scope was operationalised through the percentage of working time usually associated with each activity set. Careful consideration was placed on the choice of groups of activity sets undertaken by the foreign-owned subsidiary. In order to keep the number of sets manageable for participants it was chosen to include seven categories: ‘R&D/product development’, ‘procurement’, ‘manufacturing’, ‘sales and marketing’, ‘logistics/distribution’, ‘after-sales services’ and ‘administration’. These categories have also been applied in Benito et al. (2003), Davis and Meyer (2004), Pedersen (2006), Manolopoulos (2010) and Schmid and Schurig (2003). While not of interest in this study, ‘administration’ was included since it occurs at most subsidiaries. In addition, some managers asked for such a category in the pilot-tests when it had initially been omitted in the questionnaire. In particular, it was asked: “what is the proportion of working time in the following activities at the establishment?”

Following Asmussen et al. (2009), related activity sets were collapsed. Thus, ‘logistics/distribution’ and ‘procurement’ build the *supply* activity set, while ‘sales and marketing’ and ‘after-sales services’ form the *marketing* set (see also Section 3.1 of Chapter 3).

5.8.2 The degree of complexity in activity sets (dependent variables)

This study aims to capture high value added in activity sets through the levels of complexity in these sets (see Section 2.2.3 of Chapter 2). It is difficult to directly observe and thus measure this degree of complexity, given its unobservable nature. One potential remedy for analysing un-observables is to focus on observable outcome variables and infer from those variables the degree of complexity. This is a widely taken approach in research on superior firm resources (e.g. Keupp et al. 2011; Shi et al. 2014). Often, this line of research looks at the financial performance of the firm. However, this approach is less suitable in the present study for several reasons. First, financial data about the performance of foreign subsidiaries are not available, as MNEs do not disclose performance data at the subsidiary level (Chang et al. 2013). Similarly, accounting data may not truly reflect subsidiary performance, given that MNEs artificially alter the sales or value added by their affiliates by manipulating the transfer prices that these units paid for inputs sourced from other units of the MNE (Demirbag et al. 2007; Eden et al. 2005; Ma et al. 2013). In addition, not all subsidiaries calculate their financial performance as an individual business unit (Andersson et al. 2001; Enright 2005). Last, and most critical, such data operate at the macro level, i.e. the subsidiary level and do not provide lower level details, i.e. for each activity set. In sum, traditional accounting data are not collected and reported in a way that is in line with the needs of value chain analysis (Stabell & Fjeldstad 1998).

Following Bozarth et al. (2009), activity set complexity is thus defined and operationalised as the level of detail and dynamic complexity inherent in the products, processes and relationships that make up an activity set. In this section, the variables included in the analyses to proxy the degree of complexity in the each of the four activity sets are described. While the measure for R&D/PD was adopted from subsidiary research, the measures for the other three sets were borrowed from the supply chain literature. This is an original contribution. To the best of the author's knowledge, no study has used complexity-based variables from research on supply chains to proxy the degree of value added in activity sets. The variables used in this thesis are presented in Table 5.5 on page 140.

R&D and product development (PD) activity set

As stressed in Section 5.7 above, survey items that have been used in previous studies were preferred in this thesis as to increase the validity and reliability of the survey. In contrast to the measures for the other three activity sets, the measure for HVA within the R&D/PD set was found in the literature on subsidiary R&D mandates. In this literature, the most widely used approach is to distinguish between competence-creating and competence-exploiting subsidiary R&D mandates (e.g. Achcaoucaou et al. 2014; Blomkvist et al. 2010; Cantwell & Mudambi 2005; Le Bas & Patel 2007). Table 5.3 shows some examples of explicit competences underlying this dichotomy of R&D types.

Table 5.3: Competence-creating and competence-exploiting mandates

Competence-creating subsidiary mandate	Competence-exploiting subsidiary mandate
Knowledge/competences of a more novel nature relative to current practices in the MNE: Cutting-edge research (basic research) Applied research into new product generations Development of new products or components Research into new materials and new specifications New product design Development of prototypes Major improvements to machinery	Knowledge/competences of a more duplicative nature relative to current practices in the MNE: Product quality improvement, licensing and assimilating new imported product technology Equipment stretching, process adaptation and cost saving, licensing new technology Assimilation of product design, minor adaptation to market needs, replication of fixed specifications Debugging, balancing, quality control preventive maintenance, assimilation of process technology

Source: Achcaoucaou et al. (2014).

For a long time, different types of R&D/PD activities have been accepted to differ in terms of their complexity levels (Amsden & Tschang 2003; Ronstadt 1978). Accordingly, competence-exploiting R&D/PD activities have been associated with somewhat lower levels of complexity, whereas competence-creating activities in this activity set have been related to higher levels of complexity (Ronstadt 1978). Thus, in line with the complexity logic in this thesis, HVAAs in the R&D/PD set are defined and operationalised as competence-creating activities.

In order to identify the R&D mandate of a subsidiary it was decided to let managers choose the category that best describes the R&D/PD activities carried out at their establishment. In order to reduce the cognitive burden of managers only five categories were provided. This question and the five categories are reproduced in Table 5.4. This measure was taken from Taggart (1996). In line with the studies above, categories ‘4’, ‘5’ and ‘6’ are representative of competence-creating R&D/PD activities, whereas categories ‘2’ and ‘3’ are indicative of competence-exploiting activities.

Table 5.4: Measuring competence-creating R&D activities

Please choose the category that best describes the R&D/ product development activities conducted at your establishment.
▪ N/A (no R&D and product development whatsoever) (1) ▪ Customer technical services (2) ▪ Adapting manufacturing technology (3) ▪ Developing new and/or improved products for the South American market (4) ▪ Developing new and/or improved products for the global market (5) ▪ Generating new technology for the corporate parent (6)

Manufacturing activity set

The first variable measured the *number of different items* required to produce the different products at the subsidiary. This detail complexity driver has often been revealed in relevant supply chain research (Bozarth et al. 2009; Calinescu et al. 1998; Fisher et al. 1999; Jiao et al. 2007; Krishnan & Gupta 2001; Ramdas & Sawhney 2001). As the amount of items used for the production of goods grows complexity in the manufacturing set increases (Salvador et al. 2002).

The second variable measured the *number of product models* that are produced at the focal subsidiary. As such, this variable is also concerned with detail complexity. It has long been recognised that product proliferation will result in higher levels of complexity in the manufacturing environment (Closs et al. 2008; Hu et al. 2008; Salvador et al. 2002; Thonemann & Bradley 2002; Yano & Dobson 1998).

The third variable measured aimed to capture the interconnectedness inherent in the manufacturing processes of the subsidiary. These processes have been modelled on a continuum, ranging from job shops with custom-built, one-of-a-kind (or very low volume) products, to repetitive processes that result in high volumes of standardised products (Duray et al. 2000; Hill & Hill 2009). Activity sets mainly concerned with low volume production will exhibit higher complexity levels (Bozarth et al. 2009). Thus, the '*flexible manufacturing*' variable has been widely recognised in relevant literature (Calinescu et al. 1998; Duray et al. 2000; Hill & Hill 2009; Safizadeh et al. 1996).

The fourth variable is related to *unstable manufacturing schedules*. Unstable schedules can result in unpredictable, non-linear influences on production and material plans (Closs et al. 2008; Jacobs et al. 2011). Therefore, unstable schedules will drive dynamic complexity in the manufacturing activity set (Vollmann et al. 2005). The better a subsidiary can deal with this kind of complexity the more value added should be generated. Arguably, firms that are not able to master this complexity will avoid unstable schedules to attain their performance targets (e.g. schedule attainment).

Supply activity set

As defined above, this activity set consists of the procurement and the logistics/distribution activity set. As such, it is exposed to both downstream and upstream complexity. However, as the variables concerning downstream complexity are needed for analysing the marketing activity set it was decided to focus exclusively upon the upstream drivers of complexity for the supply activity set. Three drivers of upstream complexity in particular have been found to play important roles within the supply activity set (Chen et al. 2000; Gattiker et al. 2007; Goffin et al. 2006; Nellore et al. 2001; Wu & Choi 2005): the number of supplier relationships, delivery lead time, and the reliability of suppliers.

The first variable measured the *number of suppliers* that deliver to the foreign subsidiary in question. An increase in the amount of suppliers inevitably increases detail complexity due to the intensification of information flows, physical flows and relationships that need to be managed (Costantino & Pellegrino 2010; Wu & Choi 2005).

The second main complexity driver is the *lead time performance of suppliers* (Banomyong & Supatn 2011; Jacobs et al. 2011). Long supplier lead times may force firms to use planning and material management processes characterised by long planning horizons and high levels of detail (Bozarth et al. 2009; Jacobs et al. 2011). As such, longer supplier lead times result in increases in the level of dynamic complexity (Chen et al. 2000).

The third driver of complexity in the supply activity set – *unreliability of suppliers* – works in a similar way, mainly increasing dynamic complexity (Chen et al. 2000). Thus, the third variable measured if the delivery of suppliers was unreliable.

Marketing activity set

As defined above, this activity set includes the sales and marketing and after-sales services activity sets. In order to proxy the degree of value added in the marketing set it is relied on measures of downstream complexity proposed in the supply chain literature (e.g. Calinescu et al. 1998; Hill & Hill 2009; Krishnan & Gupta 2001; Qi et al. 2009). Four variables have been recurrent in particular: the number of customers, the heterogeneity of customer needs, the average of the product life cycle, and the variability of demand.

The first variable is concerned with the *number of customers*. As the number of customers increases, the number of activities within the marketing activity set (e.g. customer relationship management, demand management and order management) will increase. This means that there is a higher level of detail complexity, which is likely to also affect the interaction of elements in this activity set (Gröroos 1995; Jacobs et al. 2011).

The second variable measured the *heterogeneity in customer needs*. This complexity driver has been widely acknowledged in pertinent literature (Bozarth & Edwards 1997; Calinescu et al. 1998; Da Silveira 2005; Qi et al. 2009). A heterogeneous set of customers will make it difficult to precisely identify order winners and qualifiers (Hill & Hill 2009; Jüttner et al. 2006). The variable captures the changing needs and product preferences of customers, and the changing types of customers. Thus, it is a proxy for dynamic complexity in the marketing set.

The third variable measured the *length of the product life cycle*, and has been included in a number of supply chain studies (Bozarth et al. 2009; Fisher et al. 1999; Krishnan & Gupta 2001; Ramdas & Sawhney 2001). It is often claimed that shorter life cycles, mainly due to customers' demand for new products, increase dynamic complexity and require the adaption of activities (e.g. promotions, customer relationship management, forecasting, or familiarisation with new products).

The fourth variable for measuring complexity in the marketing set was *demand variability*, which is seen as main source of dynamic complexity in the firm's value chain (Chen et al. 2000; Fransoo & Wouters 2000; Lee et al. 1997; Shah & Ward 2007). In the marketing set, high levels of demand variability make tasks such as pricing, planning or demand forecasting difficult (Allred & Steensma 2005).

Table 5.5: Overview of complexity measures (dependent variables)

Set	Measure	Survey item	No.	Type of item	Adopted from
Manufacturing	Number of different items	This plant's output requires approximately how many individual active part numbers of material items?	3.5	Factual data	Bozarth et al. (2009)
	Number of product models	How many product models are manufactured at this plant?	3.6	Factual data	Bozarth et at. (2009) Salvador et al. (2002)
	Flexible manufacturing	The production processes in this plant are best characterised as follows: 1) One of a kind 2) Small batch 3) Large batch 4) Repetitive/line low 5) Continuous (Respondents were asked to indicate the percent of production volume accounted for by each category, with all percentages adding to 100%. The sum of the first two categories was then calculated.)	3.2		Bozarth et al. (2009)
	Unstable manufacturing schedules	The master schedule is level-loaded in our plant, from day-to-day.	3.1	7-point Likert scale	Bozarth et al. (2009)
Supply	Number of suppliers	How many suppliers does the establishment have approximately?	3.7	Factual data	Tatsis et al. (2006) Bozarth et al. (2009)
	Lead time performance of suppliers	We seek short lead times in the design of our supply chains. (reverse scored)	3.1	7-point Likert scale	Liu & Deitz (2011) Zhao et al. (2013)
	Unreliability of suppliers	We can depend upon on-time delivery from our suppliers. (reverse scored)	3.1	7-point Likert scale	Bozarth et al. (2009) Zhao et al. (2013)
Marketing	Number of costumers	How many customers does this establishment serve (approximately)?	3.3	Factual data	Bozarth et al. (2009)
	Heterogeneity in customer needs	All of our customers desire essentially the same products. (reverse scored)	3.1	7-point Likert scale	Bozarth et al. (2009)
	Length of the product life cycle	What is the average life cycle of your products?	3.4	Factual data	Bozarth et al. (2009) Mckone-Sweet & Lee (2009)
	Demand variability	Our total demand, across all products, is relatively stable. (reverse scored)	3.1	7-point Likert scale	Bozarth et al. (2009) Zhao et al. (2013)

5.8.3 Location factors (independent variables)

Following the literature review on location theories and frameworks in IB studies (see Section 2.4 of Chapter 2), 17 variables were identified as to measure the quality of the location factors of interest. It was decided to draw on the evaluation of subsidiary managers – rather than publicly available data – as managers base their decision-making largely on their own evaluation of the host environment (Ambos et al. 2010; Santangelo & Meyer 2011).

Table 5.6: Overview of location measures

Survey item	**Construct**	**Adopted from**
Multi-item scales		
Availability of labour	Cost advantages	Chidlow et al. (2009)
Communication and transportation infrastructure	Cost advantages	Ellram et al. (2013); Galan et al. (2007)
Availability of raw materials	Cost advantages	Galan et al. (2007); Marinova & Marinov (2003)
Market size	Market attractiveness	Chidlow et al. (2009); Galan et al. (2007)
Market potential	Market attractiveness	Galan et al. (2007); Chen & Chen (1998)
Access to other South American markets	Market attractiveness	Demirbag et al. (2007); Marinova & Marinov (2003)
Amount of suppliers	Supply conditions	Galan et al. (2007)
Quality of suppliers	Supply conditions	Davis & Meyer (2004); Foss & Pedersen (2002); Frost et al. (2002)
Corruption (reverse scored)	Country risk	Meschi & Riccio (2008)
Political stability	Country risk	Demirbag et al. (2007); Galan et al. (2007)
Macroeconomic stability	Country risk	Demirbag et al. (2007)
Enforcement of laws and contracts	Regulatory framework	Frost et al. (2002)
Protection of intellectual property rights	Regulatory framework	Javorcik (2004); Veliyath & Sambharya (2011)
Labour regulations	Regulatory framework	Pajunen (2008)
Single-item scales		
Competitors in close proximity	-	Chidlow et al. (2009)
Existence of scientific institutions	-	Asmussen et al. (2009); Frost et al. (2002); Pearce (1999)
Availability of skilled employees	-	Holm & Pedersen (2000); Schmid & Schurig (2003)

The variables capturing the quality of location factors formed a separate block of questions in the questionnaire, i.e. Section 5, (see Appendix A). Managers were asked to evaluate the business environment in Brazil on the 17 dimensions that are presented in Table 5.6 above. The scale of measurement (1=very low/very bad and 7=very high/very good) was adopted from Frost et al. (2002) and the centres of excellence project (Holm & Pedersen 2000).

5.8.4 Control variables

As discussed in Section 3.2, seven variables were included in this study to control for alternative explanations: subsidiary age, subsidiary size, export share, country of HQ origin, industry, subsidiary location (within Brazil) and market scope. These factors are discussed in this section.

Subsidiary age has often been used in relevant research (e.g. Delios et al. 2008; Hogenbirk & van Kranenburg 2006; Santangelo & Meyer 2011; Scott-Kennel 2007), as the subsidiary may require time to accumulate resources and knowledge (Sahaym & Nam 2012), the antecedents of high-value added activities. Hence, respondents were asked how many years the subsidiary has been foreign owned. This measure was borrowed from Rabbiosi (2011) and Holm and Pedersen (2000).

Subsidiary size was controlled for because it has been identified as a valuable proxy for the resources of the subsidiary (Ambos & Birkinshaw 2010; Penrose 1995), which may in turn affect the degree of value added in activity sets. In line with relevant research (Demirbag et al. 2011; Roth & Morrison 1992; Wan & Hillman 2006), this variable was measured by the total number of subsidiary employees.

Export share was included due to the hypothesised effect of market orientation upon value-added activities of the foreign affiliate (Hogenbirk & van Kranenburg 2006; Manolopoulos 2010). Often, market scope has been used in subsidiary research to indicate market orientation. However, this only captures if export takes place, but tells little about export intensity.

The export share variable avoids this problem. It was measured as the share of export sales to total sales, as done in Chang et al. (2013) and Manolopoulos et al. (2005).

The *country of HQ origin* has been included in many studies on subsidiaries (e.g. Davis & Meyer 2004; Dimitratos et al. 2009; Noorderhaven & Harzing 2009). Different hypotheses have been proposed as regards the home base of the HQ, including its size (Filippaios et al. 2009; Petersen et al. 2008), the geographical distance to the host market (Hogenbirk & van Kranenburg 2006; Taggart 1996), or historical ties with the host location (Ma et al. 2013). The data for this variable was obtained from the database.

The *industry* of the subsidiary was controlled for given that subsidiary roles and the nature of their activities may differ across different industries. The classification of manufacturing industries was based on the NACE codes. As has been done in prior research (e.g. Chidlow et al. 2009; Gammelgaard et al. 2012; McDonald et al. 2008), industries were then grouped based on their technological intensity. The categories are based on the OECD classification system (Hatzichronoglou 1997), i.e. 'high tech' (4), 'medium-high tech' (3), 'medium-low tech' (2) and 'low tech'(1).

Subsidiary location (within Brazil) is included as a control variable because regions within countries differ in terms of location factors (Head et al. 1995; Nachum 2000). Subnational differences are especially pronounced in emerging economies (Chan et al. 2010). Hence, it can be assumed that the subsidiary's location in Brazil has an effect on its value chain activities. Using the postal addresses revealed during the creation of the bespoke database (see Section 5.5 of this chapter), subsidiaries were categorised into five different regional areas. Drawing upon the classification provided by the Brazilian Institute of Geography and Statistics (IBGE) these regional areas are: North, Northeast, Central-West, Southeast and South.

Market scope was included as a control variable given its associations with the nature of value-added activities at the subsidiary. As done in prior research, this control variable was measured by the market(s) supplied by the focal subsidiary (Hogenbirk & Van Kranenburg 2006; Manolopoulos 2010; Papanastassiou & Pearce 1999; Taggart 1997a; White & Poynter 1984). Respondents were asked to choose from four main areas of foci: 'local', 'Brazil', 'South America', and 'global'.

Some of these control variables were further collapsed in order to set them up for statistical analysis. These transformations and the coding of the variables are outlined within Section 6.2.2 of Chapter 6.

5.9 Response analysis and sample characteristics

Response rate

309 cases of the selected 1,907 cases were removed for several reasons (e.g. the subsidiary turned out to pertain to the service sector, did not exist anymore, was no longer owned by a foreign firm, etc.), meaning that the usable sample size was reduced to 1,598 foreign subsidiaries. The telephone survey yielded 395 responses, equalling an effective response rate of 24.7%.[14] This is well in line with comparable studies in the subsidiary literature (Asmussen et al. 2009; Manolopoulos 2010; Tavares & Young 2006; Williams 2003). It is also seen as quite a large sample for questionnaire survey-based research in emerging markets (Estrin et al. 2008). Likewise, the sample compares favourably to other surveys targeting subsidiaries in Brazil (Harzing 2000). In fact, to the best of the author's knowledge, it signifies the largest sample of foreign-owned subsidiaries in Brazil thus far. Moreover, this sample size is sufficient to conduct statistical analysis, as will be discussed in Section 6.2 of Chapter 6. It

[14] As indicated in Section 5.4, interviewers may occasionally invent responses. Through comparisons with secondary data (i.e. company websites) along the 'sector variable' 17 interviews were considered invented thus reducing the number of responses from 412 to 395.

is also well above the required minimum of 260 cases, which was calculated in Section 5.5 of this chapter.

Response rates vary per country of HQs origin (as identified by Harzing 1997, 1999), ranging from 0% to 57%. Responses were gained from 25 different countries of origin. Such a variety is seen as a main advantage (Filippaios et al. 2009).

Representativeness of the sample

In order to evaluate if the foreign subsidiaries included in this study are representative Chi-square test were carried out. Following common practice (cf. Ambos & Birkinshaw 2010; Harzing 1999), non-response bias was estimated by investigating whether respondents and non-respondents differed significantly across two key characteristics: the home region (i.e. North America, Latin America, Europe and Asia/Australia), and subsidiary location within Brazil (i.e. North, Northeast, Central and South). The corresponding data stem from the bespoke database. First, it was tested for non-response bias. No significant difference could be found between non-respondents and respondents of the contacted subsidiaries. The Chi-square tests were neither significant in terms of home region (chi-square 6.093, sig. 0.107) nor as regards subsidiary location (chi-square 0.164, sig. 0.983). Therefore, bias from non-response is not an issue in the study. Second, tests were performed to check if the sample is representative for the overall population of foreign-owned subsidiaries in Brazil. There was no significant difference between respondents and the overall population in terms of home region (chi-square 6.155, sig. 0.104). Likewise, subsidiary location exhibited no significant difference (chi-square 0.285, sig. 0.963). Thus, the sample can be deemed representative for the entire population of foreign-owned subsidiaries in Brazil.

Furthermore, as discussed in Section 5.6 above, enormous efforts were made to contact the selected subsidiaries, given that obtaining the highest response rate possible is the best way to reduce the chance of response bias.

Sample characteristics

Table 5.7 below provides an overview of the attributes of the subsidiaries in this sample. It is considered advantageous in terms of the research aims and objectives that a wide range of characteristics exists in the obtained sample. As outlined above, sample varieties such as this are favourable. Many of the subsidiaries (44%) have less than 50 employees, but 47% of them passed the 100 employees' benchmark. Almost 80% of the subsidiaries have been owned by a foreign firm for at least 10 years.

Table 5.7: Overview of sample characteristics

Subsidiary size		
No. of employees	Frequency	%
1-49	173	43.8
50-99	35	8.9
100-199	54	13.7
200-499	64	16.2
500+	69	17.5
Total	395	100.0

Years in foreign ownership		
Years	Frequency	%
0-9	81	20.5
10-19	145	36.7
20-39	98	24.8
40-99	66	16.7
100+	5	1.3
Total	395	100.0

Export share		
Export share in %	Frequency	%
0	132	38.0
1-14	108	31.1
15-29	55	15.9
30-49	38	11.0
50+	14	4.0
Total	347	100.0

Subsidiary location (within Brazil)		
	Frequency	%
North	12	3.0
Northeast	26	6.6
Central-West	9	2.3
Southeast	221	55.9
South	127	32.2
Total	395	100.0

Industry		
	Frequency	%
High-tech	41	10.4
Medium-high tech	207	52.4
Medium-low tech	79	20.0
Low-tech	68	17.2
Total	395	100.0

HQ home region		
	Frequency	%
North America	76	19.2
Latin America	9	2.3
Europe	271	68.6
Asia/Australia	39	9.9
Total	395	100.0

Market scope		
	Frequency	%
Local	48	12.2
Brazil	120	30.4
South America	86	21.8
Global	141	35.7
Total	395	100.0

Activity sets conducted by subsidiaries	
	% of subsidiaries
R&D/PD	35
Procurement	52
Manufacturing	60
Sales & marketing	74
Logistics/distribution	66
After-sales services	59
Administration	74

This is indicative of the long tradition of FDI in Brazil, as shown in Section 4.3 of Chapter 4. The export share figures indicate that most of the subsidiaries concentrate upon the Brazilian market. Only 15% of the subsidiaries had an export share of 30% or more. Almost 60% of subsidiaries, however, had a market scope beyond the Brazilian market. A somewhat high share of subsidiaries (52%) belonged to the medium-high technology sector, and a tenth to the high-technology sector. More than half of the subsidiaries (55.9%) were located in the Southeast region and another 32% resided in South Brazil, reflecting a clear North-South divide.

5.10 Statistical instruments for hypothesis testing

Statistical analysis of the obtained data was required in order to test the specific hypotheses that were advanced in Chapter 3. The specific instrument should also allow for the generalisation of findings. In particular, this study intends to understand the relationship between different location factors and value-added activities. Thus, multiple regression analysis was deemed most appropriate. This choice fits well with the literature of international business, where multiple regression is the most widely used statistical instrument (Yang et al. 2006). It enables the evaluation of the relationship between a single dependent and multiple independent (or explanatory) variables (Bryman & Cramer 2011; Hair et al. 2010). While there are some techniques to explore relationships among variables, ordinary least square (OLS) regression is used to analyse three of the activity sets. It is worth noting that this particular technique has often been used in the subsidiary literature (e.g. Benito et al. 2003; Bouquet & Birkinshaw 2008; Tavares & Young 2006). The R&D/PD activity set, however, is going to be examined through logistic regression because the respective data are categorical.

A number of studies in the field rest on various forms of logistic regression (Enright 2009; Galan et al. 2007; Manolopoulos et al. 2005). This group of techniques can be somewhat less sensitive to the requirements related to the characteristics of data if compared to other multiple regression techniques (Tabachnick & Fidell 2006). Nevertheless, this group often does not provide the detail of information that is obtainable with statistical techniques such as OLS regressions (Tavares & Young 2006). The principal reason is that such models are based on categorical data for the dependent variables. As the majority of the variables for this thesis are usually considered metric or interval (Nunnally & Bernstein 1994), OLS is deemed most suitable. Ideally, all four activity sets would be analysed employing the OLS technique. However, as noted earlier, the data for the R&D/PD activity set are categorical, meaning that this set is not suitable for multiple regression (Pallant 2007).

Multiple regression techniques predict a single outcome variable from a combination of all the explanatory variables (Field 2009). As such, the purpose of multiple regression is that of finding a regression equation to predict one dependent variable (Howell 2013). In OLS, the prediction is completed by calculating a line that minimises the vertical (squared) distance between the actual values and the regression line, i.e. the predicted values from the regression model. The accuracy of this line in terms of fitting the data is expressed through 'R squared', or the coefficient of determination. This value signifies how much better the advanced model is compared to the baseline model, which is simply the mean (Tabachnick & Fidell 2006; Hair et al. 2006; Field 2009). Multiple regressions equations usually take the following form:

$$Y_i = b_0 + b_1 X_{1i} + b_2 X_{2i} + \ldots + b_n X_{ni} + \varepsilon_i$$

Y is the dependent variable, b_0 is the intercept, b_1 is the coefficient of the first explanatory variable (X_1), b_2 is the coefficient of the second explanatory variable (X_2), b_n is the coefficient of the n^{th} explanatory variable (X_n), and ε_i is the difference between the predicted and the observed value of Y for the i^{th} case (Field 2009).

Logistic regression allows one to test models to predict categorical outcomes with two or more categories (Frost et al. 2002; Tabachnick & Fidell 2006). When aiming to predict membership of only two categorical outcomes binary logistic regression is most suitable, but if the dependent variable entails more than two categories multinomial logistic regression is required (Pallant 2007; Field 2009). Following Taggart (1996), the R&D/PD activity set comprises of six categories, meaning that a multinomial procedure is appropriate. Instead of predicting one dependent variable (Y) from several explanatory variables (X_n), logistic regression predicts the probability of Y occurring. As the model produced by logistic regression is nonlinear, the equations used to describe the outcome are slightly more complex than those for multiple regression (Tabachnick & Fidell 2006). The classical logistic regression equation is as follows:

$$P(Y) = \frac{1}{1 + e^{-(b_0 + b_1 X_{1i} + b_2 X_{2i} + \ldots + b_n X_{ni})}}$$

P(Y) is the probability of Y occurring, e is the base of natural logarithms, b_0 the constant, intercept or logit P(Y) value when X_j are zero, and b_j the weight attached to each explanatory variable, which in turn are denoted by X_j (Field 2009).

Nevertheless, in order to reveal a fitting model, OLS draws on several assumptions. These assumptions comprise sample size, normality of the data, linearity, additivity, homogeneity of the variance, multicollinearity and outliers (Hair et al. 2010; Tabachnick & Fidell 2006). Although less strict in terms of data requirements, logistic regression is sensitive to sample size, multicollinearity and outliers (Pallant 2007). Therefore, appropriate (pre-) tests were carried out and their corresponding results are outlined in Section 6.2.3 within Chapter 6.

As discussed below, the effective *sample size* for data analysis is at least 214. Some simple rules of thumb are 5-15 cases per explanatory variable (Hair et al. 2010), and $N \geq 50 + 8m$, where m is the number of predictor variables (Tabachnick & Fidell 2006). The amount of predictor variables used in the regressions does not exceed 17. In consequence, this sample is considered sufficiently large to undertake OLS regression analysis. Of course, the same holds true for the logistic regression analysis. The sample size of this research can also be expected to demonstrate relatively high levels of statistical power. However, the statistical power and thus the possibility to generalise the results of the study is also contingent upon assumptions such as multicollinearity (Tabachnick & Fidell 2006).

Multicollinearity does not adversely affect the statistical model as such, but impedes evaluating the individual importance of predictors (Hair et al. 2010). Multicollinearity refers to the relationship among the explanatory variables. It occurs when these variables are highly correlated ($r \geq 0.9$) with each other (Pallant 2007). To this end, multicollinearity results in larger portions of shared variance and lower levels of unique variance making it problematic to determine the contributions of each explanatory variable. This can produce unreliable and unstable regression estimates (De Vaus 2001). In this study, two main steps were taken in order to detect the possibility of multicollinearity. Firstly, Pearson's r correlation matrix was examined as to identify particularly high correlations ($r \geq 0.9$). Secondly, the variance inflation factor (VIF) was checked in all the regression models. This VIF is calculated by regressing each explanatory variable with other explanatory variables so that each explanatory variable, in turn, is used as the dependent variable. The resulting tolerance measure is 1 – R-square and its inverse value represents the VIF. The VIF should not exceed 10 (Field 2009; Hair et al. 2006), but some scholars advocate scores as low as 5 (Studenmund 2001). Scores beyond these thresholds indicate multicollinearity problems.

5.11 Summary

This chapter discussed the study's research design. First, the philosophical foundations and some implications were discussed. Second, it was argued that a large-scale survey administered by telephone interviews was most suitable. Third, choices concerning the sample of foreign subsidiaries were explained. Fourth, the development of the survey questionnaire was discussed. This was followed by the definition and operationalisation of constructs for dependent variables, i.e. the degree of value added within activity sets, and the independent variables, i.e. location factors. Then, an analysis of the responses showed that non-response bias is not a problem and that the sample can be considered representative. The last section discussed the statistical methods, i.e. OLS and logistic regression, to examine the data. The outcomes of these analyses are presented in the next chapter.

6 RESULTS
6.1 Introduction

Having set out the research design of the present thesis, this chapter is concerned with the findings of the statistical analysis. In order to test the hypotheses put forward in Chapter 3 the methods of multiple regression and logistic regression were used (see also Section 5.10 in Chapter 5). The analyses were done with the SPSS Statistics 19 software. This particular software has been used in several studies in international business (e.g. Boehe 2007; Shieh & Wu 2012; Wang et al. 2009). This chapter is structured as follows. First, it discusses the treatment of missing data (Section 6.2.1). In Section 6.2.2, it is described how the variables and constructs were transformed to make them fit for the subsequent data analyses. Then, pre-tests (Section 6.2.3) and post estimation procedures (6.2.4) are discussed. Section 6.2.5 presents the descriptive statistics for the variables used in the statistical analyses and provides an overview about the correlations between variables. This is followed by a presentation of the regression models and results (Section 6.3). These results are then discussed and interpreted in Chapter 7.

6.2 Data transformation and analysis
6.2.1 Missing values

To test the hypotheses both logistic regression and multiple regressions were used (see also Section 5.10 above). Following the four-step process proposed by Hair et al. (2010), where appropriate, mean values were imputed. However, missing data were only imputed for one independent variable, i.e. the export share of a subsidiary. As regards dependent variables, cases with missing data were removed to avoid any artificial increase in relationships with independent variables (Hair et al. 2010). After list wise removal of cases with missing data, the panels subject to multiple regression analyses comprised of 214 cases (for the manufacturing activity set), 233 cases (supply activity set) and 298 cases (marketing activity set). There were no missing data for the R&D/PD activity set, which will be examined through logistic regression and has 138 cases. To remind the reader, the different sub-sample sizes are due to the configuration of value chains in the subsidiaries examined. For example, 138 foreign subsidiaries conduct R&D/PD. Two variables were removed since they had 50 per cent or more missing data.[15] This is suitable as other variables exist to represent the intent of those variables (Tabachnick & Fidell 2006).

6.2.2 Transformation of the variables and constructs

The refinement of measurement constructs is seen as critical part of the preparation of data for statistical analysis (Hair et al. 2010; Pallant 2007). As indicated in Section 5.7, four of the complexity measurement items were reverse-coded to minimise the chance of common method bias. The variable 'level of corruption' was reversed as to align it with other items of the construct (see Section **Error! Reference source not found.** of Chapter 5). Section 6.2.2.1 is concerned with the transformation of dependent variables.

As outlined in Section 5.8 of Chapter 5, five constructs are used that proxy location factors of the foreign subsidiary's host environment. It was decided to use composite scales, where possible, to improve the reliability and validity of the constructs. Section 6.2.2.2 describes the transformation of indicators into constructs. A summary of all variables and their transformations is provided in Appendix C.1.

6.2.2.1 Dependent variables

As described in Section 5.8.2 of Chapter 5, R&D and PD activities were classified into five groups. In line with Taggart (1996) these groups were further collapsed into two categories as to enable binary logistic regression as discussed in Section 5.10. Therein, this dependent variable was grouped into '0' for customer technical services and adaptation of manufacturing technology, i.e. representing competence-exploiting activities, and '1' for the other

[15] 'These variables were 'number of active parts' and 'product life cycle'.

three categories, i.e. representing competence-creating activities. The first category denotes LVA, the second category HVA in the R&D/PD activity set (Taggart 1996; see also Section 5.8.2 of Chapter 5). Almost all other dependent variables were log-transformed in order to comply with the assumptions of regression analysis (Field 2009; see Section 6.2.3 below for detailed information).

6.2.2.2 Independent variables

Cost advantages

Cost advantages were operationalised based on three items, as discussed in Section 5.8.3 of Chapter 5. Communication and transportation infrastructure gained the highest mean (5.04, SD 1.28). The other two items had similar values. Cronbach alpha was 0.780, which is well above the suggested threshold of 0.70 that indicates a reliable construct (Gerbing & Anderson 1988). The corrected item-total correlations were higher than the threshold of 0.3 with scores ranging from 0.499 to 0.724 (Field 2009). The deletion of the communication and transportation variable would increase Cronbach's alpha to 0.822. This is seen as sufficient increase to justify the deletion of the variable. Thus, the mean of the two remaining items was used in data analysis. Relevant data are reproduced in Table 6.1.

Table 6.1: Descriptive statistics for the cost advantages scale

	Mean	Std. Deviation	N	Median	Mode	Cronbach's alpha
Availability of labour	4.54	1.637	395	5	5	.780
Communication and transportation infrastructure	5.04	1.275	395	5	6	
Availability of raw materials	4.92	1.734	395	5	6	

	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Availability of labour	.667	.495	.646
Communication and transportation infrastructure	.499	.259	.822
Avail. of raw materials	.724	.541	.577

Market attractiveness

The construct for market potential included three alternative indicators. The most direct indicator – market potential – was evaluated best by subsidiary managers (Mean 5.81, SD 1.08). The values for market size and access to other South American markets were only marginally lower, meaning that potential demand for a subsidiary's product is usually evaluated as good. Nonetheless, Cronbach's alpha (0.646) raises doubts about the existence of a single construct underlying the set of measures. The market potential construct might be too heterogeneous and might contain sub-dimensions not recognised by it. However, if the item 'access to other South American markets' is deleted, Cronbach's alpha increases to an acceptable value of 0.735. Thus, the average value of the two items market size and market potential was used for data analysis. Table 6.2 shows the relevant data.

Table 6.2: Descriptive statistics for the market attractiveness scale

	Mean	Std. Deviation	N	Median	Mode	Cronbach's alpha
Market size	5.69	1.042	395	6	6	.646
Market potential	5.81	1.080	395	6	6	
Access to other South American markets	5.46	1.403	395	6	6	

	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Market size	.533	.359	.464
Market potential	.523	.356	.469
Access to other South American markets	.356	.127	.735

Supply conditions

The supply environment was operationalised based on two indicators: amount of suppliers and quality of suppliers. Both were with a mean of 4.81 and 5.05 respectively well above the average. The Cronbach's alpha of 0.905 means that the construct was well above the threshold of 0.70 (Hair et al. 2006). Not surprisingly, the relationship between the two variables was strong (r=0.827) and significant at the 1% level. Hence, the two items were aggregated in the same fashion as the constructs above. The data are depicted in Table 6.3.

Table 6.3: Descriptive statistics for supply conditions

	Mean	Std. Deviation	N	Median	Mode	Cronbach's alpha
Amount of suppliers	4.81	1.660	395	5	5	.905
Quality of suppliers	5.05	1.663	395	5	6	

	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Amount of suppliers	.827	.684	.
Quality of suppliers	.827	.684	.

Country risk

The next multiple-item construct is country risk. As regards the mean values for each item, there is some variation with scores ranging from 3.83 (corruption) to 5.63 (macroeconomic stability). Cronbach's alpha was 0.741, which is well above the recommended threshold of 0.70 that implies a reliable construct (Gerbing & Anderson 1988). Also, the corrected item-total correlations were above the proposed threshold of 0.3 (Field 2009).

Table 6.4: Descriptive statistics for the government stability scale

	Mean	Std. Deviation	N	Median	Mode	Cronbach's alpha
Corruption	3.83	2.068	395	5	1	.741
Political stability	4.92	1.710	395	5	6	
Macroeconomic stability	5.63	1.228	395	6	6	

	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Corruption	.597	.403	.656
Political stability	.702	.492	.488
Macroeconomic stability	.480	.268	.766

The deletion of the item macroeconomic stability would only increase the overall Cronbach's alpha by 0.015. Thus, it was decided to retain this item in the country risk construct. The relationships between the three items were significant at the 1% level. The three items were aggregated in the same fashion as in the constructs above. The corresponding data are presented in Table 6.4 above.

Regulatory framework

The construct for regulatory framework was also measured by some alternative indicators. All indicators have means of 5.57 or above. The Cronbach's alpha of 0.716 is above the recommended 0.70 threshold (Gerbing & Anderson 1988). Likewise, the corrected item-total correlations exceeded the minimum threshold of 0.3 with scores ranging from 0.531 to 0.543 (Field 2009). None of the items if removed would increase the overall Cronbach's alpha. The correlation matrix showed that 3 out of 3 correlations were at least significant at the 1% level. In consequence, the three indicators were aggregated into a summated scale in the same way as the variables discussed previously. The relevant statistics can be found in Table 6.5 below.

Table 6.5: Descriptive statistics for the regulatory framework scale

	Mean	Std. Deviation	N	Median	Mode	Cronbach's alpha
Enforcement of laws and contracts	5.83	1.074	395	6	6	.716
Protection of intellectual property rights	5.57	1.029	395	6	6	
Labour regulations	5.79	1.124	395	6	6	

	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Enforcement of laws and contracts	.543	.296	.616
Protection of intellectual property rights	.533	.284	.631
Labour regulations	.531	.282	.633

In addition to the multiple-item constructs, there are four single-item scales. These scales are presented here to complete the overview of location factors. As shown in Table 6.6, the availability of skilled employees gained a mean of 4.54 (SD 1.63), which is well above the average, and similar to prior research (Holm et al. 2003). The existence of scientific institutions was assessed marginally better with a mean of 4.81 (SD 1.37). Competitors in close proximity exhibited a mean of 5.35 (SD 1.16). Ideally, two or more items would have been administered to indicate any underlying construct (Gerbing & Anderson 1988). Yet, due to restrictions concerning the amount of items that could be included in the questionnaire (see Section 5.7), and the construct validity based on their use in previous studies (e.g. Asmussen et al. 2009; Davis & Meyer 2004), it was decided to rely also on single-item measures. An overview of the descriptive statistics of single-item measures is provided in Table 6.6.

Table 6.6: Descriptive statistics for single-item scales

Items	Mean	Std. Deviation	N	Median	Mode
Competitors in close proximity	5.35	1.158	395	6	6
Existence of scientific institutions	4.81	1.132	395	5	5
Availability of skilled employees	4.54	1.631	395	5	5

6.2.2.3 Control variables

In order to facilitate the inclusion of non-metric data into multiple regression analyses the relevant variables were re-coded into dummy variables (Hair et al. 2010). In addition, some variables were collapsed because such a breakdown reduces the potential problem of multicollinearity (see Section 6.2.3.3). Similarly, categories of a variable need a minimum number of cases as to allow for meaningful statistical analysis (Field 2009). Hence, country of origin was included as a control using two dummies, i.e. for the EU (EU parent='1'; other parent='0') and for the US (US parent='1'; other parent='0'). Previous IB research has included similar dummies to measure the country of origin effect (e.g. Boehe 2010; Dimitratos et al. 2009).

As discussed in Section 5.8.4 of Chapter 5, subsidiaries were categorised into four types of *industries* based on the OECD classification. In line with prior research (e.g. Chidlow et al. 2009; Dikova & van Witteloostuijn 2007; Goerzen et al. 2013), the industry type was aggregated and dummy coded as '1' for high- and medium-high technology industries and '0' for low- and medium-low technology industries for further analysis.

Based on the classification by the Brazilian Institute of Geography and Statistics (IBGE), it was decided to use two dummies to control for *subsidiary location*, i.e. South-Brazil (='1'; '0' if located elsewhere) and South-East Brazil (='1'; '0' if located elsewhere). The regions were chosen since they have the highest industrial concentration in Brazil (Kaufmann et al. 2006; Lall et al. 2004).

For the variable *market scope*, the categories 'South America' and 'global' were combined to signify foreign market servicing (coded '1'; '0' if only domestic market servicing).

The three remaining control variables, i.e. *subsidiary age*, *subsidiary size* and *export share*, were measured at the metric level. As they showed skewness, they were log-transformed as to respect the assumptions of regression analysis (Hair et al. 2010; see Appendix C.1 for an overview of variables and their transformations).

6.2.3 Pre-tests

6.2.3.1 Sample size, normality, linearity and outliers

As indicated earlier, the *sample size* varies depending on the activity set that is going to be investigated. To reiterate, the amount of observations for each set was as follows: R&D/PD (138), manufacturing (214), supply activities (233), market activities (298). It is recurrently recommended, as a rule of thumb, that the researcher should aim for 5-15 cases for each independent variable (Hair et al. 2010). The maximum number of independent variables, i.e. variables of interest and control variables, in this research is 17. Thus, there are 8 cases per independent variable in the R&D/PD activity set, the smallest sub-sample. This is deemed sufficient to undertake binary logistic regression. The other sub-samples have at least 12.6 cases per independent variable, which is seen as suitable to run OLS regression analysis. In general, the number of observations allowed for robust estimations using the chosen statistical instruments.

Normality refers to two notions, namely the normality of the sampling distribution and the normality of the error terms for the actual regression. Normality of the sampling distribution was checked for visually, through the use of histograms and p-p plots. Statistical tests such as the modified version of Kolmogorov-Smirnov test were run where sample size was appropriate (Field 2009). If necessary, non-normally distributed variables were transformed in order to establish normality. Due to the nature of the measures, all except one dependent variable (i.e. manufacturing schedule instability), demonstrated a positive or a negative skew. For example, a high proportion of subsidiaries do not conduct any R&D/PD activities, which is not an unusual phenomenon (Grandstrand 1999). Out of the 13 dependent variables that were skewed, 12 were log transformed and one was square root transformed. As could be expected, both the single-item scales and the aggregated location constructs exhibited a negative skew, with varying degrees. In accordance, all variables of interest, i.e. location factors, were log transformed (see Appendix C.1 for an overview). As pointed out in the previous section, the control variables of age, size and export share were peaked with a positive skew and thus log transformed. All regressions were rerun using the untransformed variables, but no new patterns emerged from these regressions. Normality of the error term was tested for by visually examining the residuals, i.e. through histograms and p-p plots. All tests revealed acceptable results.

Linearity was tested for visually by scrutinising bivariate scatterplots of the entire dependent and predictor variables that were measured at a metric level. In addition, for each of the 13 OLS regression models, the residuals and partial regression plots revealed no severe divergence from the linearity assumption of the dependent and predictor variables.

As regards *outliers*, a number of steps were undertaken in order to examine the impact of influential observations. Univariate outliers were discovered by calculating z-scores for the transformed variables (Field 2009). Most of the revealed outliers formed part of the population but were seen in the distribution as extreme cases. As suggested by Tabachnick and Fidell (2006), the outliers' scores were altered so that they were still extreme but fit within a normal distribution. Bivariate outliers were tested for by examining the bivariate scatterplots. In order to identify multivariate outliers a number of diagnostic tests were executed. In that respect, the author followed the three-step approach proposed by Hair et al. (1998). Thus, residuals were investigated (standardised, studentised, studentised deleted), leverage points were revealed (Hat values, Mahalanobis distance) and different single case means (Cook's distance, COVRATIO, SDFFIT) were examined. If cases failed to pass the corresponding thresholds consistently, they were removed from the database and the regressions were re-run without them (see Appendix C.2 for details).

6.2.3.2 Homogeneity of variance

As suggested in the literature, a Levene's test was undertaken in order to test for the homogeneity of variance assumption (i.e. the dependent variable shows equal levels of variance across predictor variables). The test was carried out utilising four non-metric variables as predictor variables and all the metric variables as dependent variables.

As shown in Table 6.7, Levene's test is significant more than once only for two of the variables (i.e. 'extent of R&D/PD activity set' and 'manufacturing schedule instability'), indicating differences in variances across groups. Nonetheless, in larger samples such as in this thesis, Levene's test can be significant even if group variances are not very different (Field 2009). The calculation of variance ratios for the corresponding groups showed that values were below the critical value of 1.64 (Field 2009). The highest variance ratio was 1.26 (for the R&D/PD activity set across group differences regarding the South-East Brazil dummy, which captures the subsidiary's location in Brazil. Thus, the results showed that there is no severe problem regarding homoscedasticity among the metric variables.

Table 6.7: Levene's test for homogeneity of variance

	Dummy for United States		Dummy for industry		Dummy for South-East	
	Levene statistic		Levene statistic		Levene statistic	
Dependent variables						
Extent of R&D/PD	2.512		4.861	*	5.844	*
Extent of manufacturing	0.252		2.071		7.195	*
Extent of supply	2.514		0.096		0.443	*
Extent of marketing	0.321		0.764		2.855	
Number of products[1]	1.691		0.033		0.487	
Flexible manufacturing[1]	0.136		3.447		2.319	
Manufacturing schedule instability[1]	0.064		3.958	*	4.557	*
Number of suppliers[1]	0.741		1.235		0.572	
Long supplier lead times[1]	0.007		0.001		1.160	
Supplier delivery unreliability[1]	0.849		3.148		0.248	
Number of customers[1]	1.420		5.622	*	0.201	
Customer heterogeneity[1]	0.031		0.371		0.008	
Demand variability[1]	0.075		0.326		0.074	
Location variables						
Cost advantages	1.820		0.073		0.456	
Market attractiveness	0.023		0.047		1.600	
Competitors in proximity	0.001		0.013		0.505	
Supply conditions	0.418		0.046		0.070	
Existence of scientific institutions	4.985	*	1.099		0.070	
Availability of skilled employees	5.231	*	0.188		1.300	
Country risk	4.503	*	1.742		0.006	
Regulatory framework	5.460	*	0.120		1.689	
Control variables						
Subsidiary age	0.603		4.523	*	0.029	
Subsidiary size	1.999		6.132	*	1.786	
Export share	0.244		0.121		4.044	*

*Significant at the 5% level. [1] Analysed in the relevant sub-sample.

Furthermore, the studentised residuals of the models were plotted against the standardised predicted dependent values. A careful inspection of those plots revealed no specific pattern of increasing or decreasing residuals, supporting the view that the assumption of homoscedasticity was met.

6.2.3.3 Multicollinearity

To check if there was a correlation between two or more predictor (independent) variables, augmenting the estimated R^2 of the model, the variance inflation factor (VIF) and the condition index matrix were calculated. Different threshold values of the VIF have been proposed ranging from the value of 5 (Studenmund 2001) to numbers as high as 10 (Hair et al. 2006). All VIF-scores in this research were far below the threshold of 5, where the variable cost advantages had the highest score (3.168) in the models 11-13. The average VIF across all predictors is close to the value of 1 in all sub-samples (Field 2009). Likewise, none of the condition indexes exceeded the advised score of 30 (highest value= 29.852).

Table 6.8: Multicollinearity statistics for regression models

Variable*	**Variance inflation factor (VIF)**			
	Models 1-4	Models 5-7	Models 8-10	Models 11-13
Cost advantages	2.087	1.598	2.370	3.168
Market attractiveness	1.399	1.424	1.418	1.349
Competitors in proximity	1.607	1.348	1.298	1.489
Supply conditions	2.155	1.584	1.492	2.198
Exist. of scientific institutions	1.300	1.263	1.374	1.406
Avail. of skilled employees	1.570	1.194	2.160	2.447
Country risk	1.260	1.224	1.278	1.200
Regulatory framework	1.377	1.295	1.346	1.348
Subsidiary age	1.204	1.266	1.250	1.174
Subsidiary size	1.345	1.192	1.341	1.295
Export share	2.748	2.156	2.372	2.566
US dummy	2.011	2.403	2.264	2.080
Europe dummy	1.993	2.370	2.273	2.041
Industry dummy	1.063	1.073	1.101	1.056
South-East Brazil dummy	1.129	1.196	1.220	1.130
South Brazil dummy	1.079	1.088	1.080	1.124
Market scope dummy	2.720	2.066	2.290	2.511
Average VIF across predictors	1.649	1.514	1.642	1.740

*All metric variables, i.e. all non-dummy variables, were log-transformed.

None of the predictor variables in the condition indexes was above the score of 0.9 in more than one coefficient (Hair et al. 2010). The correlation matrix, shown in Table 6.12 below, illustrates that the highest correlation coefficient is 0.77. This is below the advised value of 0.90 (Field 2009). Thus, multicollinearity is not a problem in this study. Table 6.8 above shows the VIF for each independent variable in the models and the VIF across all the variables, considering the different sub-samples.

6.2.4 Post-checks
6.2.4.1 Common method bias

When dependent and predictor variables all stem from a single respondent there is always the chance of common methods variance bias (Hair et al. 2006; Podsakoff et al. 2003). The same bias may emerge when using the same survey instrument. As stressed by Chang et al. (2010), both may create an incorrect internal consistency. However, in line with practice in IB research, several ex-ante and ex-post methods were executed as to alleviate the threat of common method bias (CMB) (Chang et al. 2010; Ertug et al. 2013).

As regard *ex-ante* methods, the questionnaire was designed so that respondents are not able to infer the underlying research hypotheses based on questionnaire patterns (Heeringa et al. 2010; see Section 5.7 of Chapter 5). Within the assessment of location factors (Section 5 of the questionnaire), items of the same construct were placed apart. Some of the control variables, i.e. 'country of origin' and 'subsidiary location', were obtained from secondary data sources, which should reduce CMB. The use of different types of measurement (i.e. Likert-scales, count data, categorical data, etc.) is considered a big advantage.

The expectation that CMB should not be an issue in this study seems to be corroborated by the results of the correlation matrix below (Section 6.2.5). None of the variables exhibits a high relationship that could be deemed problematic. Still, to ensure CMB is not present in the present study two *ex-post* approaches were performed, as suggested in the international business literature (Chang et al. 2010; Ertug et al. 2013). First, the one-factor test proposed by Podsakoff and Organ (1986) was used. An unrotated factor analysis on all the items that are employed in the variables of the models resulted in 15 factors with eigenvalues greater than 1. Together, these 15 factors accounted for 74% of the variance. In addition, with only 14% the largest factor did not explain the majority of variance. Second, a marker-variable analysis was carried out to look for potential CMB (Lindell & Whitney 2001). Accounting for the differences in sub-sample sizes it was decided to conduct the analysis on all transformed predictor variables using the entire sample (N=395). A marker variable should be measured by the same instrument as the scale used in the analysis, but should be theoretically unrelated to the variables in the statistical analysis (Noorderhaven & Harzing 2009). 'Tax burden' was chosen as the marker variable. First, as this variable was not used in the analyses, there seems to be no theoretical reason to assume a relationship with any of the variables of interest. Second, the marker variable is measured on a 7-point Likert-scale, as many of the other variables. After the partial correlation adjustment, only very few of the significant correlations (6 of 65) became non-significant. Both ex-post checks thus indicate that CMB is not a serious problem in the current data set.

6.2.4.2 Post-estimation analysis

One useful option to validate the regression results is to collect more data from respondents or new survey participants. Yet, this option appeared less feasible, due to the large sample size and general difficulties in gaining data, especially since senior managers were targeted in this study (Baruch 1999; Couper & De Leeuw 2003). Hence, it was decided to apply two alternative techniques, namely split-sample tests and changes of model specifications (Hair et al. 1998; Leamer 1983). For all regression models, regressions were run again utilising a randomly chosen split sample. The overall model statistics resembled the complete sample regression in terms of R-square and the F-ratio. In general, the sign and the significance of the coefficient were confirmed in most of the random split sub-sample regressions, indicating that the models are sufficiently robust (see Appendix C.3 for statistics).

The second post-estimation technique was concerned with a change in the specification of the model (Leamer 1983). In that regard, continuous control variables that were included in the initial models, i.e. subsidiary age, subsidiary size and export share, were modified into binary variables, using the median as cut-off point. Again, both sign and significance levels differed only at moderate levels from the initial models that are discussed in Section 6.3.1 of this Chapter.

6.2.5 Descriptive statistics and correlation matrix

Before continuing with the regression analysis this sub-section provides an overview of the general patterns in the data. The descriptive statistics include measures of central tendency (mode, median, mean), dispersion (standard deviation) and frequency tables. Data are presented here in their non-transformed state (i.e. not log- or square root transformed). Several noteworthy patterns emerge from this data. The average foreign-owned subsidiary in Brazil has 283 employees (SD=641, median=80) and was 23 years old (SD=20.7, median=15), at the time of the survey. Thus, the typical subsidiary was established just before Brazil adopted neo-liberal policies (see Section 4.3 of Chapter 4).

Table 6.9: Descriptive statistics for subsidiary characteristics

	N	Mean	SD	Median	Mode	Min	Max
Subsidiary age	395	23.03	20.70	15.00	10.00	2	178
Subsidiary size	395	282.6	641.40	80.00	30.00	1	8000
Export share	347	11.14	16.97	3.00	0.00	0	100
	N	Category			Frequency		%
HQ country of origin	395	HQ from the US			76		19.2
		HQ from Western Europe			271		68.6
		Otherwise			323		12.2
Industry	395	Low-/ medium-low tech			147		37.2
		High-/ medium-high tech			248		62.8
Subsidiary location (in Brazil)	395	South-East Brazil			221		55.9
		South Brazil			127		32.2
		Otherwise			47		11.9
Market scope	395	Domestic market scope			168		42.5
		International market scope			227		57.5

The export share of 11% shows that subsidiaries are not restricted to the Brazilian market. Indeed, 57.5% have an international market scope. 68.6% of the subsidiaries are part of Western European MNEs. 62.8% of the subsidiaries belong to the medium-high or high technology sector. More details can be found in Section 5.9 of Chapter 5.

As regards the variables of interest, i.e. location factors, market attractiveness (5.75), regulatory framework (5.73) and competitors in proximity (5.35) were evaluated highest by the respondents. All location factors have values well above the average of 3.5 (see Table 6.10 below).

Table 6.10: Descriptive statistics for location factors

	N	Mean	SD	Median	Mode	Min	Max
Cost advantages	395	4.73	1.55	5.00	5.00	1.00	7.00
Market attractiveness	395	5.75	0.94	6.00	6.00	2.50	7.00
Competitors in proximity	395	5.35	1.16	6.00	6.00	1.00	7.00
Supply conditions	395	4.93	1.59	5.50	5.50	1.00	7.00
Existence of scientific institutions	395	4.81	1.37	5.00	5.00	1.00	7.00
Availability of skilled employees	395	4.54	1.63	5.00	5.00	1.00	7.00
Country risk	395	4.79	1.38	5.00	5.67	1.00	7.00
Regulatory framework	395	5.73	0.86	6.00	6.00	2.67	7.00

In relation to the dependent variables, marketing activities have an average share of 36% of all activities of the MNE subsidiary; followed by manufacturing (25%), supply (24%) and R&D/PD (3%). The median of product models is 30 (mean=583, SD=3797). 19.5% of the manufacturing activities are grouped into the category of flexible manufacturing. The value for manufacturing schedule instability is above average (above 3.5 for this study's 7-point Likert-scale). The median of suppliers of the subsidiary is 80 (mean=464, SD=1649). Long supplier lead times (mean=1.94, SD=1.22) and supplier delivery unreliability (mean=2.53, SD=1.46) exhibit rather low values. Subsidiaries in the survey have a median of 200 customers, which do not appear to be very heterogeneous (mean=3.11, SD=1.93). Their demand over time seems to fluctuate only little (mean=2.77, SD=1.75). Regarding the classification of the R&D/PD activities, 70 subsidiaries are competence exploiting (i.e. rather low value-added) and 68 units are competence creating (i.e. HVA).

Table 6.11: Descriptive statistics for dependent variables

	N	Mean	SD	Median	Mode	Min	Max
Extent of R&D/PD	395	3.08	7.29	0.00	0	0	100
Extent of manufacturing	395	24.86	27.18	20.00	0	0	100
Extent of supply activities	395	23.73	25.12	20.00	0	0	100
Extent of marketing activities	395	36.03	33.11	28.00	0	0	100
Number of products	214	582.84	3797.7	30.00	30	1	40000
Flexible manufacturing	214	19.53	32.08	0.00	0	0	100
Manufacturing schedule inst.	214	3.99	2.47	4.00	1	1	7
Number of suppliers	233	464.00	1639.3	80.00	50	1	20000
Long supplier lead times	233	1.94	1.22	2.00	1	1	7
Supplier delivery unreliability	233	2.53	1.46	2.00	2	1	7
Number of customers	298	1503.8	9250.8	200.00	100	1	150000
Customer heterogeneity	298	3.11	1.93	3.00	1	1	7
Demand variability	298	2.77	1.75	2.00	1	1	7
	N	Category		Frequency		Percentage	
R&D/PD complexity	138	LVA R&D/PD		70		50.7	
		HVA R&D/PD		68		49.3	

The transformed variables (see Appendix C.1 for an overview) were correlated as to obtain a first overview of their bivariate relationships. As can be seen in the correlation matrix reproduced in Table 6.12 below, there exist no correlations that are close to the critical value of 0.9 (Field 2009; Hair et al. 1998). This supports the view expressed in Section 6.2.3.3 of this Chapter that this research should not be affected by multicollinearity.

Table 6.12: Correlation matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Extent of R&D/PD	1																				
Extent of manufacturing	.392*	1																			
Extent of supply	.326*	.276*	1																		
Extent of marketing	.081†	-.425*	-.391*	1																	
Cost advantages	.150*	.185*	.145*	.033	1																
Market attractiveness	.026	-.003	.024	-.012	.261*	1															
Competitors in proximity	.071	.158*	.048	.056	.480*	.654*	1														
Supply conditions	.195*	.267*	.246*	-.124†	.654*	.216*	.150*	1													
Exist. scientific institution	.122†	.049	.040	.105†	.390*	.247*	.266*	.351*	1												
Avail. skilled employees	.161*	.100†	.088	.043	.734*	.169*	.309*	.513*	.346*	1											
Country risk	.050	-.003	.097	-.047	.099†	.063	.010	.081	.298*	.196*	1										
Regulatory framework	-.055	.093	.022	-.053	.182*	.449*	.167*	.248*	.260*	.150*	.175*	1									
Subsidiary age	.196*	.177*	.070	-.035	.109†	-.046	.027	.114†	.070	.095	.150*	.025	1								
Subsidiary size	.452*	.609*	.233*	-.252*	.183*	-.019	.081	.224*	.015	.162*	.127†	.077	.290*	1							
Export share	.444*	.341*	.175*	-.069	.128†	-.078	.037	.229*	.014	.178*	.041	-.012	.276*	.383*	1						
US parent firm	-.014	-.019	-.033	-.011	.006	.095	-.054	-.077	-.026	.027	.071	.058	.061	.059	-.018	1					
EU parent firm	.024	.070	.088	-.015	.041	-.027	.054	.091	.030	.001	-.015	.044	-.071	.028	.044	-.690*	1				
Industry dummy	.065	.028	-.026	.056	-.045	.005	.033	-.009	-.023	-.017	.043	.079	-.036	.068	.071	.079	-.055	1			
South-East Brazil dummy	-.031	.108†	-.003	-.032	-.003	.018	-.125†	-.046	-.010	-.034	.071	.056	.155*	.163*	.107†	-.017	.016	.129†	1		
South Brazil dummy	.079	-.078	.028	.027	-.040	.021	.098	.036	-.008	-.028	-.010	-.063	-.154*	-.128†	-.064	-.030	.052	-.076	-.776*	1	
Market scope	.301*	.339*	.088	-.070	.130*	-.092	.093	.158*	.068	.192*	.130*	.004	.250*	.375*	.764*	.061	-.050	.047	.155*	-.099	1

Notes: *, † indicate 0.01 and 0.05 significance levels, respectively (2-tailed). N=395 (i.e. full sample).

6.3 Regression models and results

As indicated earlier, in this study both the extent to which a subsidiary conducts an activity sets and the degree of value added within those sets are analysed. Even if the former is not directly related to testing hypotheses, it is useful for enriching the discussion. As shown in Table 6.13 on the next page, 13 models are analysed through ordinary least squares (OLS) regressions. Applying the equation described in Section 5.10 of Chapter 5, the corresponding regression equations for this thesis take the following format:

$Y_i = b_0 + b_1$ cost advantages + b_2 market attractiveness + b_3 competitors in proximity + b_4 supply conditions + b_5 existence of scientific institutions + b_6 availability of skilled employees + b_7 country risk + b_8 regulatory framework + b_9 subsidiary age + b_{10} subsidiary size + b_{11} export share + b_{12} US dummy + b_{13} Europe dummy + b_{14} industry dummy + b_{15} South-East Brazil dummy + b_{16} South Brazil dummy + b_{17} market scope dummy + ε_i ,

where Y_i is the dependent variable. The operational definitions for the dependent variables of Models 1-4 are shown in Section 5.8.1 (on page 132), whereas the specifications for the dependent variables of Models 5-14 are provided in Section 5.8.2 (page 140). Table 5.6 on page 141 provides information on location factors, i.e. independent variables.

The presentation of the results is in line with related studies in the field (Benito et al. 2003; Frost et al. 2002; Yamin & Andersson 2011). The decision to present the standardised beta coefficients and the t-values sought to increase the clarity of the results presentation. These are reported in Table 6.14 and Table 6.15. Due to their measurement in standard deviation units, standardised beta coefficients allow for the evaluation of the relative impact for each predictor variable upon the dependent variable (Kerr et al. 2002).

Table 6.13: Overview of regression models

Predictor variables	Dependent variable (Y_i)		Sample size	Model #	Statistical technique
	Activity set	Measure			
Models examining the extent of each activity set					
Location factors	R&D/PD	Percentage of set	395	1	OLS
	Manufacturing	Percentage of set	395	2	OLS
	Supply	Percentage of set	395	3	OLS
	Marketing	Percentage of set	395	4	OLS
Models examining the degree of value added in each activity set					
Location factors	Manufacturing	Number of products	214	5	OLS
		Flexible manufacturing	214	6	OLS
		Manufacturing schedule	214	7	OLS
	Supply	Number of suppliers	233	8	OLS
		Long supplier lead times	233	9	OLS
		Supplier delivery	233	10	OLS
	Marketing	Number of customers	298	11	OLS
		Customer heterogeneity	298	12	OLS
		Demand variability	298	13	OLS
	R&D/PD	R&D/PD category	138	14	LR

Table 6.13 provides a summary about the models that were statistically tested. As outlined above, the models differ in terms of sample size since the configuration of subsidiary value chains varies. For example, 298 subsidiaries of our sample conducted marketing activities, while only 214 carried out manufacturing. To remind the reader, for the supply, marketing and manufacturing activity set, three models each help proxy the association between HVA and location factors. There is only one model as regards the R&D/PD set, as to ensure validity of the dependent variable (see Section 5.8.2 of Chapter 5).

6.3.1 Model statistics

Except for Model 6, all regression models are significant. It was decided to ignore Model 6 as there are two other models that explain relationships between location factors and HVA in this activity set, i.e. manufacturing. The other models work well. R^2 and F values are in line with similar studies in the international business literature that rely on a cross-sectional research design and use OLS regressions (e.g. Ambos et al. 2006; Benito et al. 2003; Demirbag et al. 2007; Hansen et al. 2009; Indro & Richards 2007; O'Donnell 2000; Petersen et al. 2008; Yamin & Andersson 2011).

The models for the extent of activity sets (models 1-4) show F-ratios ranging from 3.23 to 19.14 and R^2 values between 0.127 and 0.416. The supply (model 3) and marketing (model 4) models have lower explained variance than the models for R&D/PD and manufacturing, which have been the most widely analysed sets in IB research (Davis & Meyer 2004; Frost et al. 2002; Hansen & Løvås 2004). All four models are very significant ($p<0.001$).

The models for the degree of value added within the manufacturing set (models 5-7) show F-ratios between 0.84 and 6.09 and R^2 scores between 0.068 and 0.346. While Model 5 and Model 7 are significant ($p<0.001$ and $p<0.01$, respectively), Model 6 is insignificant and is thus not considered for hypothesis testing.

The models for the degree of value added in the supply set (models 8-10) exhibit F-values ranging from 2.46 and 6.09 and R^2 values between 0.164 and 0.333. All three models are at least significant at the 1% level.

The models for the degree of value added in the marketing activity set (model 11-13) show F-scores between 2.27 and 3.78. Their R^2 values range from 0.122 and 0.188. Again, all three models are at least significant at the 1% level.

Model 14, which has the binary competence-creating variable as the dependent variable, is the only model based on logistic regression. The model chi-square is significant at the 10% level and the Nagelkerke R^2, an R^2-type measure, is 0.237. This indicates that, overall, the model is meaningful. Even though higher values would have been desirable they are in line with previous research using logistic regression (Frost et al. 2002; He & Wei 2011; Sawers et al. 2008).

6.3.2 Models related to the extent of activity sets

This sub-section presents the results of the regression models that analyse the relationships between location factors and the extent to which the foreign subsidiary carries out a certain activity set. As stated earlier, these results provide additional information that enriches the discussion in Chapter 7.

Model 1 indicates that the *R&D/PD* activity set has a positive relationship with market attractiveness and the availability of skilled employees. There is a negative association with the regulatory framework. Model 2 suggests that the extent of the *manufacturing* activity set is positively related with the availability of skilled employees and supply conditions, whereas it exhibits a negative association with cost advantages and the existence of scientific institutions. Model 3 indicates that the extent of the *supply* set is positively associated with supply conditions, the availability of skilled employees and low country risk. In Model 4, a negative relationship exists for the extent of the *marketing* set and supply conditions, whereas the set is positively related with cost advantages, competitors in proximity and the existence of scientific institutions.

Table 6.14: OLS regression results for extent of activity sets (models 1-4)

	Model 1 (n=390)			**Model 2** (n=391)			**Model 3** (n=395)			**Model 4** (n=394)		
	Extent of R&D/PD activity set			Extent of manufac-turing activity set			Extent of supply activity set			Extent of marketing activity set		
	β	t-value	sig.	β	t-value	sig.	β	t-value	sig.	β	t-value	sig.
Cost advantages	.031	.537		-.096	-1.737	†	-.035	-.518		.184	2.676	**
Market attractiveness	.109	2.404	*	-.017	-.389		-.022	-.405		-.012	-.228	
Competitors in proximity	-.010	-.200		.032	.657		-.097	-1.608		.118	1.932	†
Supply conditions	-.051	-.870		.133	2.353	*	.226	3.218	**	-.274	-3.870	***
Existence of scientific institutions	.073	1.603		-.074	-1.704	†	-.085	-1.557		.121	2.200	*
Availability of skilled employees	.100	2.006	*	.167	3.522	***	.150	2.500	*	-.001	-.024	
Country risk	.013	.287		-.046	-1.079		.125	2.326	*	-.050	-.921	
Regulatory framework	-.176	-3.900	***	.017	.384		-.050	-.929		-.027	-.490	
Subsidiary age	.017	.392		-.005	-.124		-.014	-.259		.031	.594	
Subsidiary size	.390	8.479	***	.545	12.370	***	.154	2.781	**	-.258	-4.616	***
Export share	.443	6.727	***	.040	.633		.163	2.063	*	.065	.814	
US dummy	.020	.359		.032	.602		.047	.696		-.021	-.302	
Europe dummy	.027	.467		.055	1.034		.082	1.214		-.020	-.289	
Industry dummy	.026	.625		-.020	-.524		-.043	-.882		.083	1.665	†
South-East Brazil dummy	.011	.162		.026	.413		.006	.078		.041	.511	
South Brazil dummy	.114	1.762	†	.000	-.007		.029	.374		.044	.560	
Market scope dummy	-.164	-2.508	*	.081	1.296		-.137	-1.741	†	-.044	-.549	
R	.645			.683			.375			.356		
R-square	.416			.466			.141			.127		
F-value (sig.)	15.610***			19.144***			3.633***			3.225***		

Notes: ***, **, * and † indicate 0.1%, 1%, 5% and 10% significance levels, respectively. Standardised beta coefficients reported.

6.3.3 Testing of the research hypotheses

Hypothesis 1a: Cost advantages will have a significant negative effect on the likelihood of high value added in the R&D/PD activity set, if compared to low value added.

Hypothesis 1b: Cost advantages will have no significant association with the degree of value added in the manufacturing activity set.

Hypothesis 1c: Cost advantages will be significantly negatively associated with the degree of value added in the supply activity set.

Hypothesis 1d: Cost advantages will be significantly negatively associated with the degree of value added in the marketing activity set.

For the *R&D/PD* activity set, the predicted negative relationship with cost advantages was found in this study, at a 10% significance level (Hypothesis 1a). As shown in Table 6.17, no statistical significance was found for the *manufacturing* set, suggesting that cost advantages have no impact on the degree of value added, as was predicted (H1b). As regards the *supply* set, only the relationship between cost advantages and supplier delivery unreliability had the expected negative sign and was significant ($p<0.10$). Hence, there is no support for the advanced hypothesis (H1c). All relationships for the *marketing* set had the expected negative sign, but solely customer heterogeneity became significant ($p<0.05$), meaning that partial support was found (H1d). Overall, cost advantages seem to play a moderately negative role for HVAAs.

Hypothesis 2a: Market attractiveness will have no significant effect on the likelihood of high value added in the R&D/PD activity set, if compared to low value added.

Hypothesis 2b: Market attractiveness will be significantly positively associated with the degree of value added in the manufacturing activity set.

Hypothesis 2c: Market attractiveness will be significantly positively associated with the degree of value added in the supply activity set.

Hypothesis 2d: Market attractiveness will be significantly positively associated with the degree of value added in the marketing activity set.

As regards the *R&D/PD* activity set, a positive relationship with market attractiveness was found, though it was insignificant. This lends support to Hypothesis 2a, which predicted no influence. For the *manufacturing* set, a negative relationship ($p<0.05$) was found regarding manufacturing schedule instability. It was expected that market attractiveness has no effect on the degree of value added in this set (H2b). In each of the models for the *supply* activity set, the coefficients had a negative (i.e. opposite) sign and the variables failed to reach significance. Thus, no support is found for Hypothesis 2c. In relation to the *marketing* activity set, customer heterogeneity and demand variability showed the opposite sign and were significant ($p<0.05$), suggesting a rejection of Hypothesis 2d. Overall, market attractiveness is not an important location determinant for HVAAs.

Hypothesis 3a: Competitors in close proximity will have a significant positive effect on the likelihood of high value added in the R&D/PD activity set, if compared to low value added.

Hypothesis 3b: Competitors in close proximity will be significantly positively associated with the degree of value added in the manufacturing activity set.

Hypothesis 3c: Competitors in close proximity will be significantly positively associated with the degree of value added in the supply activity set.

Hypothesis 3d: More competitors in close proximity will be significantly positively associated with the degree of value added in the marketing activity set.

In relation to the *R&D/PD* activity set, the expected positive relationship was found, but it was not significant. Thus, there is no support for Hypothesis 3a. Both models for the *manufacturing* activity showed no statistical significance for the relationship with competitors in proximity. This means that there is no support for the predicted positive relationship (H3b). As regards the *supply* set, the relationships in all three models were positive (as expected in H3c), but they were not statistically significant. For the *marketing* activity set, two models showed negative (i.e. opposite) relationships, one of which was significant at the 5% level. Therefore, there is no support for Hypothesis 3d. Overall, competitors in proximity seem to have no association with HVAAs.

Hypothesis 4a: Favourable supply conditions will have a significant negative effect on the likelihood of high value added in the R&D/PD activity set, if compared to low value added.

Hypothesis 4b: Favourable supply conditions will be significantly positively associated with the degree of value added in the manufacturing activity set.

Hypothesis 4c: Favourable supply conditions will be significantly positively associated with the degree of value added in the supply activity set.

Hypothesis 4d: Favourable supply conditions will have no significant association with the degree of value added in the marketing activity set.

A negative relationship between supply conditions and competence creating (i.e. HVA) in the *R&D/PD* activity set was found, but it was not significant. It was predicted that there is no association (H4a). As regards the *manufacturing* set, there was a negative (i.e. opposite) relationship for the number of products ($p<0.10$). Thus, no support was found for Hypothesis 4b. For the *supply* activity set, two models had negative (i.e. opposite) coefficients, one of which was significant ($p<0.05$), meaning that no support was found (4c). No significant relationship was found in the models for the *marketing* set, implying that supply conditions have no impact on the degree of value added, as was expected (H4d). Overall, this location factor is not an important determinant for HVAAs.

Hypothesis 5a: The existence of scientific institutions will have a significant positive effect on the likelihood of high value added in the R&D/PD activity set, if compared to low value added.

Hypothesis 5b: The existence of scientific institutions will be significantly positively associated with the degree of value added in the manufacturing activity set.

Hypothesis 5c: The existence of scientific institutions will have no significant association with the degree of value added in the supply activity set.

Hypothesis 5d: The existence of scientific institutions will have no significant association with the degree of value added in the marketing activity set.

A positive and significant coefficient ($p<0.10$) was found for the existence of scientific institutions in the model for R&D/PD, providing partial support for Hypothesis 5a. For both models of the *manufacturing* set, the expected positive relationship was found, though only one, i.e. number of products, was statistically significant (p<0.10). Hence, partial support is provided in this thesis (H5b). In relation to the *supply* set, all relationships failed to become statistically significant, suggesting that the existence of scientific institutions has no impact on the degree of value added, as was expected (H5c). For the *marketing* activity set, the co-efficient was only significant for customer heterogeneity (p<0.10). This suggests that there is no association, as was expected (H5d). Overall, scientific institutions appear to influence some HVAAs of the foreign-owned subsidiary.

Hypothesis 6a: The availability of skilled employees will have a significant positive effect on the likelihood of high value added in the R&D/PD activity set, if compared to low value added.

Hypothesis 6b: The availability of skilled employees will be significantly positively associated with the degree of value added in the manufacturing activity set.

Hypothesis 6c: The availability of skilled employees will be significantly positively associated with the degree of value added in the supply activity set.

Hypothesis 6d: The availability of skilled employees will be significantly positively associated with the degree of value added in the marketing activity set.

Regarding the *R&D/PD* activity set, the predicted positive relationship with the availability of skilled employees existed (H6a), though it is not significant. Both models for the *manufacturing* set had the expected positive coefficient, but they were not significant. Hence, no support was provided for Hypothesis 6b. Regarding the *supply* activity set, all relationships failed to become statistically significant, implying that the availability of skilled employees has no impact on the degree of value added. A positive relationship was expected (H6c). In relation to the *marketing* activity set, the coefficient had the predicted positive sign in all of the models. It became statistically significant, at the 5% level, for number of customers and customer heterogeneity. Hence, Hypothesis 6d is supported. As a whole, the availability of skilled employees seems to have limited association with HVAAs.

Hypothesis 7a: A favourable institutional environment will have a significant positive effect on the likelihood of high value added in the R&D/PD activity set, if compared to low value added.

Hypothesis 7b: A favourable institutional environment will be significantly positively associated with the degree of value added in the manufacturing activity set.

Hypothesis 7c: A favourable institutional environment will be significantly positively associated with the degree of value added in the supply activity set.

Hypothesis 7d: A favourable institutional environment will be significantly positively associated with the degree of value added in the marketing activity set.

In Section 3.2.7 of Chapter 3, it was predicted that the institutional environment should be positively correlated with HVA in each of the activity sets (H7a-7d). To remind the reader, the institutional environment was divided into two dimensions, i.e. country risk and regulatory environment, to provide a more fine-grained level of analysis. The results indicate that solely the relationship between country risk and long supplier lead times was significant, at the 5% level. Thus, there is partial support for the *supply* set (H7c). Conversely, no support was provided for the other activity sets. Overall, the institutional environment is not an important location factor for HVAAs at the foreign-owned subsidiary.

Table 6.15: OLS regression results for value added in activity sets (models 5-13)

	Manufacturing activity set									Supply activity set								
	Model 5 (n=211)			**Model 6** (n=214)			**Model 7** (n=212)			**Model 8** (n=231)			**Model 9** (n=231)			**Model 10** (n=233)		
	Number of products			Flexible manufacturing			Man. schedule instability			Number of suppliers			Long supplier lead times			Supplier delivery unreliability		
	β	t-value	sig.	β	t-value	sig.	β	t-value	sig.	β	t-value	sig.	β	t-value	sig.	β	t-value	sig.
Cost advantages	.001	.017		.005	.050		.070	.722		.052	.601		-.002	-.025		-.162	-1.690	†
Market attractiveness	.057	.874		.033	.402		-.159	-2.040	*	-.105	-1.572		-.104	-1.394		-.035	-.469	
Competitors in proximity	-.016	-.240		.025	.307		.120	1.577		.032	.498		.001	.010		.079	1.120	
Supply conditions	-.133	-1.848	†	.066	.748		.097	1.169		.010	.147		-.021	-.276		-.180	-2.360	*
Exist. scientific institution	.111	1.701	†	-.143	-1.733	†	.059	.751		.010	.157		-.003	-.038		-.053	-.719	
Avail. skilled employees	.003	.047		.073	.719		.128	1.345		.007	.087		.032	.348		.000	-.004	
Country risk	-.062	-.966		-.033	-.417		.114	1.532		.068	1.067		.177	2.496	*	.002	.025	
Regulatory framework	.038	.592		-.125	-1.595		-.023	-.308		-.002	-.030		-.100	-1.372		-.039	-.546	
Subsidiary age	.031	.483		.038	.488		.093	1.276		.062	1.000		-.078	-1.114		-.140	-2.006	*
Subsidiary size	-.565	-8.961	***	-.056	-.741		-.034	-.468		.333	5.151	***	-.263	-3.627	***	.020	.282	
Export share	.016	.187		-.105	-1.033		.032	.334		.235	2.739	**	.230	2.380	*	.070	.732	
US dummy	.043	.481		.118	1.098		-.016	-.162		.037	.434		.122	1.293		.067	.712	
Europe dummy	.076	.850		.191	1.814	†	.054	.546		.174	2.059	*	.077	.819		.095	1.007	
Industry dummy	.066	1.095		.030	.420		-.064	-.946		.074	1.255		-.072	-1.092		-.126	-1.648	†
South-East Brazil dummy	.105	1.024		.176	1.435		.063	.543		-.012	-.201		.125	1.808	†	.091	1.319	
South Brazil dummy	.039	.383		.175	1.442		.131	1.147		-.130	-2.235	*	-.020	-.301		.030	.463	
Market scope dummy	-.058	-.695		.109	1.107		.063	.677		.020	.241		-.249	-2.624	**	-.134	-1.421	
R	.588			.260			.417			.577			.405			.406		
R-square	.346			.068			.174			.333			.164			.165		
F-value (sig.)	6.094***			.837			2.413**			6.256***			2.457**			2.503**		

Notes: ***, **, * and † indicate 0.1%, 1%, 5% and 10% significance levels, respectively. Standardised beta coefficients reported.

Table 6.15: continued

	Marketing activity set								
	Model 11 (n=295)			**Model 12** (n=296)			**Model 13** (n=297)		
	Number of costumers			Customer heterogeneity			Demand variability		
	β	t-value	sig.	β	t-value	sig.	β	t-value	sig.
Cost advantages	-.094	-.966		-.200	-2.003	*	-.077	-.784	
Market attractiveness	.038	.607		-.137	-2.130	*	-.139	-2.156	*
Competitors in proximity	-.138	-2.087	*	-.096	-1.394		.066	.976	
Supply conditions	.130	1.634		.075	.896		-.073	-.894	
Existence of scientific institutions	.067	1.046		-.119	-1.783	†	-.070	-1.069	
Availability of skilled employees	.195	2.307	*	.181	2.064	*	.032	.376	
Country risk	.023	.398		.090	1.466		-.068	-1.123	
Regulatory framework	.035	.551		.042	.649		-.040	-.619	
Subsidiary age	.185	3.150	**	-.035	-.579		-.117	-1.945	†
Subsidiary size	-.005	-.081		.065	1.011		.245	3.893	***
Export share	.017	.199		.142	1.577		.027	.309	
US dummy	.027	.348		.033	.413		.137	1.717	†
Europe dummy	.113	1.470		.118	1.468		.205	2.582	**
Industry dummy	-.091	-1.634		-.001	-.016		-.006	-.106	
South-East Brazil dummy	.013	.224		-.090	-1.508		.002	.018	
South Brazil dummy	-.017	-.299		.085	1.423		.062	.650	
Market scope dummy	.152	1.776	†	-.122	-1.365		-.087	-1.001	
R	.434			.350			.379		
R-square	.188			.122			.144		
F-value (sig.)	3.782***			2.279**			2.752***		

Notes: ***, **, * and † indicate 0.1%, 1%, 5% and 10% significance levels, respectively.

Table 6.16: Logistic regression results for model 14

Predictor variables	Model 14 Competence-creating R&D/PD	
	β	S.E.
Location factors		
Cost advantages	-2.664	1.620†
Market attractiveness	0.093	1.224
Competitors in proximity	0.017	1.133
Supply conditions	-0.944	1.483
Existence of scientific institutions	1.953	1.165†
Availability of skilled employees	1.337	1.316
Country risk	-0.971	1.240
Regulatory framework	1.810	1.608
Control variables		
Subsidiary age	-0.144	0.628
Subsidiary size	0.795	0.381*
Export share	1.685	0.559**
US dummy	-0.139	0.494
EU dummy	1.986	0.372*
Industry dummy	0.324	0.417
South-East Brazil dummy	1.784	0.210*
South Brazil dummy	0.378	0.407
Market scope dummy	-0.800	0.646
Constant	-0.3034	1.281*
-2 log-likelihood	166.824	
Model chi-square	26.784†	
df	17	
Nagelkerke R^2	.237	
% of cases classified correctly	67.8	

Notes: **, * and † indicate 1%, 5% and 10% significance levels. N=138.

Table 6.17: Summary of empirical findings

Location factor	Hypothesis	Expected sign	Complexity measure	Result sign	Result sig.	Overall assessment of HVA (per set)	Overall assessment of location factors
Cost advantages	R&D/PD (1a)	-	Competence-creating	-	10%	Partial support	Partial association
	Manufacturing (1b)	0	Number of products	+	not sig.	Supported	
			Man. schedule instability	+	not sig.		
	Supply (1c)	-	Number of suppliers	+	not sig.	No support	
			Long supplier lead times	-	not sig.		
			Supplier delivery unreliability	-	10%		
	Marketing (1d)	-	Number of customers	-	not sig.	Partial support	
			Customer heterogeneity	-	5%		
			Demand variability	-	not sig.		
Market attractiveness	R&D/PD (2a)	0	Competence-creating	+	not sig.	Supported	Partial association
	Manufacturing (2b)	0	Number of products	+	not sig.	Partial support	
			Man. schedule instability	-	5%		
	Supply (2c)	+	Number of suppliers	-	not sig.	No support	
			Long supplier lead times	-	not sig.		
			Supplier delivery unreliability	-	not sig.		
	Marketing (2d)	+	Number of customers	+	not sig.	No support	
			Customer heterogeneity	-	5%		
			Demand variability	-	5%		
Competitors in proximity	R&D/PD (3a)	+	Competence-creating	+	not sig.	No support	No association
	Manufacturing (3b)	+	Number of products	-	not sig.	No support	
			Man. schedule instability	+	not sig.		
	Supply (3c)	+	Number of suppliers	+	not sig.	No support	
			Long supplier lead times	+	not sig.		
			Supplier delivery unreliability	+	not sig.		
	Marketing (3d)	+	Number of customers	-	5%	No support	
			Customer heterogeneity	-	not sig.		
			Demand variability	+	not sig.		

Location factor	Hypothesis	Expected sign	Complexity measure	Result sign	Result sig.	Overall assessment of HVA (per set)	Overall assessment of location factors
Supply conditions	R&D/PD (4a)	-	Competence-creating	-	not sig.	No support	No association
	Manufacturing (4b)	+	Number of products	-	10%	No support	
			Man. schedule instability	+	not sig.		
	Supply (4c)	+	Number of suppliers	+	not sig.	No support	
			Long supplier lead times	-	not sig.		
			Supplier delivery unreliability	-	5%		
	Marketing (4d)	0	Number of customers	+	not sig.	Supported	
			Customer heterogeneity	+	not sig.		
			Demand variability	-	not sig.		
Existence of scientific institutions	R&D/PD (5a)	+	Competence-creating	+	10%	Partial support	Partial association
	Manufacturing (5b)	+	Number of products	+	10%	Partial support	
			Man. schedule instability	+	not sig.		
	Supply (5c)	0	Number of suppliers	+	not sig.	Supported	
			Long supplier lead times	-	not sig.		
			Supplier delivery unreliability	-	not sig.		
	Marketing (5d)	0	Number of customers	+	not sig.	Supported	
			Customer heterogeneity	-	10%		
			Demand variability	-	not sig.		
Availability of skilled employees	R&D/PD (6a)	+	Competence-creating	+	not sig.	No support	Partial association
	Manufacturing (6b)	+	Number of products	+	not sig.	No support	
			Man. schedule instability	+	not sig.		
	Supply (6c)	+	Number of suppliers	+	not sig.	No support	
			Long supplier lead times	+	not sig.		
			Supplier delivery unreliability	-	not sig.		
	Marketing (6d)	+	Number of customers	+	5%	Supported	
			Customer heterogeneity	+	5%		
			Demand variability	+	not sig.		

Location factor	Hypothesis	Expected sign	Complexity measure	Result sign	Result sig.	Overall assessment of HVA (per set)	Overall assessment of location factors
Country risk	R&D/PD (7a)	+	Competence-creating	-	not sig.	No support	No association
	Manufacturing (7b)	+	Number of products	-	not sig.	No support	
			Man. schedule instability	+	not sig.		
	Supply (7c)	+	Number of suppliers	+	not sig.	Partial support	
			Long supplier lead times	+	5%		
			Supplier delivery unreliability	+	not sig.		
	Marketing (7d)	+	Number of customers	+	not sig.	No support	
			Customer heterogeneity	+	not sig.		
			Demand variability	-	not sig.		
Regulatory framework	R&D/PD (7a)	+	Competence-creating	+	not sig.	No support	No association
	Manufacturing (7b)	+	Number of products	+	not sig.	No support	
			Man. schedule instability	-	not sig.		
	Supply (7c)	+	Number of suppliers	-	not sig.	No support	
			Long supplier lead times	-	not sig.		
			Supplier delivery unreliability	-	not sig.		
	Marketing (7d)	+	Number of customers	+	not sig.	No support	
			Customer heterogeneity	+	not sig.		
			Demand variability	-	not sig.		

6.4 Summary

Chapter 6 presented the results of the statistical data analysis. In the first part, the variables were transformed and aggregated. The second part dealt with the pre-tests that were carried out to ensure that all assumptions were met to allow for executing OLS and logistic regression analysis. Then, post-checks showed that common method bias is not a problem in this study and that the regression models are robust. This was followed by a presentation of the descriptive statistics as well as the correlation matrix.

The findings of the regression analyses provide only very limited support for the expected associations advanced in Chapter 3. A few observations stand out. First, the coefficient of a location factor often has different signs for the same activity set, indicating that there could be differences in terms of the type of complexity (i.e. detail and dynamic). Second, only in 1 out of 18 relationships concerning institutional factors the variables were statistically significant, casting some doubt on the – widely voiced – importance of the institutional environment in emerging economies. Third, the rather high magnitude of control coefficients is noteworthy. All this indicates that in the context of HVAAs executed by the foreign-owned subsidiary the local environment is less salient. This is further substantiated by the findings of the complementary models, i.e. those that analysed the association between the extent of activity sets and location factors. They exhibited a higher number of statistically significant location coefficients.

The findings will be further discussed and interpreted in the next chapter.

7 DISCUSSION OF RESULTS

7.1 Introduction

The empirical findings presented in Chapter 6 are discussed in this chapter. The results will be discussed in relation to the research questions stated in Chapter 1:

1. To what extent do location factors affect HVAAs in each activity set of the foreign-owned subsidiary in emerging economies? (Section 7.2)
2. What are the main location factors that affect HVAAs (in general) at the foreign-owned subsidiary in emerging economies? (Section 7.3)
3. What are key characteristics of the foreign subsidiary for HVAAs? (Section 7.4)

In Section 7.5, the findings are discussed from the perspective of literature on the resource-based view (RBV), the capabilities-based view, knowledge, and complexity. This chapter is summarised in Section 7.7. Managerial and policy implications, i.e. answers to research question 4, are discussed in Chapter 8 below.

7.2 Location factors and high value added within activity sets

7.2.1 Cost-related advantages

Overall, the results indicate that Brazil is not attractive in terms of *cost-related advantages* for foreign MNEs. This is not surprising because Brazil is renowned to exhibit higher costs than emerging economies in Asia (Boehe 2010; see also Section 4.4 of Chapter 4). It has also been posited to be less viable as location for assembly, due to its geographical distance from advanced markets in the US and Europe (Grosse 2006). With regards to the degree of value added, the findings of this study exhibit only three significant associations in the nine models. Thus, cost advantages are generally not more relevant to HVAAs than to activities of less value added. In other words, this location factor does not help explain why HVAAs are performed at the foreign-owned subsidiary. Equally, cost-related advantages only seem to affect the extent of activities in the marketing set (see Section 6.3.2 of Chapter 6). At the same time, the high ratings for the items of the construct suggest that cost advantages could be a necessary but not sufficient location facet for the extent in the other activity sets of the foreign-owned subsidiary.

In Section 3.2.1 of Chapter 3, a negative association was expected between cost advantages and competence-creating R&D/PD, as such advantages are most conducive to lower value-added activities in this activity set, such as adaptation (Fifarek & Veloso 2010; Mudambi 2008). In this study, the expected relationship was found to be statistically significant, even if at a moderate level.

Interestingly, there appears to be no direct relationship between cost advantages in the host country and the extent of R&D/PD activities. This is striking because cost advantages have been labelled as a key location factor for foreign R&D/PD in emerging markets (Demirbag & Glaister 2010; Lewin et al. 2009). On a general level, Kumar (2001) found that the relative cost of R&D personnel affects the global pattern of location of foreign R&D. The conflicting findings of this thesis may be ascribed to the fact that Brazil has higher labour costs than other emerging markets (Boehe 2010, see Section 4.4 of Chapter 4). Thus, even if the indicators of the cost advantages construct are rated above average (see Section 6.2.2.2 of Chapter 6), this may not result in more R&D/PD activities at the foreign-owned subsidiary because other host countries may provide better opportunities for cutting the overall cost of R&D/PD conducted by the MNE. Kedia and Mukherjee (2009) argue that India, China and the Philippines provide this type of opportunity, due to the huge, yet cheap, R&D labour pools available in these countries.

In Section 3.2.1 of Chapter 3, it was stated that *cost advantages* would show no association with HVA in manufacturing, since MNEs are likely to conduct all manufacturing activities, i.e. of variant degrees of value added, in locations that provide cost savings, provided that other production-related factors are available. The results of this thesis show a positive coefficient, which is not significant. This indicates that cost advantages do not distinguish the nature of value-added activities in the manufacturing set. Concerning the extent of this set, a moderate negative effect was found (see Section 6.3.2 of Chapter 6).

While the findings of this thesis indicate that cost advantages are equally important to both LVAAs and HVAAs in the manufacturing activity set, the negative effect on the extent of activities in this set is counterintuitive, especially in light of the ample evidence of research that has corroborated the essential role of low costs for FDI (e.g. Bevan et al. 2004; Disdier & Mayer 2004; Kang & Jiang 2012). One potential explanation is that – in the case of Brazil – cost advantages may be interpreted as a signal for lower productivity (i.e. lower value added per employee). Productivity is widely accepted as more important than the mere cost of factors of production (Mataloni 2011; Song 2002). As stated above, Brazil is a mid-cost country. Hence, higher levels of productivity are required to offset relative wage disadvantages vis-à-vis low-cost countries. Essentially, for MNEs, Brazil does not appear to provide efficiency-related cost advantages for production. Instead, skills, which are a key driver of productivity, tend to dominate (see Section 7.2.6 below).

It was anticipated in Section 3.2.1 of Chapter 3 that *cost advantages* would have a negative association with HVAAs in the supply set, as they are less likely to draw upon this location factor than LVAAs. Yet, the association was not significant. This suggests that cost factors are equally important to all activities in the supply set. Likewise, as the results of this study show that the extent of supply activities is affected by cost advantages (see Section 6.3.2 of Chapter 6), this location aspect appears to be necessary but not sufficient for HVAAs in the supply set. One way of interpreting this is that all activities in the supply set will be geared, to a certain extent, toward cost optimisation. Thus, to help explain differences in the degree of value added in this set other – external or internal – factors may be more critical.

It was hypothesised in Section 3.2.1 of Chapter 3 that *cost advantages* would be negatively associated with the degree of value added in the marketing set, since this location factor is more relevant to LVAAs. The findings partially support this hypothesis; the coefficient has the anticipated sign in all models, and is significant in one of them. This suggests that other factors are sought for HVAAs in the marketing set. In specific, knowledge-intensive inputs such as large pools of skilled employees have been put forward in this respect (Cantwell & Mudambi 2011). Indeed, this thesis has found evidence for the relevance of skilled labour for HVA in the marketing set (see Section 7.2.6. below).

7.2.2 Market attractiveness

There exist three significantly negative relationships between market attractiveness and the degree of value added: one in the manufacturing set and two in marketing. This indicates a generally limited effect of this location factor.

It was predicted in Section 3.2.2 of Chapter 3 that no association exists between the market attractiveness of the host region and the likelihood of HVA R&D/PD, which is reflected in the results of this research. Therefore, this location facet does not increase the likelihood of competence-creating R&D (vis-à-vis competence exploiting). Instead, it seems that market attractiveness is equally relevant to LVAAs and HVAAs in the R&D/PD set. This interpretation is supported by the finding that an attractive market is positively associated with the extent of all activities in this activity set (see Section 6.3.2 of Chapter 6). In prior research, Cantwell and Mudambi (2005) examined 225 foreign subsidiaries in the UK and found that market potential does not influence competence-creating R&D. The same result was shown by Kuemmerle (1999) who analysed R&D units of 32 MNEs of the Triad region. However, Blomkvist et al. (2010) found that local market size has a positive effect on the likelihood of a subsidiary's entry into technologies that are new to the entire MNE. In their work, they analysed 211 US-based subsidiaries owned by 21 Swedish MNEs, which casts some doubt about the generalisability of their results. In fact, the US may be a special case. The present study indicates that market attractiveness positively affects all R&D/PD activities, but does not help explain the likelihood of HVAAs, vis-à-vis LVAAs, in this set. As such, it contributes to existing research in validating prior findings gained in developed country contexts, such as the UK or the US, in an emerging economy setting.

Hypothesis 2b proposed that no association would exist between market attractiveness and the degree of value added in the manufacturing set, because potential demand should mainly affect the scale, but not the quality of this activity set (see Section 3.2.2 of Chapter 3). A negative sign ($p<0.05$) was found in one of the models. Thus, the greater market attractiveness the more stable the manufacturing schedule.

The results of this thesis indicate that dynamic complexity in the manufacturing activity set decreases in large markets. As such, the activity set is less likely to be unique, valuable and difficult to copy (see Section 2.2.3 of Chapter 2). One potential explanation is that foreign-subsidiaries may increase their inventory levels as to cope with larger markets (Zhao et al. 2013). This or similar means may help to augment manufacturing schedule stability and, in turn, profitability, but at the same time the firm may lose its ability to deal with complexity and become subject to imitation by rivals.

In Section 3.2.2 of Chapter 3, a positive association was posited between *market attractiveness* and the degree of value added in the supply set. Yet, the results of this thesis show the opposite sign in all models, though they are not significant. One way of interpreting this is that this location facet is equally relevant to LVAAs and HVAAs in the supply activity set. Yet, the insignificant association between market attractiveness the extent of supply activities suggests that the supply set is driven by other factors.

Hypothesis 2d posited a positive association between market attractiveness and the degree of value added in the marketing set (see Section 3.2.2 of Chapter 3). Yet, the results of this study show that the coefficient has the opposite sign and is significant. This seems to indicate that higher market attractiveness is associated with lower value added in the marketing activity set. One explanation is that subsidiaries decide to rely upon rather simple processes and a limited range of product offerings, which implies lower degrees of complexity. They may also focus on narrowly defined customer segments, allowing them to reduce complexity that emerges from the diversity of customer needs. The reduction of complexity levels, however, means lower potential for HVAAs in this thesis.

There exists no significant association between market attractiveness and the extent of activities within the manufacturing, supply and marketing sets. A probable explanation for this finding is that the data provide the proportion of activity set of overall subsidiary activities. Hence, they tell somewhat little about the absolute extent of activities. Indeed, the potential of the Brazilian market may well be relevant to the subsidiary (MNE) as a whole. The high ratings for market size and potential lend support to this view (see Section 6.2.2 of Chapter 6). In addition, Brazil is renowned as one of the largest markets in the world, as depicted in Section 4.4 of Chapter 4. Prior work has also identified it as notable driver of FDI (Gouvea 2004; Kaufmann et al. 2006). Arguably, market attractiveness may be assumed an essential location facet for firms investing in Brazil, or any other emerging market, at the outset (e.g. informing the decision where to invest or where to pledge resources). There is a wide range of empirical research corroborating this view (e.g. Agarwal 1980; Flores & Aguilera 2007; Kang & Jiang 2012). However, market attractiveness seems less relevant to post-entry configurations of value-added activities at the foreign subsidiary.

7.2.3 Competitors in proximity

In Section 3.2.3 of Chapter 3, it was predicted that competitors in proximity would have a positive relationship with HVA in each of the four activity sets, based on the argument that high levels of skills and knowledge are needed to tap into potential knowledge spillovers of competitors (Cohen & Levinthal 1990; see also Section 2.4.5 of Chapter 2). However, this thesis did not detect such a relationship in any of the sets. Thus, competitors in close proximity are not a relevant location factor for HVA at the foreign subsidiary. It is worth noting that managers rated the quantity of competitors in close proximity rather high, with a mean of 5.35 (see Section 6.2.2.2 of Chapter 6). The lack of significant associations can thus not be ascribed to the absence of rivals.

The results in this study are surprising, because competition is widely seen as a push factor driving productivity, quality or innovation (e.g. Allred & Steensma 2005; Birkinshaw et al. 2005; Porter 1990). The general lack of significant associations may signify that the population of foreign subsidiaries is no attracted to potential knowledge inflows, which was put forward as location factor, following the reviews of learning-oriented FDI (Section 2.4.5 of Chapter 2) and agglomeration economies (Section 2.4.6). One potential explanation is that Brazil is a special case as a host location for foreign-owned subsidiaries. Clusters, of which competitors are a component, do not contribute equally. Instead, the specific characteristics of the cluster in question affect the role of the subsidiary (Birkinshaw & Hood 2000). As noted in Section 4.4 of Chapter 4, the ‘prevalence of well-developed clusters’ in Brazil was ranked far behind those in advanced countries such as the US or Germany. The probability that a subsidiary undertakes HVAAs is likely to be higher when the nature of activities by firms in proximity promises greater potential for knowledge spillovers (Feinberg & Gupta 2004; Perri et al. 2013). However, the right set of activities, i.e. advanced activities, is not likely to be performed by domestic rivals, given the long protection from foreign competition (Katz 2001; Kaufmann et al. 2006; see also Section 4.5 of Chapter 4). In fact, thus far very few Brazilian firms have developed leading technological expertise (Boehe 2010). As a result, there is little potential for knowledge inflows from the perspective of the foreign-owned MNE subsidiary. Likewise, foreign firms in Brazil have long been criticised for the use of less advanced technologies and less efficient machinery than in other entities of their

MNE network (Baer & Rangel 2001; Hobday & Rush 2007). This means that the potential of knowledge inflows from foreign rivals to the subsidiary should also be rather limited. In that situation, the focal subsidiary has little to gain and much to lose in terms of knowledge spillovers (Mariotti et al. 2010; Santangelo 2012). All this suggests that knowledge stemming from competitors present in Brazil may not be useful enough to foreign MNEs. Instead, MNEs may undertake their value-added activities in those regions that promise the best fit, i.e. highest potential for valuable knowledge spillovers (Jensen & Pedersen 2011; Rugman et al. 2011).

At the same time, the absence of significant negative relationships indicates that the sample of subsidiaries is not deterred by potential knowledge outflows to rivals. Thus, competitors in proximity do not lead to a preference for LVAAs, whose underlying knowledge is likely to be less critical for the competitive advantage of the MNE (Jensen & Pedersen 2012; see Section 2.2.2.2 of Chapter 2). One way of interpreting this is that the foreign-owned subsidiary may assess the local rivals' absorptive capacity required to appropriate its knowledge as insufficient. However, this picture may be quite different in developed countries because those are host to leading MNEs (Caves 1971; 2007). Leading MNEs are likely to have the underlying capabilities to acquire knowledge from rivals (Penner-Hahn & Shaver 2005). In sum, MNEs differentiate between different types of firms (e.g. advanced vs. laggard firms) in judging the potential, or threat, for knowledge spillovers (Alcácer & Chung 2007; Perri et al. 2013). Based on the discussion above, it is fair to argue that this thesis is in line with literature on subsidiary-specific advantages (Moore 2001; Rugman & Verbeke 2001), proposing that subsidiaries seek to access location-specific advantages, while trying to avoid the dissipation of strategic assets.

The findings of this thesis add interesting insights to the results of previous research about knowledge-oriented FDI (Cantwell 1989; see also Section 2.4.5 of Chapter 2). Most previous research that has produced evidence for knowledge-oriented activities has been carried out in dynamic country settings, such as the US (e.g. Almeida 1996; Colakoglu et al. 2014; Shan & Song 1997). This thesis, however, indicates that competitors in close proximity do not appear to have a direct association with HVA at the foreign-owned subsidiary – in any of the four activity sets examined. As such, it is in line with empirical work that has found that subsidiaries benefit little from other regional firms in Canada (Frost et al. 2002; Phene & Almeida 2008), and in Ireland (Roper et al. 2008). Schmid and Schurig (2003) questioned the impact of competitors upon the development of capabilities in their sample of 2,100 foreign-owned subsidiaries in Western Europe. As stated earlier, firms distinguish between different types of firms in assessing the potential for positive spillovers (Feinberg & Gupta 2004; Perri et al. 2013). Thus, the US may be a special case of a host country for organisational learning. In fact, it is widely acknowledged that the US have an advanced knowledge base, which foreign MNEs try to access (Ambos 2005; Colakoglu et al. 2014).

As regards the extent of activities, competitors in proximity only have a positive significant relationship with the marketing set. Put differently, the more rivals there are, the more marketing activities take place at the foreign-owned subsidiary. This shift towards marketing is reasonable, as this activity set allows to gain or secure market share in a highly competitive market (Hewett et al. 2003).

7.2.4 Supply conditions

It was predicted in Section 3.2.4 of Chapter 3 that supply conditions would have a negative association with competence-creating R&D/PD, since the kind of knowledge that resides in the local supply base should be more relevant to competence exploiting. A positive association was hypothesised for supply conditions and the degree of value added in two sets (i.e. manufacturing and supply), because tapping into supplier’s knowledge requires absorptive capacity on the side of the foreign subsidiary. Last, no significant association was expected for the marketing activity set. The results of this thesis suggest that this location factor does not help explain the degree of value added in any of the four sets. As managers judged both construct items, i.e. amount and quality of suppliers, to be well-above average this result is surprising.

The result can be interpreted in several ways. First, the firms constituting supply conditions may be needed by the foreign-owned subsidiary for factors that are relevant to activities of different degrees of value added, i.e. LVAAs and HVAAs alike. Such factors could include meeting the delivery, price and quality requirements of the subsidiary (Alcácer 2006; Song 2002; Tavares & Young 2006). Second, local suppliers may not provide enough impetus in terms of resources and capabilities that may result in novel, improved, or refined ways of doing things that create organisational value or improve efficiency and flexibility (Lall et al. 2004; McDonald et al. 2008). In particular, local suppliers may not provide incentives that are primarily relevant for HVAAs. Indeed, there exist some doubts regarding supplier capabilities in Brazil (see Section 4.4 of Chapter 4). As outlined above, the probability that HVAAs are conducted is likely to be higher when the nature of activities by other firms in the area provides greater potential for knowledge inflows (Feinberg & Gupta 2004). Thus, if knowledge spillovers from suppliers are key, co-location of activity sets in industrialised countries, where the quality of the supply base is higher, may be preferred by the multinational firm (Asmussen et al. 2009; Fifarek & Veloso 2010). Third, even if local suppliers hold knowledge that may be of value to the foreign-owned subsidiary, the unwillingness or inability of the supplier to invest in a long-term relationship may inhibit the transfer of that knowledge (Crone 2002). In the subsidiary literature, the prominence of such relationships for effective knowledge transfers has been stressed (see Section 2.3.4 of Chapter 2).

There are mixed empirical results on the influence of local suppliers on the development of HVAAs at the foreign-owned subsidiary. Evidence from Europe and New Zealand showed that foreign subsidiaries seldom develop extensive supply linkages (e.g. Crone 2002; Scott-Kennel 2007; Tavares & Young 2006). However, Asmussen et al. (2009), in their study of

2,100 MNE subsidiaries in Western Europe, found that a favourable supply environment is positively associated with strong subsidiary competences in the supply set, which supports the view that different activities draw on different location aspects, thus requiring activity-based analyses. While this argument is not supported in this study in the case of HVAAs of the foreign subsidiary, there is evidence in favour of the disaggregated stance postulated in this thesis in terms of the extent of activity sets.

The foreign-owned subsidiary performs more manufacturing and more supply activities if local supply conditions are excellent, while a negative relationship was found for the extent of marketing activities (see Section 6.3.2 of Chapter 6). As outlined above, this could mean that favourable supply conditions are seen as relevant drivers for the operational efficiency of the MNE. As a result, the relative focus of the value chain of the foreign subsidiary may shift towards supply and manufacturing activities. The results may add to the discussion of network and resource-based theories (see Section 2.3.4 of Chapter 2). The development of inter-organisational relationships may be dependent upon the activity sets conducted by the foreign subsidiary and the kind of network partner, i.e. suppliers, customers, etc. (Forsgren et al. 2005; Schmid & Schurig 2003).

7.2.5 Existence of scientific institutions

It was hypothesised in Section 3.2.5 of Chapter 3 that the existence of scientific institutions has a positive association with the degree of value added in the R&D/PD and the manufacturing set. No such association was expected for the supply and the marketing activity set, since these sets lack the absorptive capacity to benefit from the kind of knowledge that is generated by scientific institutes.

This thesis has found moderate evidence for a positive association between the existence of scientific institutions and HVA in R&D/PD and manufacturing. This indicates that foreign-owned subsidiaries try to access scientific knowledge, which may lead to HVAAs, through the combination with internal knowledge (see Section 3.2.5 of Chapter 3). It also supports the view that prior related knowledge is a premise as to benefit from such sources (Penner-Hahn & Shaver 2005; Petersen et al. 2008). However, as expected, no significant relationships were revealed in the results of this thesis for HVAAs in the supply and marketing set, which suggests that scientific institutions are of little relevance. As stated above, these two sets are unlikely to have the absorptive capacity that is required to benefit from the – basic and less appropriable – knowledge that is created by scientific institutes (Alcácer & Chung 2007; Cohen & Levinthal 1990). In sum, this kind of knowledge may be best absorbed by the R&D/PD and the manufacturing activity set of the foreign-owned subsidiary.

The results of this thesis are in line with prior research that found support for the claim that foreign-owned subsidiaries intend to tap into knowledge created by scientific institutions to augment their technological capabilities (e.g. Almeida 1996; Cantwell & Iammarino 2003; Phene & Almeida 2008; Shan & Song 1997). Davis and Meyer (2004), exploring a sample of 2,100 subsidiaries based in Europe, found a highly significant positive effect on both the incidence and level of R&D. Almost no work exists that investigates the effect of scientific institutions on activity sets other than R&D. However, data in the correlations matrix provided by Asmussen et al. (2009) shows tentative support for the argument that the presence of research institutions is positively associated with capabilities in the manufacturing set of foreign subsidiaries in Western Europe. The contribution of this research is that it confirms earlier findings from developed countries (i.e. the US and Western Europe) in an emerging market context. Furthermore, it shows that the foreign-owned subsidiary needs to carry out technical activities (i.e. R&D and manufacturing) to benefit from knowledge that resides at scientific institutions (Frost et al. 2002). As stated earlier, only these activity sets have the required absorptive capacity. Thus, supply and marketing activities do not profit from such knowledge, which is reflected in the results of this thesis.

As regards the extent of activity sets, there are significant positive associations between the existence of scientific institutions and two sets, i.e. R&D/PD and marketing. One reason is that the foreign subsidiary may observe the newest technological developments in the field and identify opportunities for the MNE (Buckley & Ghauri 2004; Liouka 2007). While the R&D/PD activity set can benefit directly from the corresponding knowledge, the marketing set is likely to operate as a scanning unit that identifies novel products, or new distribution options, that stem from such knowledge. A negative association was found for the extent of the manufacturing set, which means that less manufacturing activities are performed at the subsidiary if there are scientific institutions. One way of interpreting this is that the foreign subsidiary reconfigures its value chain. Thus, the emphasis of R&D/PD activities may lead to a smaller share of manufacturing activities on the overall set of activities. No significant relationship exists for the extent of the supply activity set, which may indicate that directly related location factors, such as cost of inputs and availability of local suppliers, are more important (see Section 6.3.2 of Chapter 6).

One last observation as regards the existence of scientific institutions in Brazil is worthy of note. The average rating for this location factor was only 3.07 in the sample of subsidiaries that participated in the centres of excellence project (Holm & Pedersen 2000). This sample consisted of 2,100 foreign subsidiaries located in Western Europe. The primary data gained from MNE subsidiaries in Brazil in this thesis exhibits a mean rating of 4.81. However, in both cases the presence of scientific institutions has been found to be an important location factor. One potential explanation is that managers of foreign subsidiaries in Europe focus on the quality of scientific institutions. In other words, out of a small amount of institutions a sufficient amount of actors exists that meets the requirements of the subsidiary. However, it is conceivable also that the differences in the values are due to the cultural background of managers. For example, Brazilian managers are known to be proud of Brazil and tend to be rather optimistic (Kaufmann et al. 2006). The high rating may be attributed, at least in part, to these elements.

7.2.6 Availability of skilled employees

It was hypothesised in Section 3.2.6 of Chapter 3 that the availability of skilled employees would be positively associated with HVA in each of the four sets, particularly because high skilled labour has been recognised as a critical aspect of HVAAs (Buckley & Casson 2009; Section 2.2.2.2 of Chapter 2). Based on the findings of this thesis, the availability of skilled employees only affects the degree of value added in the marketing activity set. There are a few potential interpretations. First, the availability of skilled employees (i.e. with a tertiary education) is likely to be relevant to activities of variant degrees of value added within the R&D/PD, manufacturing and supply activity set. For example, both competence-exploiting and competence-creating R&D/PD activities are drawn to this specific location factor. This is supported by the finding that the availability of skilled employees is positively correlated with the extent of R&D/PD activities (see Section 6.3.2 of Chapter 6). Equally, the positive impact of the availability of skilled employees on the extent of manufacturing supports the view that skilled workers are required in response to increased sophistication of industrial machinery and a move towards "lean production" in which personnel is expected to think critically about the production process (e.g. Carstensen & Toubal 2004; Mataloni 2011; Roper et al. 2008). Yet again, the results of this study suggest that skilled employees do not affect the degree of value added in this activity set. Therefore, one way of explaining these results is that skilled employees may be a necessary but not sufficient condition for the performance of HVAAs in these two activity sets. This may also suggest a need for specialists rather than generally well-educated employees. The number of doctorates, for example, has been revealed as main driver for HVA R&D/PD in previous research (Ambos 2005; Chung & Alcácer 2002; Kuemmerle 1999).

The picture is different in the supply activity set. The results of this thesis indicate that the availability of skilled employees has neither an effect on the extent of supply activities nor on the degree of value added in this set. Thus, this location facet appears to be irrelevant to the supply activity set. One potential explanation is that supply policies and guidelines may be formulated at a regional headquarter of the parent firm (Enright 2005). The execution of such guidelines may then not require highly skilled staff.

Another potential explanation for the irrelevance of skilled employees related to HVAAs in the three sets abovementioned is the relative quality of this location factor in comparison to developed countries or other emerging economies. Many other host countries provide more and higher skilled employees than Brazil (see Section 4.4 of Chapter 4). For example, 11% of Brazilians held a tertiary degree in 2010, while the figure was 27% for both Chile and Germany. Hence, if skilled employees are important for HVAAs of the MNE, it may carry out these activities in such superior host locations.

The results of this thesis support the hypothesis that the availability of skilled employees is positively associated with HVA in the marketing activity set. Therefore, the foreign-owned subsidiary seems to require knowledgeable and competent staff if it aims to differentiate its customer segments and its goods and services, or intends to implement more complex sales and after-sales processes. In addition, many activities, such as the maintenance of products, need to be undertaken by local personnel, even if employees that are more skilled might be available in other entities of the MNE. Face-to-face social interactions may be required to explain the products and services, particularly if the related knowledge is tacit and of non-codifiable nature (Noorderhaven & Harzing 2009). As such, HVA in the marketing activity set may be linked to the idea of location-bound subsidiary-specific advantages (Rugman & Verbeke 2001), whereby each subsidiary develops its own capabilities, usually confined to the local environment in which they are created.

7.2.7 Institutional environment

The results of this thesis corroborate the argument by Rugman and Verbeke (2001) that for the majority of foreign-owned subsidiaries the *institutional environment* is less critical. It is in contrast to most prior empirical research on location drivers for FDI in general. This line of research has delivered a lot of evidence for positive effects of institutions (e.g. Ali et al. 2010; Bevan et al. 2004; Disdier & Mayer 2004; Grosse & Treviño 2005; Kang & Jiang 2012; Pajunen 2008). One way of interpreting this is that institutional factors are important for location decisions of the MNE (i.e. market entry), while it is less relevant for post-entry value chain activities carried out by the subsidiary. As very little significant – both positive and negative – associations were found in this thesis, it appears that institutions are neither frictional nor enabling factors in relation to the extent and degree of value added of activity sets. It has been posited that foreign-owned subsidiaries possess an “institutional ability” to master institutional voids (Chan et al. 2008; Henisz 2003). Thus, institutional environments may no longer be seen as problematic by the MNE, due to their vast experience around the world (Coeurderoy & Murray 2008). On the other hand, Brazil and other emerging markets are no locations for institutional arbitrage, as institutions are superior in advanced countries such as the US or Germany (see Section 4.4 of Chapter 4). Thus, if institutional factors are essential MNEs are likely to conduct activities in these superior host countries.

While the influence of institutional facets on value chain activities of the foreign subsidiary was found to be low in general, three relationships (out of 16) are significant. First, a negative effect was shown for the regulatory framework on the extent of R&D/PD activities (see Section 6.3.2 of Chapter 6). At first sight, this finding seems counterintuitive in view of the argument that the rule of law in a host environment affects the protection of intellectual property. Since weak institutional frameworks erode the appropriable value of innovation MNEs are expected to keep R&D/PD activities away from countries with rather poor institutions (Zhao 2006). However, the negative relationship detected in this study can be explained by institutional arbitrage (Ghemawat 2007; see Section 3.2.7 of Chapter 3). A foreign-owned subsidiary might extend its R&D/PD activities as Brazil's regulatory framework may allow it to conduct activities that are not permitted in other host environments in which the parent firm operates. For example, MNEs such as BASF or Syngenta have set up research units concerned with genetic engineering in Brazil, because genetic engineering is far more accepted in this location than in Europe (Economist 2008). Hence, a more lenient regulatory framework may provide better opportunities for the exploration of some kind of firm-specific advantages (Dunning 1993; Rugman & Verbeke 2001).

In Section 3.2.7 of Chapter 3, it was argued that the institutional environment would have a positive association with HVA in the supply set. For country risk, one of the two constructs examined as facet of the institutional environment, partial support was found. However, no such association existed for the regulatory framework. This particular pattern indicates that foreign-based MNE subsidiaries are able to adapt their supply activities to the institutional realities in a host country (Chan et al. 2008; Zhao 2006), at least as long as the rules of the game do not change unexpectedly. Hence, low country risk seems relevant to guarantee the stability of value-added activities (Brouthers & Brouthers 2003). Prior research has shown that low country risk results in higher resource commitment by headquarters to the foreign-based subsidiary (Henisz 2000; Luo 2001). Conceivably, the low risk in Brazil has led to high resource levels in the supply set of the foreign subsidiary. As noted in Section 2.2.1 of Chapter 2, resources are a pre-requisite for HVAAs.

An interesting finding is that neither a favourable regulatory environment nor low country risk exhibited a positive significant relationship with the extent of R&D/PD or manufacturing activities (see Section 6.3.2 of Chapter 6). Investments in these two activity sets are expensive, because machinery and equipment are required. Such long-term investments are difficult to reverse (Benito et al. 2003). Hence, foreign MNEs will be more likely to allocate resources to the subsidiary if it resides in an institutional environment that protects the investor from hazards such as suddenly imposed export quota or nationalisation (Feinberg & Gupta 2009; Veliyath & Sambharya 2011). Thus, not surprisingly, there is an empirical consensus in the IB research that MNEs conduct less – manufacturing – FDI in foreign markets that have a weak institutional environment (e.g. Delios & Henisz 2003; Flores & Aguilera 2007; Globerman & Shapiro 2003; Henisz & Delios 2001; Slangen & Beugelsdijk 2010). This study suggests that post-entry value chain configurations of the foreign-owned subsidiary are less affected by the institutional environment. Thus, as outlined above, once initial investments such as buying land and setting up factories have been decided in consideration of institutional factors (Gelbuda et al. 2008), the MNE and its subsidiaries try to exploit their existing R&D/PD and manufacturing facilities and develop the ability to overcome shortcomings in the institutional environment (Chan et al. 2008; Coeurderoy & Murray 2008).

7.3 Overall assessment of location factors

In general, the findings of this study indicate that location factors are not as relevant as was expected (see Table 6.17, on page 183). Indeed, several of the R^2-values suggest that other variables explain a larger share of the non-accounted variance. This is in line with previous work in Brazil. For example, Athreye et al. (2014) found that subsidiary role development in this emerging economy was driven largely by parent firm investments. Further potential factors are discussed in Section 8.5 of Chapter 8.

Despite the low amount of significant associations, the results suggest that the relevance of location factors varies by activity set of the foreign-owned subsidiary. This finding is much clearer for the extent of sets (see Section 6.3.2 of Chapter 6). As such, this thesis is in line with prior research in different country contexts (e.g. Asmussen et al. 2009; Enright 2009; Schmid & Schurig 2003). It suggests that aggregate units of analysis, e.g. FDI in general or overall subsidiary strength, need to be interpreted with caution.

The above results suggest that the relevance of traditional economic factors (labour, natural resources, markets, etc.) and institutional factors is relatively low for HVAAs at the foreign subsidiary operating in an emerging economy. Instead, these factors may be more relevant for the MNE when deciding where to invest, i.e. which market to enter. In fact, most of the research that has provided evidence for this set of factors has examined FDI inflows or outflows (e.g. Grosse & Treviño 2005; Treviño et al. 2008; Wang et al. 2012).

Some moderate effects seem to exist for knowledge-based assets (i.e. scientific institutions, skilled employees). These location aspects appear more important to HVAAs conducted by the foreign-owned subsidiary. Most previous studies that have found stronger relationships between such location aspects and competence levels (or knowledge absorption) of foreign MNE subsidiaries have been done in the US (e.g. Almeida & Phene 2004; Colakoglu et al. 2014; Phene & Almeida 2008; Shan & Song 1997). Thus, the US may be a special case. In fact, it is viewed by many MNEs as a hot spot for organisational learning and innovation, due to favourable location aspects. In general, developed countries are more likely to offer knowledge-based assets (Narula & Dunning 2000; Galan et al. 2007). Thus, it is likely that these countries remain more attractive for HVAAs, at least in the near future (Hansen et al. 2011; Jensen & Pedersen 2011; Manning et al. 2008). For the MNE subsidiary in emerging economies, learning and knowledge from other units of the same MNE could be more relevant for HVAAs.

7.4 Subsidiary characteristics and high value added activities

As outlined in Section 3.3 of Chapter 3, it is widely accepted in the multinational literature that structural factors may be correlated with the set of activities undertaken by the foreign subsidiary. This section deals with these factors. Thus, it addresses research question 3 (i.e. research objective 5).

Subsidiary age

Based on the statistical analyses, subsidiary age generally seems to have rather little impact on the degree of value added within each activity set. As regards HVA in R&D/PD, no significant coefficient was found. Mixed results have been provided in previous research. For example, Ambos (2005) found that German-owned R&D labs with a competence-creating mandate are rather young. Kuemmerle (1999) provided an opposing picture. Thus, learning and experience may be relevant for HVA R&D in only some affiliates. Within marketing, a positive relationship (for detail complexity) and a negative association (dynamic complexity) were found. Overall, subsidiary age does not help explain HVVAs.

Subsidiary size

The results of this research suggest that HVA within the R&D/PD set takes places at larger subsidiaries. This is in contrast to Andersson and Forsgren (2000) who found that the relative size of the subsidiary has no impact on its role as a centre of excellence in the activity set related to the development of products and processes. Frost et al. (2002), analysing a set of Canadian subsidiaries even found a negative effect. The result of this study suggests that – within the R&D/PD activity set – larger units are better equipped to create knowledge on their own (Foss & Pedersen 2002). However, no support was revealed for this line of argument in the other three sets. As regards manufacturing, Frost et al. (2002) also did not find significant relationships. These results suggest that the amount of resources available to the foreign-owned subsidiary may be less important for the performance of HVAAs. For those activities, the quality, i.e. uniqueness, of resources may be far more critical, as emphasised in the literature review (see Section 2.2.1 of Chapter 2).

Export share

Previous research has found that Scandinavian subsidiaries that export conduct more R&D activities (Benito 2000; Ivarsson & Jonsson 2003). However, these tendencies may simply be a reflection of the characteristics of the host country as a small market. Examining R&D

labs owned by US firms Athukorala and Kohpaiboon (2010) found export-orientation to be significant only for units in developed countries. The results of this study suggest that these tendencies may also be found in emerging markets. In particular, they also show a positive effect of export intensity for R&D/PD of HVA. To this end, it reveals different patterns for different activity sets. Supply activities by the foreign subsidiaries in the sample seem to be of higher value added if the entity is export oriented. No such effect could be found for the other two sets (i.e. manufacturing and marketing). Frost et al. (2002), examining Canadian subsidiaries showed that centres of excellence in all three areas (i.e. research, development and manufacturing) exhibit higher export figures than non-centres. Song (2002) found that Japanese MNEs carry out more advanced activities in export platforms (for developed markets) compared to units geared mainly towards their host market. One way of interpreting the findings of this research then is that the effect of export intensity on the degree of value added in certain activity set may be contingent on the host country of the subsidiary and/or its export markets.

Country of origin

As described in Section 6.2.2.3 of Chapter 6, the country of HQ origin was included in the analyses using two dummy variables (i.e. US parent and EU dummy). Subsidiaries that are owned by US MNEs generally do not exhibit higher degrees of value added if compared to other countries of origin. The EU dummy was significant in only two of the eight models as regards the manufacturing, supply and marketing activity sets. Thus, overall, these findings indicate that the country of origin can be interpreted as evidence for the similarity of behaviour of MNEs rather than as evidence for differences among MNEs, in terms of value added in these sets. However, regarding value added in the R&D/PD activity set, this study shows that European subsidiaries located in Brazil are more likely to conduct HVAAs than their counterparts from a non-European origin. This is in contrast with Kuemmerle (1999) who found that units from different regions do have varying propensities to conduct home-base augmenting versus home-base exploiting R&D/PD.

Type of industry

Findings for the industry dummy (high and medium-high technology) can be interpreted as evidence for the similarity of foreign-owned subsidiaries in terms of their propensity to carry out HVAAs. This is in line with the criticism outlined in Section 2.2.2.1 of Chapter 2 that no industry consist of homogeneous groups of firms but a mix of high-, medium- and low-tech firms and that activity sets in any group of industrial classification will have dissimilar degrees of value added (Kirner et al. 2009).

Subsidiary location

In general, the findings concerning the subsidiary location dummies (i.e. South East Brazil, South Brazil) did not provide evidence that certain subnational regions in emerging economies are host to more HVAAs carried out by foreign-owned subsidiaries, though location factors in Brazil vary across regions. For example, South-East Brazil has the highest industrial concentration (Kaufmann et al. 2006; Lall et al. 2004). However, HVA in R&D/PD is more likely in this region than in other regions (see Section 6.3.3 of Chapter 6). Hence, the widely accepted view that sub-national location advantages are essential (e.g. Arregle et al. 2009; Chan et al. 2010; Tan & Meyer 2011) may be more relevant to initial investment decisions or limited to certain value chain activities.

Market scope

In general, the market scope dummy (i.e. international market scope) does not help explain the degree of value added within activity sets. It was suggested that an international market scope may indicate a world product mandate, where HVAAs are more likely (Birkinshaw 1996; see also Section 3.3 of Chapter 3). Moreover, international markets are more competitive than domestic emerging markets, which should lead to more HVA. The results of this research, however, provide no evidence for this line of argument. One interpretation is that the fine slicing of MNE activities across the globe means that HVAAs are more conducive to location advantages in developed countries. Likewise, the competitive pressure of world markets may be borne by the MNE as a whole. In this research, market scope is negatively related with the extent of R&D/PD. This makes intuitive sense, as goods for world markets are less sensitive to specific requirements, i.e. require less adaptation.

7.5 Underpinnings of high value added activities

This section discusses the findings from the viewpoint of the literature reviewed in Section 2.2 of Chapter 2, i.e. literature upon the resource-based view (RBV), the capabilities-based view, knowledge, and complexity.

As discussed in Section 2.2 of Chapter 2, HVAAs harness valuable, rare, and difficult-to-copy resources (Barney 1991; Peteraf 1993; Ray et al. 2004). The somewhat low relevance of location factors for HVAAs may be due to the absence of such resources at the foreign-owned subsidiary. For example, human resources, especially highly skilled employees, are needed to absorb knowledge from the external environment and then recombine it with the subsidiary's own stock of knowledge to create HVAAs (Cohen & Levinthal 1990; Kogut & Zander 1993, 2003). In particular, past accumulation of knowledge and skills shapes the subsidiary's ability to absorb and create knowledge, and subsequently, HVAAs (Lall 1992; Nelson & Winter 1982). Therefore, it is conceivable that resources allocated by the parent firm to the subsidiary in an emerging economy setting might still be rather limited in terms of their volume. In the subsidiary literature, the size of the subsidiary is often used as an indicator for subsidiary resources (Yamin & Andersson 2011; see also Section 3.3 of Chapter 3), usually hypothesising that larger subsidiaries are better equipped to develop knowledge themselves (e.g. Foss & Pedersen 2002; Frost 2001). However, this thesis found that there is no unambiguous relationship between subsidiary size (or amount of resources) and the performance of HVAAs (see Section 7.4 above). Instead, for those activities, the quality of resources may be far more critical, as emphasised in the literature review.

Following from the above, it could well be that the parent MNE tends to allocate common resources to the foreign-owned subsidiary. For example, the allocated assets may be mostly of tangible versus intangible nature. However, it has been stressed that the latter resources are more crucial for the long-term competitiveness of the MNE and its subsidiaries because they are difficult to imitate (Delios & Beamish 2001; Teece et al. 1997, 2007). As outlined in the context chapter, most foreign subsidiaries have used less advanced technologies and less efficient machinery in Brazil for a long period (e.g. Baer & Rangel 2001; Costa 2005; see Section 4.5 of Chapter 4). Hence, even the more tangible resources residing at foreign-owned subsidiaries in Brazil may still be rather common, i.e. no source for HVAAs. There are a few potential implications. First, if certain tangible assets are required, either on their own or to complement intangible resources, in order to create HVAAs, the subsidiary will not be able to benefit from location advantages that could lead to activities of higher value added. For example, in the manufacturing activity set, advanced machinery may be needed to master the degree of complexity that might emerge with product proliferation or demand variety, meaning that the performance of HVAAs is unlikely. Second, many resources that are required to create capabilities and, subsequently, carry out HVAAs are path-dependent and thus affected by such factors as the subsidiary's history (Dierickx & Cool 1989; Eisenhardt & Martin 2000; Schreyögg & Kliesch-Eberl 2007). Particularly, past accumulation of knowledge and skills shapes the subsidiary's ability to absorb and develop technical knowledge, an essential pre-requisite of HVAAs (Lall 1992; Nelson & Winter 1982; see Section 2.2.2.3 of Chapter 2). Thus, the historically low technology status of Brazilian subsidiaries may mean that they have not accumulated sufficient relevant resources, such as knowledge and skills, to benefit from specific location factors, particularly within R&D/PD and manufacturing.

Another possible explanation for the low relevance of location factors for HVAAs from the viewpoint of resources are inter-organisational relationships. As discussed in the literature review, such relationships facilitate the access to locally available resources (Gammelgaard et al. 2012; McDonald et al. 2008), and may be viewed as an internal resource (Dunning & Lundan 2008a; Liouka 2007; see Section 2.3.4 of Chapter 2). A lack of inter-organisational relationships means that the focal subsidiary's access to location advantages is restricted to those that can be exploited through arm's length transactions (Dunning 2009). Two aspects matter when examining relationships of the subsidiary, namely the amount of external partners and how frequent it interacts with its partners (Gammelgaard et al. 2012). On the one hand, the subsidiary may have no or very few linkages with units outside the boundaries of the MNE. In other words, it does not have 'network' resources. It is often proposed that the autonomy granted to the subsidiary by the parent company helps management to set up and manage inter-organisational relationships (Birkinshaw et al. 2005; Giroud & Scott-Kennel 2009). If freedom to make decisions is low, the subsidiary may not be able to develop such relationships. On the other hand, the frequency of interactions impacts the process of relation-specific knowledge acquisition, as frequency facilitates trust building between partners and thus increases the likelihood that the partner provides knowledge, and access to several valuable assets available in the host country (Mu et al. 2007). Likewise, most of this knowledge is tacit and characterised by causal and social ambiguity, which means that frequent social interactions are required to transfer it (Gupta & Govindarajan 2000; Kogut & Zander 1993, 2003). Therefore, if the foreign-owned subsidiary has external partners, but does not interact with them, the subsidiary will be very unlikely to benefit from all location factors available in the host country. In that case, the subsidiary's 'network' resources will become sluggish and might lose their value over time (Coates & McDermott 2002; Wu et al. 2010; see Section 2.2.1 of Chapter 2). In essence, the subsidiary's ability to create and undertake HVAAs based upon location-specific advantages depends, in large part, on its ability to set up intense and frequent interactions with external actors in their network (Gammelgaard et al. 2012; Meyer et al. 2011). Thus, another way of explaining the result that neither supply conditions nor competitors in proximity are relevant for HVAAs at foreign subsidiaries in emerging markets is that they have not yet established backward linkages (such as supply and logistics) or collaborative linkages (such as strategic alliances with rivals).

As outlined in Section 2.2.1, capabilities are another important antecedent of HVAAs. One notion in the capabilities literature in specific may help explain the rather low relevance of location factors for HVAAs. Capabilities span activity sets and hierarchical levels (Grant 1996; Wu et al. 2010), and they may create more value if combined with other capabilities of the subsidiary (Ordanini & Rubera 2008). In fact, the respective knowledge and abilities that underpin capabilities are held at the subsidiary level, supported by social networks and processes (Nelson & Winter 1982; Pandža et al. 2003). As a result, the absorptive capacity required to learn and integrate knowledge from external sources might be held collectively, i.e. across activity sets of the subsidiary. Furthermore, firms may look at processes, instead of individual functions (i.e. R&D, production, etc.). Therefore, location factors in emerging economies may be more relevant to capabilities, or processes, which may include a number of individual activity sets. In this study, the sum of HVAAs within a single set was investigated.

As outlined in the review in Section 2.2.2.2 of Chapter 2, HVAAs are knowledge-intensive activities. This explains why knowledge-related location factors, i.e. skilled employees and the existence of scientific institutions in emerging economies have at least a moderate relevance for HVAAs at the foreign-owned subsidiary, while the other factors have almost no positive effect (see Section 7.3 above).

As discussed in Section 2.2.3 of Chapter 2, complexity is an important facet of HVAAs for a variety of reasons. In particular, complexity within an activity set increases the likelihood that the set is inimitable, which is essential according to the RBV logic (see Section 2.2.1). However, many firms act to reduce complexity in order to make their operations more cost effective, efficient and manageable (Hilmersson et al. 2011). For example, product family and platform-based product development has gained plentiful attention (Huang et al. 2005; Jiao et al. 2007; Salvador et al. 2002). One perspective views a platform as a physical one, namely a collection of “elements” shared by several products (Duray et al. 2000; Jiao et al. 2003). As a result, the main aim is to design the product in ways in which it can be decomposed into independent components and/or modules in a way that they may be reassembled together without losing functionality (Jiao et al. 2007; Kotabe et al. 2007). In fact, Kotabe et al. (2007) highlight that foreign car manufacturers in Brazil have implemented strategic modularization. Accordingly, MNEs may seek location factors that help reduce the degree of complexity in the activity sets of their foreign-based affiliates, e.g. few but high-quality input items and few but reliable suppliers. Indeed, in this thesis, there are some significantly negative associations between location factors and the degree of complexity (see Section 6.3.3 of Chapter 6).

7.6 Reflection on the research design

This section deals with the reflection of the research design applied in this thesis. It entails considerations on choices around variables, data quality, methods chosen and the methodology used in this research.

As elaborated in Section 6.2 of Chapter 6, good practice in the literature was followed as to confirm decent *data quality*. The transformation of variables and constructs, pre-tests, post-checks and the correlation matrix showed favourable results. Similarly, the process of data collection was carefully designed by a knowledgeable set of researchers and applied rigorously by an experienced team of telephone interviewers (see Section 5.6 of Chapter 5). At the same time, some issues emerged on reflection. First, even if pilot-tests did not indicate any problem with the questions “what is the average life cycle of your products?” and “this plant’s output requires approximately how many individual active part numbers of material items?”, the data had to be removed since too many values were missing (see Section 6.2.1 of Chapter 6). One potential reason is that, in contrast to several supply chain management studies, the questionnaire in this thesis was directed to only one person, i.e. the CEO of the subsidiary, as he was presumed to be well-informed (see Section 5.5 of Chapter 5). Yet, for certain data, a head of section (e.g. logistics, purchasing) may be more knowledgeable, and thus more capable of answering questions. Possibly, distributing questions to the respective key informant could have led to less missing values and to more accurate data. Second, the data was gained only from subsidiary managers. However, HQ managers may have another view on the quality of location factors in Brazil (see Section 8.5 of Chapter 8), particularly in light of the observation that local managers tend to be rather optimistic (Kaufmann et al. 2006). In addition, HQ managers may have a clearer idea about what location factors drove the decision to devote certain resources and, subsequently, the configuration of activity sets in the Brazilian subsidiary. Third, respondents were invited to assess the quality of location factors but not the importance, based upon the argument that subsidiary manager would act rational and adjust the value chain according to location advantages. In short, in this thesis, the importance of location factors was inferred. Conceivably, directly asking for the importance of those factors – ideally for each activity set – could lead to different results. Fourth, longitudinal data appears to be useful to track changes in the quality of location factors and the degree of value added within activity sets (see Section 8.5 of Chapter 8).

Very careful consideration was also placed upon the selection of *variables*. As discussed in Section 5.7 of Chapter 5, almost all variables were taken from previous studies. The use of widely utilised and validated variables aimed at enhancing the validity and reliability of the questionnaire in this study (Dimitratos et al. 2012). To remind the reader, this thesis is the first that focuses upon complexity within activity sets as to capture high value added at the foreign-owned subsidiary. Some points are worth reflecting. First, in adapting supply chain management variables this research may be overstating operational elements of complexity in activity sets. Social interactions, for instance, were not considered in this thesis, despite their effects on coping with complexity and knowledge transfers (Noorderhaven & Harzing 2009). Second, it may be suitable to pay more attention to dynamic complexity, rather than detail complexity, because this appears to be a stronger driver for complexity (Simon 1962; Vachon & Klassen 2002). Third, as outline in Section 7.5 above, many firms try to reduce complexity, which may undermine the logic in this thesis that complexity is a useful proxy for HVA in activity sets of the foreign-owned subsidiary. Moreover, the idea of complexity is only one way of capturing value added based on the idea that the underlying knowledge and resources are inimitable (see Section 2.2 of Chapter 2).

There are also some observations concerning the *methodology* and *methods* chosen for this research. As outlined in Chapter 5, there are two major areas in this thesis. The first area is HVAAs approximated by complexity measures, based on contributions in the field of RBV literature. This can be deemed an original approach. Therefore, there is no substantial body of knowledge and explorative (or qualitative) research may be seen as more appropriate. In specific, such an approach could have shown processes, patterns or constituents of HVAAs at the foreign subsidiary. Indeed, the results presented in Chapter 6 indicate that borrowing complexity measures from supply chain management studies may not be sufficient to infer the – unobservable – degree of value added. The second area concerns the location factors derived from IB research. This field is relatively mature, meaning that deductive, and thus, quantitative research designs are more useful. An evident approach then is to integrate both exploratory and explanatory research in this thesis. In such a mixed-method approach it is widely practised to begin with qualitative data collection and then collect quantitative data from respondents (Creswell 2009). In that way, the first stage can inform the design of the questionnaire and identify – complexity measures that need to be considered. As such, *"the* *qualitative stage should be seen as having a developmental purpose"* (Gray 2009: 206). A large-scale survey could then follow. Of course, depending on the results of the first stage the decision to deliver the questionnaire by telephone interviews may have to be revised in order to account for the peculiarities of the questionnaire items.

7.7 Summary

This chapter discussed the findings of this thesis. It highlighted the different patterns that emerged from a systematic analysis of the effects of various location factors on the degree of value added within subsidiary activity sets. The main outcomes are the following. First, location factors seem to be less relevant for the degree of value added than was expected in the hypothesis development. It indicates that location factors are necessary for HVAAs, but not sufficient to explain their existence in the foreign-owned subsidiary. Second, different value-added activities are drawn to different location facets, which is line with more recent research in IB. This implies that aggregate constructs – e.g. diamond strength and industry cluster – are less appropriate to help identify location effects on the configuration of value chain activities of the foreign-owned subsidiary. Third, the influence of institutional factors in emerging economies may be overstated in previous literature, at least where considering post-entry MNE behaviour.

The next chapter concludes this research. It includes a discussion of policy and managerial implications, a discussion of the limitations of this thesis and promising avenues for future research.

8 CONCLUSIONS, LIMITATIONS AND IMPLICATIONS

8.1 Findings and contributions of this research

The main purpose of this research has been to provide theoretical reasoning and empirical evidence from an integrative point of view as regards an unexplored issue in the subsidiary roles literature: examining what location determinants influence whether high value-added activities are conducted by foreign-owned subsidiaries in emerging economies. In line with the research objectives, set out in Section 1.4 of Chapter 1, this thesis has accomplished the following. It critically evaluated theoretical and empirical literature about location determinants for the degree of value added in subsidiary activity sets (objective 1). It advanced the concept of high value-added activities in the context of foreign-owned subsidiaries (objective 2). Based upon an extended version of Dunning's (2000) envelope paradigm this study developed and tested hypotheses, using quantitative data analysis (objective 3). Through a large-scale telephone survey, it created a unique and up-to-date database on foreign-owned manufacturing subsidiaries in the emerging market Brazil (objective 4). It explored characteristics of those foreign-owned subsidiaries that carry out HVAAs (objective 5). The study also contributed to empirical research on subsidiary activities by extending its geographical reach to an emerging economy context (objective 6). Objective 7, i.e. discussing policy and managerial implications derived from the empirical results of this thesis, will be addressed in Sections 8.2 and 8.3 below.

The core contributions of this research, which is the only one of its kind, to the conceptual and empirical literature are as follows. First, at the conceptual level, this thesis posited that a wider range of location factors should be integrated in studies that examine the effects of the subsidiary's host environment on its activities, or its roles. Existing related studies have often concentrated upon micro-level (i.e. firm- and industry-level) location factors, largely ignoring macro-level factors, such as institutions. While there are some studies in the wider IB literature that include a range of location factors, this is rather new territory for research carried out at the subsidiary level.

Second, this thesis contributes to IB literature by discussing theoretical foundations of high value added in individual activity sets of the firm. Most previous research that has analysed the subsidiary's *proficiency* in a certain set has looked at competence levels, often vis-à-vis other units of the same MNE. This thesis argued that the resource-based view of the firm is a valuable basis to advance the concept of HVAAs as an alternative to existing approaches in the subsidiary literature. HVAAs were defined as value chain activities that are valuable, rare and difficult-to-copy and thus are likely to be a source of competitive advantage (Frost et al. 2002; Ray et al. 2004). It was further claimed that complexity within an activity set is a valid surrogate to capture HVAAs, since complexity acts as a barrier to imitation (Barney 1991; Rivkin 2000).

Third, most previous research has taken a one-dimensional view of subsidiary competence by analysing individual activity sets in isolation (e.g. Frost 2002), or by averaging the competence of the subsidiary in different parts of the value chain (Benito et al. 2003; Pedersen 2006). This thesis adds to the pioneering work by Asmussen et al. (2009), which accounted for the degree of specialisation of the foreign-owned subsidiary. Therefore, it examined the degree of value added in four individual activity sets: R&D/PD, manufacturing, supply and marketing.

Fourth, despite the generally relatively low effect of location factors on the degree of value added within activity sets of the foreign-owned subsidiary, the results indicate that its local environment should be conceptualised and operationalised in a multi-faceted way, which is in line with recent research (e.g. Asmussen et al. 2009; Enright 2009). This finding is much clearer when looking at location determinants for the extent of activities, but tentative signs do exist also for the degree of value added. Competence-creating R&D/PD, for example, is positively related only with scientific institutions. This casts some doubts about the validity of aggregate constructs – e.g. cluster membership or diamond strength – that emphasise the reinforcing nature of their constituents.

This study also made *empirical contributions*. First, the broad industry and technical field coverage of the data set means that this research is not limited to a small amount of foreign MNEs, industries or parent firm origins. This enhances the generalisability of the results. A great deal of previous research has focused on 'biased cases' for finding evidence of higher value-added activities (or asset-seeking FDI), e.g. subsidiaries in high-tech industries such as biotechnology, semiconductors and pharmaceuticals, usually operating in advanced host countries such as the US (e.g. Colakoglu et al. 2014; Penner-Hahn & Shaver 2005; Phene & Almeida 2008; Shan & Song 1997). Likewise, the study did not limit the investigation to a particular set of subsidiaries, for example those with a certain activity set (e.g. Ambos & Reitsperger 2004; Frost 2001; Furu 2000).

Second, in collecting data on value-added activities of foreign-owned subsidiaries in Brazil it extended the geographical coverage of literature on subsidiary activities to the context of emerging economies. The majority of existing research has largely embarked on developed countries, as stressed by Enright and Subramanian (2007). However, studying the activities of the foreign subsidiary in emerging economies is important, since ever more MNE value-added activities are undertaken in these economies, which exhibit substantial differences in comparison to developed countries (Hansen et al. 2011; Peng et al. 2008).

Third, this research contributed empirically in borrowing complexity-based measures from the supply chain literature. They allow inferring the degree of value added in the manufacturing, supply and marketing activity set. It may provide a more fact-based tool to research that aims to analyse competence levels of the subsidiary, instead of the prevailing approach to ask managers directly to assess their units' competences. It may also help certain strands of literature, such as studies on capabilities, to extend research designs from case studies to large-scale surveys.

8.2 Implications for public policy

This thesis also has important implications for policy makers who are concerned with the attraction of FDI and/or the upgrading of value-added activities undertaken by the foreign-owned subsidiary. The benefits that might derive from the presence of foreign subsidiaries have been discussed in related literature (Dimitratos et al. 2009; Enderwick 2005; Marin & Bell 2010). Such benefits comprise of short-term first-round impacts, such as employment creation, capital inflows and the provision of technology, and secondary impacts, such as knowledge spillovers or productivity gains. Some of the implications discussed below have been identified in previous literature. Here, insights from both the literature review and the empirical findings of this thesis are discussed.

Derived from the review of relevant literature (see Section 2.2 of Chapter 2), one important implication is that policymakers ought to analyse the dynamics of countries' value capture, i.e. how their share in the total value added of their export product evolves, instead of what they produce and how their share in world trade evolves. Policymakers concerned with up-grading and competitiveness gain little from studying whether a firm, a region, or a country could improve labour productivity or technology intensity (Srholec 2007; Szalavetz 2012). Rather, policy makers should explore the question of value added, i.e. whether actors move from lower to higher value-added activities.

Turning to the impact of the presence of foreign subsidiaries on the economic development of the host country, relevant literature has proposed that formal mandates and/or high value added activities of a subsidiary may be an essential driver (Holm et al. 2003; Scott-Kennel 2007; Santangelo 2009). Accordingly, it has been argued that policymakers should identify particular firms with such attributes and direct their investment initiatives towards them in order to increase the effectiveness of their policies. However, the identification of certain mandates, such as competence creating or exploiting, assigned to the affiliate is not an easy task because MNEs are reluctant to share this kind of information. Therefore, the mandate approach is less promising for policymakers. As regards high value-added activities some concepts have been advanced in the literature (see Section 2.2.2 of Chapter 2). However, as discussed above, many of them suffer from critical shortcomings.

In addition, some potentially relevant subsidiary characteristics that signpost the existence of high value-added activities (HVAAs) have been proposed in prior studies. In this thesis, those attributes were integrated as structural factors (see Section 3.3 within Chapter 3). For example, policymakers seem to favour export-oriented foreign-owned subsidiaries because they are expected to transfer knowledge on production and to augment the trade balance by selling to foreign markets (Meyer 2004). Our results indicate that export-based policies are a potential way of attracting HVAAs in R&D/PD and supply, but not in the other two sets. Besides, it appears likely that such a policy may lead to more activities in the R&D/PD and supply activity set, i.e. encourage activity set *extensity*. However, it is worth noting that a subsidiary primarily geared towards the local market may also provide benefits to the host country. Such a subsidiary may transfer operational and marketing knowledge, and benefit the local economy by providing superior products. It also affects the degree of competition in the local market, while export-oriented subsidiaries do not (Meyer 2004). Hence, policy makers need to be clear on which type of resources and capabilities, from which spillovers may derive, they wish to target.

Subsidiary size is often proposed as a major attribute in the literature. In terms of the extent of activity sets, our empirical findings suggest that larger subsidiaries are more likely to be highly engaged in R&D/PD, manufacturing and supply, whereas the extensity of marketing activities is higher in small subsidiaries. As most policy makers appear to favour spillovers generated by upstream activities it would be most promising to direct initiatives or policies at large foreign-owned subsidiaries. However, regarding the potential of upgrading within MNE units, i.e. the performance of HVAAs, the picture is rather different. Larger affiliates appear to be more likely to carry out higher value-added R&D PD activities, while HVAAs in manufacturing seem more likely in small foreign affiliates. Hence, if policy makers seek to encourage local sourcing, which might give rise to spillovers, they will be more likely to achieve this objective if they target small subsidiaries.

It is stressed in the Schumpeterian literature that economic development rests, in large part, upon technologically-intensive activities (Nelson & Winter 1982; Schumpeter 1934). Thus, many policy makers have strived to establish a population of MNEs from high-technology sectors. Our findings, however, indicate that technology intensity of sectors provides little insight in terms of both the extent of and the value added in activity sets undertaken by the foreign subsidiary, confirming views in the literature that entire industries are a poor proxy for technological sophistication and, in turn, higher value added (Smith 2002; Sturgeon & Gereffi 2009). Likewise, HQ country of origin, subsidiary location in Brazil and age of the subsidiary all seem less suitable to identify HVAAs in foreign-owned firms. This indicates that policies to encourage upgrading should neither be directed at all firms in general nor at larger groups (e.g. German firms, electronics firms). This advice can also be found in prior studies (Feinberg & Keane 2001; Hobday & Rush 2007; Santangelo 2009). In essence, it is confirmed in this study that identifying relevant attributes is not easy.

The empirical results of this study add interesting insights about the importance of location factors for both the quantity and quality of FDI. First of all, the estimations of this research re-emphasise that different value-added activities of the MNE appear to be associated with different features of the host economy, and that aligning the economy to one type of investment may make it less attractive for other types of investment. Policy initiatives, therefore, should be tailored to certain, high value-added, activities as to achieve optimal results. This is in line with Enright's (2009) recommendations.

Contrary to popular belief, this study indicates that the institutional environment of the host location has very little impact on the degree of value added within activity sets undertaken by the foreign-owned subsidiary. Moreover, there is rather little statistical significance for the impact of institutions on the – much more explored – extent of activities. This indicates that national, or sub-national, changes to institutions may be rather ineffective in affecting the nature of activities in units owned by foreign MNEs. In general, host-economy features seem to be of rather minor importance for HVAAs. Nonetheless, some policy recommendations regarding location factors can be derived.

An insightful finding of this study is that supply conditions have a positive association with the extent of both manufacturing and supply activities conducted by foreign firms, whereas there is no such relationship for the degree of value added in these two sets. This may point to a rather low quality of inputs, given that many subsidiaries upgrade their activities, i.e. execute HVAAs, as more sophisticated inputs become available locally (Meyer 2004; Song 2002). Furthermore, only in the presence of excellent suppliers is the subsidiary exposed to opportunities, new knowledge and ideas (Forsgren et al. 2005). Thus, in order to encourage backward linkages policy makers may launch initiatives to foster the local supply base and to support local sourcing, entailing information and match-making, capability upgrading of local firms, financial assistance, human resource development programmes with resident suppliers and other forms of training support, and cluster-oriented programmes (Jindra et al. 2009; Scott-Kennel 2007; Tavares & Young 2006).

Based on a number of studies there is a common view that only highly innovative foreign-owned subsidiaries generate positive spillovers (Jindra et al. 2009; Marin & Bell 2010). As a result, many policymakers in emerging economies around the globe have been concerned with the attraction of high-end foreign R&D investment. Our results indicate that emerging economies would be most likely to achieve this objective if they invested in their scientific institutions. Similar policy recommendations have been advised in the context of emerging economies before (e.g. Hegde & Hicks 2008; Veliyath & Sambharya 2011). Yet, there are several doubts whether emerging economies can benefit from R&D spillovers (Feinberg &

Majumdar 2001; Meyer 2004). As such, it might be more promising to design policies that promote R&D co-operation between foreign-owned MNE subsidiaries and domestic firms as suggested in Jindra et al. (2009).

Policy makers must be mindful that just increasing inflows of FDI is not enough to reap the potential gains from units owned by MNEs. Indeed, it is widely accepted that some foreign subsidiaries have a strong inwards orientation, i.e. prefer intra-organisational relationships, which may run counter to the desired linkages with domestic firms (Andersson et al. 2007; Forsgren et al. 2005). Thus, local policy ought to discourage the emergence of subsidiaries operating in exclaves with very few linkages to the local economy (Meyer 2004; Phelps et al. 2003). Increasingly, FDI policies have focused on the importance of embedding foreign subsidiaries within their local context (Dimitratos et al. 2009; Giroud 2007; Huggins et al. 2007). In fact, as no unambiguous – both internal and external – attribute could be found in this research to help identify foreign firms that may be receptive to upgrading policies, the best option available to policy makers may be to offer ‘embeddedness policies’ (see Phelps et al. 2003; Taggart & Hood 1999).

As regards the specific case of policy making in Brazil, the following proposals are derived from this research. First, Brazil is one of the major recipients with respect to the volume of FDI attracted in the past two decades (see Section 4.3.1 of Chapter 4). Thus, quantitatively the policy of focusing on the amount of FDI may be considered successful (Costa 2005; Hobday & Rush 2007). Second, policy makers may want to pay more attention to policies, or after-care programmes, that aim to amplify the embeddedness of foreign subsidiaries in their local environment, since concerns about upgrading of indigenous firms in Brazil have been voiced (Costa & Queiroz 2002; Costa 2005). Strong linkages with local organisations may give rise to positive externalities, which could help local firm upgrade.

Summarising the above, policy makers should devise policies that enhance the embeddedness of foreign firms in the local economy. Less attention could be devoted to changing the institutional context. For the degree of value added, it may be best to devise policies that improve scientific institutions and the skills of local employees. Policies that aim to nurture backward linkages of foreign firms, with local suppliers, can be directed at export-oriented and smaller MNE affiliates. Next, implications for management are discussed.

8.3 Implications for management

From the results obtained in this research, it is possible to infer some implications for both headquarters and subsidiary managers. Headquarters can be perceived as an coordinator of resources and knowledge (Foss & Pedersen 2002). Its pivotal target is to allocate resources efficiently across the network of subsidiaries as to exploit host-country opportunities while preserving a global focus (Bartlett & Ghoshal 1989; Nohria & Ghoshal 1994). To this end, the fine-slicing of value-added activities across optimal locations calls for an increasingly sophisticated decision-making process by MNE managers (Buckley & Ghauri 2004). Thus, managers need to be aware of location issues in emerging economies.

First, the thesis provides information on the nature of activities undertaken by 395 foreign-owned manufacturing affiliates in Brazil. This information *as such* is proving insightful to headquarters managers as they investigate their own strategies, the revealed preferences of potential rivals, and the location facets that are related to the performance of certain value-added activity sets of the firms in the sample. It is worth stressing that the executive reports that were derived from the data and made available to the participants of the survey offered more bespoke information (see Section 5.6 of Chapter 5).

Second, at a general level, this study shows that higher-order R&D is conducted by units of MNEs that are residing in emerging economies, partly driven by the existence of scientific institutions. Based on this finding, HQ managers may decide to set up R&D units or focus on initiating co-operations with universities and public research centres in emerging economies, particularly if the MNE's research portfolio thus far has neglected this specific set of countries.

Third, the findings suggest that the importance of the institutional background in emerging markets might be overstated. Irrespective of whether their affiliates are good in adapting to institutions or the quality of institutions means that they have no detrimental impact on the transaction costs of the focal unit, headquarters managers ought to focus upon the location advantages in a foreign market, instead of the effectiveness of accessing them. At the same time, the lack of significant associations regarding institutions points out that there is little potential for institutional arbitrage strategies in emerging economies. Managers thus might be well advised to target developed countries when intending to exploit differences in institutional environments. However, institutions differ considerably among emerging markets, e.g. between Brazil and India (Franco et al. 2011; Nassif 2007), meaning that management may need to evaluate institutions on a country-by-country basis.

Fourth, the small amount of significant relationships between location factors and HVAAs indicates that many location factors in emerging economies may not (yet) be good enough in order to undertake HVAAs. Certain location advantages may lead MNEs to expand their activities (i.e. increase extent of sets), while they have rather little impact on the degree of value added. This leaves managers with two options. On the one hand, if specific location factors are required, they may need to carry out the activities in question in one of the other units of the MNE. On the other hand, they may assign firm-specific resources, e.g. technology or employees, to the subsidiary to mitigate the deficiencies in the host country. In fact, this thesis points to the relative salience of corporate determinants, i.e. head-office assignment and entrepreneurial endeavours by the subsidiary, for the nature of activities of MNE subsidiaries in emerging markets. Thus, HQ managers may re-consider the overall position upon initiatives, grant more decision-making autonomy to some affiliates or nurture managerial courage (Ambos et al. 2010). It may also be useful to encourage intra-organisational, rather than inter-organisational, relationships. Accordingly, it could be advisable to follow the concept of the MNE as an 'open system', nurturing intra-MNE flows of knowledge and skills. To this end, Gupta and Govindarajan (2000) proposed corporate-wide formal and informal meetings, rotation of managers and employees in key positions throughout the firm, and the development of cross-site teams.

Turning to the literature review, headquarters might wish to reconsider how to evaluate the capabilities of their subsidiaries, in order to mitigate the prevailing weakness in identifying where capabilities reside (Denrell et al. 2004). In particular, it is recommended that parent firm managers turn away from financial measures, as suggested in Andersson et al. (2001). Instead, headquarters could turn to the degree of value added within separate activity sets, which may say more about value creation in the long term. The notion of high value added based on complexity used here is only one possible way of determining the degree of value added in activity sets. In fact, it should be seen as a pioneering idea (see Section 8.5 of this Chapter). Accordingly, headquarters may want to develop their own measure, which considers their specific requirements, e.g. industry, structure, etc. Such a measure may also help prevent perception gaps between HQ and subsidiaries (Birkinshaw et al. 2000; Chini et al. 2005).

From the results, several implications can be inferred for *managers of foreign subsidiaries*. Firstly, in view of the rather small impact of external factors upon the degree of high value added within activity sets, subsidiary managers may focus on building intra-organisational relationships, i.e. with other units of the MNE, in order to unfold the potential of the focal subsidiary. Indeed, prior studies suggested that higher integration into the MNE network is likely to result in re-investment and resources from the parent firm (Dellestrand & Kappen 2012; Forsgren et al. 2005). However, this advice needs to be treated cautiously, as foreign subsidiaries in the US have been shown to profit more from external partners (e.g. Almeida & Phene 2004; Colakoglu et al. 2014).

Secondly, subsidiary managers should have very clear ideas of where they want to develop distinct competences. Only then may they decide whether to strive for a large organisation, i.e. more staff, or for a small affiliate. For example, in terms of both the extent of and the degree of value added within the R&D/PD activity set it seems that a larger employee base is preferable, while the picture is rather dissimilar for the degree of value added in the three other sets.

A widely held view is that the particular market in which a subsidiary operates is important to the performance of the MNE as a whole. To this end, previous work has often suggested that HQ managers pay most attention to those subsidiary markets that provide the greatest sales opportunities (Bartlett & Ghoshal 1986; Bouquet & Birkinshaw 2008). Based on the overall results of this thesis, it seems a promising route to focus on the host market in order to extend activities or to gain mandates for HVAAs.

8.4 Suggestions for further research

Several issues, which may be subject to further research, emerged from this research. One exciting avenue might be the exploration of determinants endogenous to the foreign-owned subsidiary. Given that the results of this thesis indicate that location factors seem to matter less than usually anticipated, entrepreneurial capabilities of the foreign subsidiary appear to be a highly promising perspective for analysing the extent of value added in certain activity sets. Of course, this argument is also valid for the headquarters assignment perspective (see Section 2.3.3 of Chapter 2). In addition, the inclusion of MNE-specific determinants, such as size, previous international experience, organisational structure, and other elements may well add explanatory power to the analysis in the present study.

As regards generalisability, only replication studies can establish the generalisability of our findings in other contexts. For that reason, future research could fruitfully extend the investigation of high value-added activities to foreign-owned subsidiaries located in various host countries to explore whether the results hold in multiple host country settings. Therein, this type of research would follow the recommendation of surveying international business (IB) themes using a comparative sample (Gammelgaard et al. 2012; Tung & van Witteloostuijn 2008).

Similarly, the present study focused on foreign-owned subsidiaries belonging to MNEs that operate in the manufacturing sector. Therefore, although the sample of this study has some advantages (see Section 5.5 of Chapter 5) it ignored affiliates from service sector MNEs. In light of the growing importance of service sector FDI, future research might wish to extend this study as to accommodate subsidiaries controlled by service sector MNEs theoretically, as well as empirically.

There is some theoretical and empirical evidence that, during the past two decades, MNEs were especially prone to use other modes for internationalising their value-added activities, such as joint ventures or strategic alliances with indigenous firms (Dunning 1995; Flores & Aguilera 2007; Meschi & Riccio 2008). Extending the findings of this research to capture commonalities and differences among all the conceivable ways in which MNEs choose to extend their operations to foreign countries and particularly focus on location determinants appears academically relevant.

Qualitative research may be a promising route to investigate the influence of non-location determinants, and the impact of the local environment, as examined in this study, on value-added activities executed by foreign-owned subsidiaries. In particular, qualitative research promise to illustrate the actual processes more deeply (Marschan-Piekkari & Welch 2004). There is some pioneering qualitative research that studies the degree of value added within activity sets (Collinson & Wang 2012; Figueiredo 2011). However, this research, hitherto, has only started to investigate activity sets beyond technical activities, i.e. R&D and manufacturing. This could be amplified by future research. Moreover, as outlined in Section 7.6 of Chapter 7, a mixed-method approach seems to be useful in order to adequately take into account the requirements of both, the novel field of HVAAs (i.e. deductive research) and the established IB research (i.e. inductive research).

Longitudinal data on the activity sets conducted by the MNE subsidiary, i.e. its role, would be very helpful in order to strengthen the results of this thesis on the influence of the local environment on the nature of activities. First, future studies could capture potential changes in terms of location advantages over longer periods. Second, future research may analyse the changes, i.e. increases or decreases, in the degree of value added within certain activity sets of the foreign-owned subsidiary, thereby permitting a dynamic analysis. Third, follow-up studies may investigate whether the relationships identified in this research have changed over time. This study as well as other research have collected two values for some variables, for 'today and five years ago' (e.g. Gammelgaard et al. 2012; Jarillo & Martínez 1990; Peng & York 2001). Admittedly, such an approach relies heavily on the memory of senior managers, and thus may be prone to error.

In order to alleviate the well-documented perception gaps between headquarters and their foreign-based subsidiaries, future research may aim to collect data at two sites of the MNE, both headquarters and local subsidiary. While such an approach is unlikely to augment the reliability of objective data, e.g. the amount of customers or suppliers, it should be valuable for perceptual data, especially the evaluation of location factors. Moreover, while the study utilises a bespoke survey-based dataset, further studies might also attempt to use firm-level secondary data sources, even though these are recognised as difficult to obtain in emerging economies (Estrin et al. 2008; Hoskisson et al. 2000).

Future research should develop refined measures of complexity in order to approximate the degree of value added within activity sets. In addition, the notion of complexity is only one relevant way of capturing value added based on the idea that the underlying knowledge and resources are inimitable (see Section 2.2 of Chapter 2). For example, the extent to which a subsidiary's knowledge is tacit may be used as an indicator for value added within separate activity sets (Najafi-Tavani et al. 2014).

At the conceptual level, given the growing attention paid to institutions in the IB literature, future research ought to integrate institutional perspectives. As most existing research, this study investigated only the regulative facet of institutions, leaving normative and cognitive dimensions untouched. Thus, while this thesis included institutions into the envelope paradigm, it did not discuss in depth other institutional perspectives that may be integrated into existing IB theories, as proposed by Dunning and Lundan (2008a). Likewise, future studies may further explore what location perspectives, and subsequently location factors, need to be considered in order to capture the richness of the local environment in which the foreign subsidiary operates.

MNEs play a fundamental role in the development of most emerging economies, especially if they dominate economic output (Jindra et al. 2009; Meyer 2004; Pedersen 2006). Hence, scholarly research by economists and policy analysts has devoted much attention to MNEs. In contrast, IB scholars have been relatively uninterested in analysing the impact of FDI on the wider social and environmental context (Dimitratos et al. 2009). The pioneering line of research that exists could be usefully extended by exploring this issue from the perspective of HVAAs carried out by MNE subsidiaries.

8.5 Limitations of this research

As all research, this study suffers from some limitations, which provide promising avenues for further investigation, as debated in Section 8.4 above. First, the obtained database only allows for the analysis of the local environment drivers of subsidiary activities. This means that other determinants, including headquarters assignment and the subsidiary's own initiative that co-evolve to create the configuration of the subsidiary's value chain are not taken into account. As such, the study is subject to the criticism that drivers of a subsidiary's role (or activities) are often analysed in isolation (Achcaoucaou et al. 2014). It should be noted, however, that the examination of 'non-location' drivers of value-added activities was not the focus of this thesis.

Also, as the unit of analysis is the subsidiary, the research did not obtain data at the parent-firm level. However, MNE-specific characteristics have been found to affect value-added activities conducted by foreign subsidiaries (Enright 2009). First, MNEs with international experience are more likely to have the knowledge about entering and setting up a variety of activities in host markets (Enright 2009). International experience, thus, may influence the scope and nature of value-added activities. Second, parent-firm size has been suggested to affect subsidiary activities. For instance, large MNEs can commit a considerable amount of resources and may control subsidiaries in each target market (Barkema & Vermeulen 1998; Demirbag et al. 2007; Pangarkar & Lim 2003). Each specific subsidiary would then be less critical for the global MNE system of manufacturing and trade (Estrin et al. 2008). This, in turn, should influence the scope and nature of activities. Third, the organisational structure of the parent, i.e. multinational vs. transnational vs. international vs. global strategy, may influence the nature of subsidiary activities (Goerzen et al. 2013; Harzing 2000a; Prahalad & Doz 1987).

Another limitation is that the data derive from subsidiary managers, and do not include the view of headquarters. Hence, while the findings above reflect the perceptions of subsidiary managers, no inferences can be made as regards differences between the headquarters perspective, and the subsidiary perspective. As discussed in Section 5.5 of Chapter 5, this study adopted the widely held assumption that both perspectives converge with one another due to feasibility considerations. Nevertheless, perception gaps between headquarters and their subsidiaries are well documented (Chini et al. 2005). To this end, it has been suggested that surveys targeting subsidiary managers might yield inflated values due to social desirability (Birkinshaw & Morrison 1995). As this research primarily relied on factual data rather than perceptual data for the nature of value-added activities this potential shortcoming should be minimal. At the same time, divergent views between headquarters and subsidiary managers may exist about the local environment of the subsidiary. Thus, it would have been useful to ask HQ managers to evaluate the local environment. In a similar vein, data from secondary sources about the parent firm would have been useful. Regrettably, this type of data seems to be only available for listed companies. Hence, due to the budget and time restrictions of this research project, it was not feasible to complement the survey data with secondary data on MNE features. However, if possible characteristics of the subsidiary were adopted from secondary data. In this research, such data were found for parent firm origin and subsidiary location in Brazil.

Of course, every single-country study raises the issue of generalisation. The analysis in this research is limited to the effects of location factors on foreign-owned subsidiaries in Brazil. The results may, to a certain extent, reflect elements of the local environment that is specifically Brazilian, and thus of restricted applicability to non-Brazilian countries. Indeed, the location advantages of countries are likely to differ considerably both between developed and developing countries, and among developing countries (Dunning & Lundan 2008b). In particular, emerging markets are not a homogenous group, but entail a diversity of market sizes, economic development, political regimes and levels of privatisation (Akbar & Samii 2005; Luo 2003). In addition, variations exist in terms of FDI experience. There is a much larger and longer presence of MNE affiliates in Brazil than in most other countries labelled emerging economy (Baer 2008; Franco et al. 2011). These differences may challenge the applicability of Brazilian-based results to other emerging markets, chiefly the conclusions that concern the impact of location factors on value-added activities. On the other hand, as shown in Chapter 4, secondary data suggests that emerging economies are rather similar in terms of the institutional environment. Hence, it is fair to assume that the low institutional effects on HVAAs found in Brazil may also be observed in other emerging economies.

Furthermore, this study was undertaken among a sample of foreign-owned subsidiaries that are operating in the manufacturing industry. Accordingly, no claims can be made regarding their applicability to affiliates from service MNEs. However, the study is generalisable in terms of parent firm origin, regional location in Brazil and size of the subsidiaries. Also, it is worth stressing that sample size limitations *as such* were minimised by ensuring a decent response rate and tests for response bias and representativeness.

Measurement may represent another limitation. The measures that approximate the degree of value added in three activity sets (i.e. manufacturing, supply, marketing) admittedly may not be the best ones. In utilising complexity measures that are widely applied in the supply chain literature as indicators, this study is of pioneering nature. Thus, the study can be best understood as an initial answer to the question of how to infer the degree of value added in activity sets, rather than a full-blown effort to rigid hypothesis testing.

Finally, as in many studies in the IB area, this thesis relies upon a cross-sectional survey of managers. Given the use of cross-sectional data, no causal inference can be made regarding the relationships in this thesis, although the relationships suggested are based on previous theorising on location advantages and MNE activities. While longitudinal methodologies are to be preferred for unravelling causality (Venaik et al. 2005), it was beyond the means and scope of this particular research.

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APPENDIX

Appendix A: Example of questionnaire

Insper | Instituto de Ensino e Pesquisa

Manchester Metropolitan University

Questionnaire on Location factors and Subsidiary activities

NOTES FOR COMPLETION OF THE QUESTIONNAIRE

(a) All the questions relate to the establishment at the site to which the questionnaire has been sent.

(b) Your response will be strictly confidential and no establishment will be named in any report or publication, which follow from the analysis of the data that we collect.

Section 1: General Information

1.1 How many years has your establishment been foreign owned?

year(s)

1.2 How was the foreign investment in your establishment accomplished?

1.3 If you are one of a number of different establishments of a foreign organisation in Brazil, are you the controlling Brazil head office?

1.4 What is the approximate number of employees at this site?

1.5 Please choose the industry that best describes the nature of your business.

Section 2: Establishment Activities

2.1 What is the proportion of employees in the following activities on overall activities at the establishment?

Business activities	2012
R&D / product development (including engineering services and product design)	%
Procurement	%
Manufacturing	%
Sales and marketing	%
Logistics / distribution	%
After-sales services	%
Administration (e.g. bookkeeping, payroll)	%
	100 %

Section 3: Supply Chain Management

3.1 Please state your disagreement or agreement with the following statements concerning your establishment (1=strongly disagree; 7=strongly agree).

All of our customers desire essentially the same products.

Our total demand, across all products is relatively stable.

The master schedule is level-loaded in our plant, from day-to-day.

NOTE TO INTERVIEWER
Ask this question only if manufacturing takes place (see 2.1).

We seek short lead times in the design of our supply chains.

We can depend upon on-time delivery from our suppliers.

3.2 Please indicate the percentage of production volume accounted for by each category, with all percentages adding to 100%.

NOTE TO INTERVIEWER
Ask this question only if manufacturing takes place (see 2.1).

One-of-a-kind	%
Small batch	%
Large batch	%
Repetitive/line low	%
Continuous	%
	100 %

3.3 How many customers does this plant serve (approximately)?

3.4 What is the average life cycle of your products?

3.5 This plant's output requires approximately how many individual active part numbers of material items?

NOTE TO INTERVIEWER
Ask this question only if manufacturing takes place (see 2.1).

3.6 How many product models are manufactured at this plant?

NOTE TO INTERVIEWER
Ask this question only if manufacturing takes place (see 2.1).

3.7 How many suppliers does the establishment have approximately?

3.8 Please choose the category that best describes the "R&D/ product development" activities conducted at your establishment.

NOTE TO INTERVIEWER
Ask this question only if "R&D / product development takes place (see 2.1).

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Section 4: Market Scope

4.1 What is the approximate percentage of your establishment's foreign sales by volume of

%

4.2 What is the market scope of your establishment?

Section 5: Quality of Location Factors

Please evaluate the business environment in Brazil on the following dimensions (1= very low/very bad; 7= very high/very good).

5.1 Amount of suppliers.

5.2 Availability of cheap labour.

5.3 Amount of competitors in close proximity.

5.4 Protection of intellectual property rights.

5.5 Availability of raw materials.

5.6 Market size.

5.7 Communication and transportantion infrastructure.

5.8 Tax burden.

5.9 Enforcements of laws and contracts.

5.10 Availability of skilled employees.

5.11 Quality of suppliers.

5.12 Macroeconomic stability.

5.13 Market potential.

5.14 Corruption.

5.15 Existence of scientific institutions.

5.16 Political stability.

5.17 Access to other South American markets.

5.18 Labour regulations.

Thank you very much for your co-operation.

Your position:

For any additional questions or concerns feel free to contact us via mail:
c.kramer@mmu.ac.uk or phone 11 4504 2786

Answers for choice-questions

1.2 How was the foreign investment in your establishment accomplished?

Wholly owned newly built/ greenfield investment (1)

Joint venture newly built/ greenfield investment (2)

Wholly owned acquisition (3)

Joint venture acquisition (4)

1.5 Please choose the industry that best describes the nature of your business.

Non-manufacturing firm (1)

Manufacture of food products (2)

Manufacture of beverages (3)

Manufacture of tobacco products (4)

Manufacture of textiles (5)

Manufacture of wearing apparel (6)

Manufacture of leather and related products (7)

Manufacture of wood and of products of wood and cork, except furniture (8)

Manufacture of paper and paper products (9)

Printing and reproduction of recorded media (10)

Manufacture of coke and refined petroleum products (11)

Manufacture of chemicals and chemical products (12)

Manufact. of basic pharmaceutical products and pharmaceutical preparations (13)

Manufacture of rubber and plastic products (14)

Manufacture of other non-metallic mineral products (15)

Manufacture of basic metals (16)

Manufacture of fabricated metal products, except machinery and equipment (17)

Manufacture of computer, electronic and optical products (18)

Manufacture of electrical equipment (19)

Manufacture of machinery and equipment (20)

Manufacture of motor vehicles, trailers and semi-trailers (21)

Manufacture of other transport equipment (22)

Manufacture of furniture (23)

Other manufacturing

Other repair and installation of machinery and equipment (25)

3.8 Please choose the category that best describes the “R&D/product development activities conducted at your establishment.

N/A (no R&D and product development whatsoever) (1)

Customer technical services (2)

Adapting manufacturing technology (3)

Developing new and/or improved products for the South American market (4)

Developing new and/or improved products for the global market (5)

Generating new technology for the corporate parent (6)

4.2 What is the market scope of your establishment?

Local (1)

Brazil (2)

South America (3)

Global (4)

Your position

Managing director (1)

Head of department (2)

Other, please indicate (3)

Appendix B: Overview of value-added activities used in subsidiary research

Study	Value chain activities	No. of activities
Ambos et al. (2010)	▪ R&D ▪ Manufacturing ▪ Back-office support ▪ Marketing ▪ Logistics ▪ Product sales and after sales service ▪ Sales of professional service	7
Asmussen et al. (2009) Benito et al. (2003) Davis & Meyer (2004) Frost et al. (2002) Holm & Pedersen (2000) Moore (2001) Pedersen (2006) Schmid & Schurig (2003)	▪ Research ▪ Development ▪ Purchasing ▪ Production of goods or services ▪ Marketing and sales ▪ Logistics and distribution ▪ Human resource management	7
Birkinshaw & Hood (2000)	▪ Product or process R&D ▪ Manufacturing ▪ Sales ▪ Marketing ▪ Management of international activities ▪ Management of interface with HQ ▪ Innovation and entrepreneurship	7
Birkinshaw et al. (2005)	▪ R&D ▪ Purchasing ▪ Manufacturing ▪ Sales ▪ Service	5
Manolopoulos (2010)	▪ R&D ▪ Product design ▪ Manufacturing ▪ Service ▪ Marketing ▪ Sales	6
White & Poynter (1984)	▪ Development ▪ Manufacturing ▪ Marketing	3
Williams (2003)	▪ Assembly ▪ Manufacturing ▪ Marketing ▪ Sales and after-sales services ▪ Finance ▪ Human resource management ▪ Research and development ▪ Procurement	8

Appendix C: Diagnostics

Appendix C.1: Overview of transformed variables

Variable	**Operational definition**
Dependent variables	
R&D/PDLG	Extent of R&D/PD activity set carried out at subsidiary, log transformed
ManufLG	Extent of manufacturing activity set carried out at subsidiary, square rooted
SupplyLG	Extent of supply activity set carried out at subsidiary, calculated as sum of procurement and logistics/distribution, square rooted
MarkSQ	Extent of marketing activity set carried out at subsidiary, calculated as sum of marketing/sales and after-sales services, square rooted
HVAR&D/PD	Competence-creating activities (i.e. HVA) =1, competence-exploiting =0
NoProd	Number of products, log transformed
FlexMan	Flexible manufacturing, log transformed
ManSchIns	Manufacturing schedule instability, log transformed
NoSuppl	Number of suppliers, log transformed
LongLeadTimes	Long supplier lead times, log transformed
SuppDelUnre	Supplier delivery unreliability, log transformed
NoCust	Number of costumers, log transformed
CustHet	Customer heterogeneity, log transformed
DemVar	Demand variability, log transformed
Variables of interest (i.e. location variables)	
CostAdLG	Cost advantages, calculated as average of two items, log transformed
MarketLG	Market attractiveness, calculated as average of two items, log transformed
CompLG	Competitors in close proximity, single-item scale, log transformed
SupplyLG	Supply conditions, calculated as average of two items, log transformed
ScienInsLG	Existence of scientific institutions, single-item scale, log transformed
SkillEmpSQ	Availability of skilled employees, single-item scale, log transformed
RiskLG	Country risk, calculated as average of three items, log transformed
RegFraLG	Regulatory framework, calculated as average of three items, log transformed
Control variables	
AgeLG	Subsidiary age (number of years), log transformed
SizeLG	Subsidiary size (number of employees), log transformed
ExpShaLG	Export share (share of foreign sales to total sales), log transformed
USDummy	Parent firm from the US =1; parent firm from elsewhere =0
EUDummy	Parent firm from the EU =1; parent firm from elsewhere =0
IndDummy	Sector (low and medium-low tech = 0; high and medium-tech =1
SEBDummy	Subsidiary location in South-East Brazil =1; location elsewhere =0
SBDummy	Subsidiary location in South Brazil =1; location elsewhere = 0
MaScoDummy	International market scope =1; domestic market scope =0

Appendix C.2: Tests of assumptions for regression analyses

Diagnostic measure	Critical value specification	Critical value(s)	Identified cases	
			Model 1	**Model 2**
Residuals				
Standardised	t value	± 2.58	35, 161, 191, 276, 318	118, 205,
Studentised	t value	± 2.58	35, 161, 191, 276, 318	86, 118, 205
Studentised deleted	t value	± 2.58	35, 161, 191, 276, 318	86, 118, 205
Leverage				
Hat values	2(k+1)/n	0.091	.	86
Mahalanobis distance		25	35, 161, 276	86, 118, 125
Single case measures				
Cook's distance	4/(n-k-1)	0.011	28, 35, 161, 191, 276, 318	28, 86, 118, 125, 128, 233, 251, 265, 357, 381
COVRATIO	1±[3(k+1)/n]	1.14 0.86	22, 35, 63, 161, 191, 276, 318	86, 118, 125, 155, 205, 233, 251, 265, 357
SDFFIT	√[(k+1)/(n-k-1)]	0.218		
Cases deleted			35, 161, 191, 276, 318	86, 118, 125, 205

N=395, k=17

Diagnostic measure	Critical value specification	Critical value(s)	Identified cases	
			Model 3	**Model 4**
Residuals				
Standardised	t value	± 2.58	.	86
Studentised	t value	± 2.58	.	86
Studentised deleted	t value	± 2.58	.	86
Leverage				
Hat values	2(k+1)/n	0.091	.	86
Mahalanobis distance		25	355	86, 125, 331
Single case measures				
Cook's distance	4/(n-k-1)	0.011	108, 288, 295, 340, 346, 355	71, 86, 331
COVRATIO	1±[3(k+1)/n]	1.14 0.86	288, 295	71, 86, 180
SDFFIT	√[(k+1)/(n-k-1)]	0.218		
Cases deleted			.	86

N=395, k=17

Diagnostic measure	Critical value specification	Critical value(s)	Identified cases	
			Model 5	**Model 7**
Residuals				
Standardised	t value	± 2.58	67, 80, 198	.
Studentised	t value	± 2.58	67, 198	.
Studentised deleted	t value	± 2.58	67, 80, 198	.
Leverage				
Hat values	2(k+1)/n	0.168	.	.
Mahalanobis distance		25	102	264
Single case measures				
Cook's distance	4/(n-k-1)	0.020	65, 75, 80, 102, 198, 244, 330	264
COVRATIO	1±[3(k+1)/n]	1.25 0.75	67, 75, 80, 198, 247, 330	264
SDFFIT	√[(k+1)/(n-k-1)]			
		Cases deleted	67, 80, 198	264

*There were no outliers outside 2 standard deviations. N=214, k=17.

Diagnostic measure	Critical value specification	Critical value(s)	Identified cases		
			Model 8	**Model 9**	**Model 10**
Residuals					
Standardised	t value	± 2.58	59, 354	.	.
Studentised	t value	± 2.58	59, 354	135	.
Studentised deleted	t value	± 2.58	59, 354	135, 248	.
Leverage					
Hat values	2(k+1)/n	0.154	.	.	.
Mahalanobis distance		25	.	.	.
Single case measures					
Cook's distance	4/(n-k-1)	0.018	46, 52, 96, 170, 175,330, 353, 354, 354, 360, 366	75, 135, 179, 206, 248, 269	.
COVRATIO	1±[3(k+1)/n]	1.23 0.77	46, 52, 59, 67, 170, 175, 352, 354, 366	24, 75, 135, 179, 206, 248	.
SDFFIT	√[(k+1)/(n-k-1)]				
		Cases deleted	59, 354	135, 248	.

N=233, k=17

Diagnostic measure	Critical value specification	Critical value(s)	Identified cases		
			Model 11	**Model 12**	**Model 13**
Residuals					
Standardised	t value	± 2.58	124, 285	49	.
Studentised	t value	± 2.58	4, 124, 285	49, 90	.
Studentised deleted	t value	± 2.58	4, 124, 285	49, 90	.
Leverage					
Hat values	2(k+1)/n	0.121	.	.	.
Mahalanobis distance		25	3, 130, 266	49	49
Single case measures					
Cook's distance	4/(n-k-1)	0.014	3, 52, 124, 130, 190, 249, 250, 266, 285	49, 90, 165	49
COVRATIO	1±[3(k+1)/n]	1.18 0.82	4, 52, 124, 190, 249, 250, 285, 301	27, 49, 90, 165, 344	49
SDFFIT	√[(k+1)/(n-k-1)]				
		Cases deleted	4, 124, 285	49, 90	49

N=298, k=17

Appendix C.3: Robustness checks

Split-sample tests for models 1-4 (extent of activity sets)

	Model 1		**Model 2**		**Model 3**		**Model 4**	
	Extent of R&D/PD set		Extent of manuf. set		Extent of supply set		Extent of marketing set	
	Sample A	Sample B	Sample A	Sample B	Sample A	Sample B	Sample A	Sample B
	β (sig.)	β (sig.)	β (sig.)	β (sig.)	β (sig.)	β (sig.)	β (sig.)	β (sig.)
Cost advantages	.049	.056	.057	-.038	.108	.025	.221 †	.035
Market attractiveness	.114	.081	-.093	-.012	.056	-.023	-.084	.018
Competitors in proximity	.006	.033	.080	.052	-.128	-.021	.282 **	.023
Supply conditions	-.129	.026	.180 *	.131 †	.206 *	.287 **	-.316 **	-.303 **
Existence of scientific institutions	.126 †	.021	.095	-.009	-.061	-.013	.075	.082
Availability of skilled employees	.038	-.026	-.145	-.104	-.080	-.106	.109	.072
Country risk	-.033	.023	-.032	-.072	.071	.102	-.082	-.049
Regulatory framework	-.191 **	-.166 *	.024	.029	-.061	-.038	-.029	-.002
Subsidiary age	.017	.011	.013	-.031	-.007	-.027	.108	.022
Subsidiary size	.365 ***	.448 ***	.491 ***	.656 ***	.141 †	.201 *	-.276 ***	-.245 **
Export share	.438 ***	.496 ***	.099	.144 *	.223 †	.075	.034	.098 †
US dummy	-.055	.135	.072	-.021	.004	.084	-.039	-.044
Europe dummy	.046	.109	.079	.013	.065	.099	-.039	-.026
Industry dummy	.034	.012	-.027	-.024	-.001	-.072	.062	.132 *
South-East Brazil dummy	-.043	-.009	.002	.047	.004	.000	.171	-.065
South Brazil dummy	.058	.142	.014	.019	.110	-.021	.059	.084
Market scope dummy	-.037	-.279 **	.056	-.112	-.141	-.068	-.063	-.068
R	.652	.654	.650	.716	.373	.372	.460	.430
R-square	.425	.428	.423	.513	.139	.139	.212	.185
F-value (sig.)	7.768***	7.706***	7.667***	10.980***	1.690*	1.697*	2.825***	2.363**

Notes: ***, **, * and † denote 0.1%, 1%, 5% and 10% significance levels, respectively.

Split-sample tests for models 5-9

	Model 5		**Model 7**		**Model 8**		**Model 9**	
	Number of products		Manuf. schedule inst.		Number of suppliers		Long suppl. lead times	
	Sample A	Sample B	Sample A	Sample B	Sample A	Sample B	Sample A	Sample B
	β (sig.)	β (sig.)	β (sig.)	β (sig.)	β (sig.)	β (sig.)	β (sig.)	β (sig.)
Cost advantages	.232 †	-.058	.152	.058	.110	.039	-.019	-.134
Market attractiveness	-.015	-.095	-.181	-.045	-.104	-.122	-.122	-.074
Competitors in proximity	.180	.148	.114	.143	-.029	.074	-.007	-.049
Supply conditions	-.188	-.066	.175	.009	-.077	.093	-.092	.172
Existence of scientific institutions	-.093	.026	.279 **	.290 *	.069	-.033	-.177	.166
Availability of skilled employees	.138	-.119	-.100	-.036	.043	.042	.092	.005
Country risk	.031	-.050	.076	.116	.017	.087	.274 *	.086
Regulatory framework	-.010	.054	-.026	.055	-.011	-.004	-.125	-.170
Subsidiary age	.037	.070	.003	.079	.073	.046	-.108	-.028
Subsidiary size	-.180 †	-.393 ***	.023	-.152	.336 **	.331 **	-.253 *	-.268 *
Export share	.130	-.095	.073	.032	.204 †	.237 *	.169	.096
US dummy	.194	-.021	.008	-.131	.031	.081	.187	.149
Europe dummy	-.005	.058	-.057	.057	.120	.317 *	.195	.180
Industry dummy	.025	.059	-.177 †	.074	.103	.060	-.030	-.019
South-East Brazil dummy	.043	-.175	.009	.251	-.066	-.294 *	-.121	-.167
South Brazil dummy	-.017	-.191	.042	.326 †	-.155	-.220	-.312 †	-.239
Market scope dummy	-.045	-.008	.072	.148	.015	.133	-.083	-.152
R	.440	.446	.524	.555	.595	.590	.550	.466
R-square	.194	.198	.275	.308	.354	.348	.303	.217
F-value (sig.)	2.434**	2.336**	1.986*	2.308**	3.152***	3.044***	2.475**	1.598†

Notes: ***, **, * and † denote 0.1%, 1%, 5% and 10% significance levels, respectively.

Split-sample tests for models 10-13

	Model 10		Model 11		Model 12		Model 13	
	Supplier delivery unre.		Number of customers		Customer heterogeneity		Demand variability	
	Sample A	Sample B	Sample A	Sample B	Sample A	Sample B	Sample A	Sample B
	β (sig.)	β (sig.)	β (sig.)	β (sig.)	β (sig.)	β (sig.)	β (sig.)	β (sig.)
Cost advantages	-.178	-.151	-.003	-.185	-.230 *	-.160 †	-.014	-.212
Market attractiveness	-.112	.076	.044	.014	-.180 *	-.110	-.091	-.164 †
Competitors in proximity	.116	.066	-.171 †	-.097	-.045	-.038	.018	.090
Supply conditions	-.180 †	-.198	.121	.044	.023	.070	-.123	-.026
Existence of scientific institutions	-.046	-.066	.130	.082	-.126 †	-.102	.027	-.138
Availability of skilled employees	-.069	-.021	.220 †	.236 †	.210 *	.236 *	.061	.145
Country risk	.058	.025	.084	.122	.060	.100	-.024	-.095
Regulatory framework	-.176	-.008	.048	.042	.022	.068	-.013	-.093
Subsidiary age	-.247	-.121	.159 †	.188 *	-.016	-.045	-.168 †	-.045
Subsidiary size	.015	.031	-.136	.147	.085	.020	.269 **	.224 *
Export share	.016	.087	.142	.030	.120	.169 †	-.043	.045
US dummy	.086	-.002	-.113	.178	.016	.050	.087	.208 †
Europe dummy	.173	-.029	-.011	.215 †	.070	-.010	.254 *	.187
Industry dummy	-.134	-.151	-.042	-.144 †	-.025	.005	-.050	-.014
South-East Brazil dummy	-.074	.303 †	.202	.122	-.066	-.099	-.190	.141
South Brazil dummy	-.140	.210	.167	.134	-.030	.050	-.039	.127
Market scope dummy	-.019	-.204 †	.051	.023	-.090	-.135	.002	-.151
R	.496	.490	.497	.496	.525	.434	.450	.409
R-square	.246	.241	.247	.246	.276	.189	.203	.168
F-value (sig.)	1.877*	1.845*	2.493**	2.495**	2.932**	1.765*	1.958*	1.725†

Notes: ***, **, * and † denote 0.1%, 1%, 5% and 10% significance levels, respectively