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Abstract

While networks, competencies, and information technology are key factors to drive innovation performance, they are frequently investigated on a separate basis. Further, their interplay and contingency have hitherto received scant attention. We propose and empirically test a framework based on the configurational perspective encompassing prevailing network theory and the competence-based view of the firm. Survey data from 235 foreign-owned subsidiaries located in Singapore and Thailand was analyzed using fuzzy set qualitative comparative analysis technique. We found that information technology advancement and high overall competence levels are important asset bundles for the occurrence of high innovation performance outcomes. However, we also determined that it is important for some subsidiaries to maintain strong interfirm network relationships for innovation performance, especially in combination with higher information technology advancement. In addition, the role of network strength as a cause of innovation performance seems also dependent on the business environment and practices of the host country. In addition, we also show that innovation performance is an important factor facilitating market performance.

Keywords: innovation performance; interfirm networks; configurational perspective; competencies, MNE; subsidiaries; fsQCA

1. Introduction

Existing innovation literature indicates that changes in the modern business world (i.e., global competition, shortage of highly skilled labor, high demand for innovative products, risks and costs associated with innovation activities, and knowledge mobility) have changed the way organizations manage and develop their innovation process (Chesbrough, 2003; Koch & Windsperger, 2017). New innovation models, such as open innovation introduced by Chesbrough (2003), suggest ways to make innovation quicker, easier, and more effective through an exchange of ideas fostered by collaborative and open network environments. Therefore, the notion of collaboration and value co

creation through various kinds of networks and the incorporation of knowledge from various internal and external sources to drive innovation performance of firms is now increasingly the focus of academic and practitioners' debate (Cantwell, 2017; Ferraris, Santoro & Dezi, 2017; Koch & Windsperger, 2017). Innovation performance is understood here to mean the ability to create innovations along the dimensions of products and services, production methods and processes, management or marketing practices (Un & Asakawa, 2015; Cabrilo & Dahms, 2018). Collaboration allows network actors engaged in innovation processes to share risks related to new products and to accelerate their time-to-market, to bring together complementary skills, and to gain access to financial resources and new technologies (Chesbrough, 2003). The key argument is that having access to interfirm networks provides access to knowledge which would otherwise be unavailable (Koch & Windsperger, 2017; Najafi-Tavani et al., 2018; Ford, Verreynne & Steen, 2018). This debate has also affected discussions related to multinational enterprises.

Increasing attention has been given to the importance of internal and external networks for innovation in multinational enterprises (MNE) (Cantwell & Piscitello, 2014). There has been a growing awareness among scholars that MNEs use their multinational networks to create competitive advantages (Cantwell, 2017). As global knowledge-seeking activity has become more important for MNEs, subsidiaries are increasingly mandated by their parent company to engage in competence-creating efforts (Cantwell & Mudambi, 2005; Mudambi & Navarra, 2004; Un & Rodríguez, 2018). The roles of foreign-owned subsidiaries (FOS) have changed from being mere knowledge receptors to becoming knowledge generators for the rest of the MNEs' network (Gupta & Govindarajan, 1991; Rugman & Verbeke, 2001). FOSs gain market-specific and general knowledge via network relationships, and this allows them to discover, create, actualize, and develop international market opportunities (Chandra and Wilkinson, 2017). The development of such opportunities has also been driven by advances in information technology.

Information technology (IT) is applauded for its multi-beneficial promotion of both inter- and intra-organizational collaboration and facilitating continuous improvement of products which can then be delivered faster and cheaper (Bharadwaj, 2000; Narula, 2014). For MNEs, IT enables greater integration and communication, enhanced information sourcing, shared access to opportunities in multiple locations (Andersson et al., 2016; Pagani & Pardo, 2017). Therefore, the capacity to build and sustain various networks of actors, and to facilitate knowledge flows within these networks through the use of advanced technology, has become an important differentiating capability for MNEs and FOSs (Jean, Sinkovich, & Cavusgil, 2010; Andersson et al., 2016; Koch & Windsperger, 2017). Moreover, the innovative creativity of MNE subunits depends on their ability to combine and recombine the knowledge and competencies that they access through their own international networks in the host location, with those already accumulated and available in the parent company (Cantwell and Piscitello, 2014; Mudambi and Navarra, 2004).

However, connectivity and collaboration along value chains increases causal ambiguity in MNEs (Cantwell & Mudambi, 2005; Mudambi & Navarra, 2004). This occurs because much of what happens in MNEs being attributable to ambiguous networks and countless interactions (Chandra & Wilkinson, 2017). The understanding of this causal ambiguity in management and marketing studies is a fast-growing area of research and is being taken up by practitioners in business, government and non-government organizations (e.g. McKelvey, 2004; Wilkinson & Young, 2013). However, this type of study is rarely or explicitly addressed within the context of MNEs and their FOSs (Chandra & Wilkinson, 2017). In addition, insights from non-multinational companies cannot be transferred without reservations to the context of MNE and their FOSs.

The modern multinational enterprise finely slices its value-adding activities and distributes those throughout a globally dispersed network of foreign-owned subsidiaries (Cantwell & Mudambi, 2005; Hutzschenreuter & Matt, 2017). Due to the MNEs headquarter's possible lack of geographical and cultural closeness and the absence of historical interactions (Thomas, 2004), the local network development is often left to the subsidiary in the host country (De Beule & Van Beveren, 2019). Accordingly, subsidiaries develop distinct competencies along those value chain activities (Rugman & Verbeke, 2001), and they can even 'venture' into new competencies over time (Ambos et al., 2010). This is often accomplished in combination with information technologies that reduce negative externalities from external and internal network transactions (Andersson et al., 2016; Koch & Windsperger, 2017; Pagani & Pardo, 2017).

From the perspective of subsidiary management, one of the main challenges is how to integrate effectively into the host country's networks and simultaneously benefit from global integration as a part of multinational enterprise (MNE) network (Doz, Santos & Williamson, 2001; Gammelgaard, McDonald, Stephan, Tüselmann & Dörrenbächer, 2012; Gilmore, Andersson &

Memar, 2018). The FOS must manage both interaction with host country actors and interaction with other portions of the MNE since the global performance of multinational firms relies heavily on connectivity (Andresson et al., 2016). This is complicated by the fact that access to local interfirm networks is not freely available to outsiders and hampered by the liability of foreignness and outsidership (Johanson and Vahlne, 2009; Hennart, 2009; McDermott, Mudambi & Parente, 2013). Those liabilities are seen as additional costs that MNEs incur whenever developing network relationships abroad, and it can be caused by an unfamiliarity with the host location, culture, and business customs, or by active discrimination from the local companies (Zaheer, 1995). In addition, the subsidiary has to compete with local companies as well as other MNEs for access to those interfirm networks (Hennart, 2009). In other words, the FOS also relies on its assets as sources for competitive advantages and needs to leverage those in the context of the local business ecosystem (Rugman & Verbeke, 2001; McDermott et al., 2013).

Such assets are usually seen as competencies along the value chain, for instance in logistics and distribution systems, information technology, or access to a global intra-organizational network. Hence, the innovation benefits derived from interfirm networks depend on the subsidiary's ability to combine and then recombine configurations of asset bundles that can be part of the subsidiary itself, the multinational enterprise, or specific to the host country location (Rugman & Verbeke, 2001; Hennart, Sheng & Pimenta, 2015). It is this importance of asset bundle configurations that has led to a growing discussion in the literatures that move away from symmetric models, which often focus on one particular factor only, towards configurational perspectives (Hennart et al., 2015; Misangyi et al., 2017; Greckhamer et al., 2018). Hence, the objective of this research is to shed light on the complex interplay between networks, competencies, and IT advancement which are considered as key assets for innovation performance in foreign-owned subsidiaries through the conceptual lens of the configurational perspective.

As such, the notion of configurational perspective is gaining momentum within strategic management and marketing fields (Short et al., 2008; Hinings, 2018; Schneider & Wagemann, 2012). It is most suitable for attaining an understanding of complex causal outcomes, which are intricate in nature and are likely to have several different causes rather than one in particular (Fiss, 2011; Misangyi et al., 2017; Hughes et al., 2017). However, this approach has received scant attention in the literatures of innovation or networks (Kraus et al, 2018). This leaves important questions unanswered that cannot be sufficiently addressed within the prevailing symmetric conceptual and empirical approaches that dominate the discussion in prevailing studies (Schneider and Wagemann, 2012; Pustovrh and Jaklic, 2014; Ritala et al., 2016).

The configurational perspective is characterized by three conceptual underpinnings, which we will apply to the fields of network, competencies, and innovation in order to contribute to industrial marketing management and innovation literatures. We further point out that the pillars of conjunction, equifinality, and causal asymmetry help us bridge knowledge gaps, without an over-reliance on symmetric thinking alone. The first is, conjunction, which has the contextual meaning that there are condition bundles ("condition" is the interchangeable term used for variables, or 'assets' in our context, according to configurational perspective terminology) rather than a single asset cause for high innovation performance. Previous studies have largely omitted the complexity of international operations and instead focused on a single or a limited set of performance drivers investigated in complete isolation of each other (Monteiro, Arvidsson & Brikinshaw, 2008; Sinkovic & Kim, 2014; Un & Asakawa, 2015). However, recent insights suggest that complex phenomena such as innovation and market performance are more likely to be driven by bundles of conditions rather than by single variable effects (Hennart et al., 2015). In other words, MNEs and subsidiaries in particular rely upon their ability to bundle different configurations of assets in order to become innovative and to drive market performance. Theoretically, that implies that we need to address how the commonly applied concepts of networks, IT advancement, and competencies affect innovation outcomes in combination, rather than in isolation, in order to increase the conceptual understanding of innovation and market performance determinants in the field.

The second characteristic is equifinality, which means that there is more than one possible combination of asset bundles that can lead to the same innovation performance outcome. For example, the bulk of literature on networks has focused on specific networks and knowledge flows that benefit the MNE (Cantwell & Mudambi, 2011). However, not every kind of knowledge accessed through networks drives innovation performance in foreign-owned subsidiaries since the MNE competencies might be incompatible with local knowledge assets (Rugman & Verbeke, 2001; McDermott et al., 2013). Furthermore, while network theory emphasizes the importance of external networks and knowledge sources for innovation, it often ignores the role that competence compatibility and IT advancement plays in formation (Hennart, 2009; Koch & Windsperger, 2017). In other words, we address the gap of understanding the relative importance of assets in order to show how innovation performance is most often driven in foreign-owned subsidiaries. The use of symmetric thinking alone would not allow us to do so because of its focus on the isolation of the strongest factor or path, rather than unpacking multiple ways to achieve higher innovation performance outcomes.

The third characteristic is causal asymmetry, meaning that conditions associated with high innovation performance might be different from the conditions that cause the absence of innovation performance in its entirety (Ragin, 2008; Fiss, 2011; Misangyi et al., 2017). Previous studies that rely on symmetric conceptual frameworks have neglected to address causal asymmetry, and they have failed to explain those conditions influencing the absence of innovation success (Pustovrh and Jaklic, 2014). This is quite important because an explanation of the occurrence of the outcome does not necessarily help us explain its non-occurrence.

As far as the authors are aware, no other study has hitherto applied a configurational perspective towards understanding the interplay between networks, IT advancement, competencies, and innovation performance in foreign-owned subsidiaries. This, we argue is an important gap to address, because the recombination of assets at the subsidiary level is seen as key to understand the competitive advantages of contemporary MNEs and their subsidiaries (Rugman & Verbeke, 2001; Hennart, 2009; McDermott et al., 2013). Hence, we have developed and empirically tested our framework based on the configurational perspective as an envelope for the commonly in isolation applied network theory and competence-based view of the firm. This has been done in principle because the unanswered question remaining is "To what extent do assets matter in combination to achieve optimal innovation performance".

This study likewise emphasizes managerial implications, as managers need to understand given asset configurations in order to achieve a more efficient management structure at the subsidiary level. Managers may gain from having a knowledge of which combination of assets leads to a particular desired outcome and how to bundle those assets into innovation and market capabilities that are leveraged to realize a competitive advantage (Sirmon et al., 2007; Helfat et al., 2007). The heart of business management and strategy concerns the creation, evaluation, manipulation, administration, and deployment of specialized resource and competence combinations to achieve profitability (Rugman & Verbeke, 2001; Lippman & Rumelt, 2003; Hennart, 2009). Managerial resources are scarce, and managers need to know where their deployment brings the highest returns. For example, we believe that there are several combinations of conditions possible that will lead to high innovation performance outcomes, some might require subsidiary competencies or IT advancement, others might be more anchored in internal or external networks. Our study aims to support managers in their identification of configurations that lead to higher innovation outcomes that will concentrate their managerial resources on achieving desired innovation outcomes with existing means at the subsidiary level. For instance, some managing directors interviewed in post-study focus groups mentioned that they function as essentially sales units and are struggling to develop competitive competencies. However, based on our findings, we are able to suggest ways in which the absence of competencies can be substituted with combinations of network and IT advancement. New technology solutions, if properly implemented open new opportunities for managers to achieve innovation performance, especially when they are ill-equipped with an undistinguished competence portfolio. Moreover, managers need to be aware regarding how the absence of certain asset bundles causes the absence of innovation and market success and accordingly develop, acquire or substitute asset bundles and to minimize the risk of innovation failures or the lacking exploitation of market opportunities.

This focus on understanding the underlying combination of conditions that drive innovation performance also informs our academic contributions. Our study aims to contribute to academic discussions where synergies between concepts that are often empirically tested in isolation of one another. This isolationist trend has been further amplified by the dominant application of symmetric analytical methods, such as multiple regression analysis, which focuses on the isolation of single variable effects (Woodside, 2013; Brenes, Ciravegna & Woodside, 2017; Nagy et al., 2018). However, the conceptual considerations of the configurational perspective, in line with current management realities in MNEs (Hennart et al., 2015) require a somewhat different analytical approach to take place. Therefore, we have applied fuzzy set qualitative comparative analysis (fsQCA) to identify not only innovation and market performance enhancing configurations in FOS, but also configurations causing the absence of innovation and market success. The technique also addresses the crucial inter-relationship between theory development and statistical methods. For example, while symmetric analytical methods allow for the inclusion of interaction and mediation terms, there are statistical limitations (e.g., the number of terms allowed for inclusion in such models) (Feurer et al., 2016). This leads to the implication that theory development is in danger of being driven by statistical methods, rather than the other way around (Woodside, 2013). As such, fsQCA has the advantage of allowing for the simultaneous inclusion of all possible relationships between assets, which reduces the risk of omitting relevant relationships. This is important for this research that tests assets, which might be interrelated in multiple ways. We test our framework based on a survey of FOSs located in Singapore and Thailand. Those countries are of regional significance in their own right, but also as important destinations for Foreign Direct Investment (FDI) and export hubs in this region and beyond (AT Kearney, 2017). Furthermore, previous studies have been overly focused on subsidiaries located in Western and industrialized countries (e.g. Birkinshaw et al, 1998; Phene & Almeida, 2003, 2008; Andersson et al, 2005, 2007). Additionally, studies related to innovation performance often focus on research- and development-mandated subsidiaries, which ignores other dimensions of innovation, such as process innovation that can emerge from all parts of the MNE network (Isaac et al., 2018). The next section will review the relevant literature, before outlining the conceptual framework, and the development of our research questions. Section 3 will discuss the research design and analysis, while Section 4 and Section 5 will discuss our results and conclude this article.

2. Literature Review and Conceptual framework

2.1. The Roles of Networks, Competencies, and IT Advancement in Innovation and Market Performance of Foreign-owned Subsidiaries

The baseline proposition from early network theorists (e.g. Granovetter, 1973; Ghoshal & Bartlett, 1990; Burt, 1992) is that networks provide access to knowledge which in turn influences various dimensions of a firm's performance. Foreign-owned Subsidies (FOSs) are embedded in three different kind of networks: Interfirm networks, non-business networks, and intra-organizational networks. In line with structural network theorists, who argue that contact with a greater number of network actors can increase the likelihood to access relevant knowledge (Burt, 1992; Granovetter, 1973), we distinguish networks in a more fine-grained manner when compared to adjacent studies that often include only one network dimension (e.g. Ciabuschi, Dellestrand &Martín, 2011; Ferraris, Santoro & Dezi, 2017). We also focus on the network relationship strength to distinguish from arm's length transaction-based relationships, which might be of lesser importance for innovation (Phene & Almeida, 2008; De Beule & Van Beveren, 2019) and value cocreation (Yaqub, 2013; Koch & Windsperger, 2017). This view largely follows relational network theorists who argue that the degree of interaction and resulting trust are key determinants for knowledge exchange between actors (Nahapiet & Ghoshal, 1998).

FOSs are increasingly considered to be at the forefront of innovation for MNEs (Doz, Santos & Williamson, 2001; Gilmore, Andersson & Memar, 2018; Delgado-Márquez et al., 2018). One driver behind that trend is that a FOS can gain crucial local market knowledge from developing interfirm network relationships in the host location (Hutzschenreuter & Matt, 2017; De Beule & Van Beveren, 2019). Interfirm networks consist of relationships with local suppliers, buyers, or competitors, which can be a crucial driver of innovation performance (Ghoshal & Bartlett, 1990; Gammelgaard et al., 2012). For instance, an FOS can learn new management and marketing practices locally that might be transferable to parts of the MNE network located in other host countries (Forsgren, Holm & Johanson, 2005; De Beule & Van Beveren, 2019). Un and Rodríguez (2018) argue that knowledge from customers and competitors can complement the global knowledge base of the subsidiary and foster subsidiary integration into the local as well as intra-organizational network.

Since locational attributes are strategic for innovation, MNEs have become more interested in exploiting and accessing local knowledge through subsidiaries and their interfirm networks, and assigning a more important role to their subsidiaries abroad to foster value cocreation (Cantwell & Mudambi, 2005; Poon et al., 2013; Koch & Windsperger, 2017). There is also some consensus that knowledge, especially tacit knowledge embodied in skilled individuals, is more effectively acquired and transmitted whenever companies and their stakeholders are in close proximity to one another (Cantwell & Mudambi, 2005; Srećković & Windsperger, 2011; Poon et al., 2013). On the other hand, the nurturing of strong relationships with interfirm networks requires a commitment of substantial managerial resources, which might consequently lead to a neglect of intra-organizational networks and lead subsequently to subsidiary isolation from the rest of the MNE network (Forsgren et al, 2005). Extensive engagement with external networks could trigger the corporate immune system, including the 'not-invented-here syndrome', which might reduce the reach of subsidiary-level generated innovation (Ambos, Andersson & Birkinshaw, 2010; Isaac et al., 2018), and hence lead to lower subsidiary innovation performance.

The FOS also encounters non-business networks in the host location such as with governmental institutions or universities. For instance, governmental institutions can help to develop leverage for the subsidiary to expand into an innovation mandate. Quesada-Vázquez and Rodríguez-Cohard (2018) showed how subsidiary management and local policy makers collaborated to establish an innovation center in southern Spain. Strong relationships with universities can become especially important for technological (Guimón & Salazar-Elena, 2015) and process innovations (Un & Asakawa, 2015) to occur. But, it can also be an indirect driver of innovation performance in that MNEs have the opportunity to engage with local universities in curriculum development which might subsequently provide a more relevant locally skilled labor pool (Monaghan, Gunnigle & Lavelle, 2014, Dahms & Kingkaew, 2016). On the other hand, strong non-business network relationships might have an impeding effect on innovation performance. For example, this may occur because of the incompatibility of innovative management practices or processes with existing ones in other parts of the MNE network (Rugman & Verbeke, 2001; Hutzschenreuter & Matt, 2017).

The last relevant network is the intra-organizational network consisting of actors within the MNE network, such as headquarters or research centers for instance (Ghoshal & Bartlett, 1990; Monteiro et al, 2008). Strong internal network relationships serve as a crucial innovation pipeline allowing the subsidiary to exploit a global network of knowledge resources (Kostova, Marano & Tallman, 2016; Ciabuschi, Forsgren & Martín, 2017; Forkmann, Henneberg & Mitrega, 2018). Håkanson and Nobel (2001) argue that strong intra-organizational relationships also allow the subsidiary to diffuse knowledge and innovations within the MNE. However, the authors point out that in order to do so, the subsidiary also requires inter-organizational network relationships to accumulate new ideas and to provide a breeding ground for innovations. This indicates the complex interplay between intra- and inter-organizational network relationships in innovation (Nagy, Jaakkola & Koporcic, 2018; Najafi-Tavani et al., 2018; Delgado-Márquez et al., 2018), which have so far mostly been investigated in isolation of one another.

In order to maintain internal coherence across their global operations and simultaneously achieve local responsiveness, apart from networks, MNEs and their subsidiaries must pay attention to their ability to source knowledge and develop competencies, especially technological competency (Berthon et al., 2003; Poon et al., 2013; McDermott et al., 2013). The idea of competencies in subsidiaries (Rugman & Verbeke, 2001) originated from the resource-based view of the firm (Barney, 1991; Teece et al., 1997; Forkmann et al., 2018). Stronger subsidiary competence levels can be associated with specific subsidiary mandates, including corporate centers of excellence (Cantwell & Mudambi, 2005). Subsidiary competencies also play a role in innovation performance (Phene & Almeida, 2008; Nagy, Jaakkola & Koporcic, 2018; Najafi-Tavani et al., 2018). For example, Najafi-Tavani et al. (2018) found that in Iran, MNEs with greater competence levels were able to derive greater innovation performance from interfirm collaborations. However, others argue that the effect of subsidiary competencies relies to a larger extent on the technological competencies available to the subsidiary as well as the network partners (e.g. Jean et al., 2010; Koch & Windsperger, 2017; Pagani & Pardo, 2017).

One of the key technological means currently discussed is information technology (IT) (Berthon et al., 2003; Pagani & Pardo, 2017). Recent IT developments have allowed MNEs to finely slice their value-adding activities, disperse them around the globe through a complex network (Rugman & Verbeke, 2001; McDermott et al., 2013), and benefit from increased market opportunities (Doz et al., 2001). The IT environment concept applied here describes the use of existing and new technology as a subsidiary specific competence. In line with Jean et al. (2014, p. 856) we focus on IT advancement, which “measures the degree of the proactive adoption and implementation of advanced IT to find customer solutions ahead of one’s competitors”. In other words, IT advancement offers broad opportunities for reorganizing networks and collaboration in order to become more flexible when faced with business uncertainty, to increase response capacities, and better adapt to changes.

This technological competence helps an FOS to first develop and maintain networks and enable easier knowledge adoption and implementation, thus increasing innovative potential (e.g. Koch & Windsperger, 2017; Pagani & Pardo, 2017). Recently, the IT dimension has been more explicitly addressed in the context of international customer-supplier relationships (e.g. Jean, Sinkovics, & Cavusgil, 2010; Sinkovics & Kim, 2014). Strong arguments (e.g. Andersson et al., 2016; Koch & Windsperger, 2017) and empirical evidence (e.g. Kim, Cavusgil & Calantone, 2006) both indicate that information technology can drive innovation and market performance in some cases. However, it remains unclear what role information technology plays in the context of FOS interfirm networks and performance, more specifically innovation and market performance. For instance, many FOS interact with interfirm networks that have developed in a pre-existing business ecosystem, and accordingly along a different technological development trajectory, which might not be easily compatible with the technology available to the FOS (Aarikka-Stenroos & Ritala, 2017).

This literature review has so far indicated that the causes for innovation performance outcomes in foreign-owned subsidiaries are frequently multi-fold and complex. There appears to be no dominating view that has emerged, and the empirical evidence seems ambiguous regarding what assets matter, and in which context. Figure 1 is a Venn diagram that includes all five conditions previously identified in the literature. The diagram summarizes the conceptual model that we derived from the reviewed literature in relation to innovation as well as market performance. The following section will outline the foundations of the configurational perspective and links to current literature before our research questions are posited to address the evident knowledge gaps.

Figure 1: Venn diagram illustrating the conceptual pillars identified from the literature (about here)

2.2. Configurational perspective

The configurational perspective is not new to marketing and management literature, however, due to recent analytical software developments, it has been currently undergoing somewhat of a revival (Ragin, 2008; Hughes et al., 2017; Greckhamer et al., 2018). It distinguishes itself from the more commonly applied symmetric (*or* single variable effect) models in four main ways (Misangyi et al., 2017). First, the unit of analysis, in our case foreign-owned subsidiaries, are seen as cases of set theoretic configurations. This means that subsidiary assets, such as network relationships, information technology advancement, or competence bases, are configured as belonging to certain theoretical sets. For instance, on the one hand, some subsidiaries might have strong intra-organizational relationships, others have strong local interfirm network relationships, while a third group might share both aspects. On the other hand, this implies that subsidiaries can be a part of various sets and still share the same level of innovation performance. This is an important characteristic because innovation performance is, just like market performance (Fiss, 2011), unlikely to be predicted by the same set of determinants across a large number of firms.

Second, subsidiaries are calibrated as parts of membership sets based on sample-specific considerations. That means subsidiaries will be assigned a set membership based upon theoretical considerations or the particularities of the subsidiaries in the sample being taken.

Third, necessary and sufficient relations between sets might exist, which implies that some conditions might be crucial (i.e., necessary) while others can be sufficient (i.e., contributing only in some configurations). For instance, strong interfirm network relationships might be more important for subsidiaries possessing high information technology advancement, because they are more easily integrated into the existing local business ecosystem structure to facilitate an increase in local responsiveness.

Lastly, it provides a counter-factual analysis of unobserved configurations, which means that the configurational analysis allows a consideration of all plausible configurations, even those presently unobserved in the dataset itself. This provides a broader view of the problem as opposed to focusing on one particular kind of network for instance (e.g. Ciabuschi et al., 2011). Hence, the configurational perspective allows for a better analysis of asset bundles rather than a narrower perspective dealing with isolated variable effects. We will now formulate our research questions accordingly.

2.3. Research questions

From the hitherto reviewed literature, we can conclude that most of the assets discussed were predominantly investigated in isolation of one another. For instance, some studies have shown that interfirm networks are crucial for innovation performance (e.g. Isaac et al., 2018), while others suggested that intra-organizational networks drive innovation (e.g. Monteiro et al, 2008), and a third suggested a possible combination of the two (e.g. Delgado-Márquez et al., 2018). This understanding is further complicated when we add insights from prior studies that include subsidiary competence levels (e.g. Phene & Almeida, 2008) as well as IT advancement (e.g. Jean et al., 2010). For example, it might well be that competencies are necessary to drive innovation from interfirm networks, given high levels of IT advancement are present. Therefore, we cannot clearly indicate, based on current empirical evidence, if a necessary asset exists for a subsidiary to achieve high innovation performance. Hence, our first research question is framed as follows:

Research question 1: Is there a single condition that is necessary for predicting high innovation performance in foreign-owned subsidiaries?

Most previous studies have employed symmetric methodologies and symmetric conceptual frameworks. However, symmetric methods often struggle with presenting a combination of factors resulting in certain outcomes because their focus is on the isolation of effects observed from single variables (Schneider & Wagemann, 2012). This implies that we are currently without sufficient insight into what kind of casual asset bundle leads to high innovation performance outcomes. However, it is exactly this asset bundling ability that drives innovation and subsequently the sustained competitive advantage of MNEs and their subsidiaries (Hennart, 2009; Hennart et al., 2015).

In theoretical terms, the question remains as to what extent networks, competencies, and IT advancement will complement or even substitute for each other. For example, while the competence-based view argues that a larger spectrum of distinguished competitive competencies in a firm is likely to drive innovation performance, the network theorists caution that those competencies might depend upon network compatibilities. For instance, Rugman and Verbeke (2001) argue that some competencies of the subsidiary might be location specific and therefore non-transferable to other parts of a multinational network. On the other hand, Doz et al (2001) argue that superior competencies might be unrequired for the subsidiary to drive innovation performance; instead, access to local knowledge may be sufficient. Hence, our approach contributes to this discussion since we expect and test for instances in which theories can complement each other in order to explain innovation performance.

The empirical literature supports the notion that because one can derive a certain complexity from it, the existence of multiple kinds of asset bundles may yet exist. For example, Delgado-Márquez et al. (2018) found in their study of foreign-owned subsidiaries located in Spain an inverted U-shaped relationship between interfirm network relationships and innovation performance. Ferraris et al. (2017) showed that the impact of external R&D networks on innovation performance may be moderated by the knowledge base of subsidiaries located in Europe. While indicating the complexity of determining innovation performance, their study was focused only on a narrow set of interfirm networks. In addition, neither study included an information technology dimension. Hence, while the studies indicate that there are several ways for subsidiaries to achieve high innovation performance, we are still lacking in a deeper understanding of the characteristics of those asset bundles that drive innovation performance. Our second research question therefore asks accordingly:

Research question 2: What are the characteristics of those causal asset bundles that predict high innovation performance in foreign-owned subsidiaries?

As indicated, the existing evidence does not lend itself to building strong conclusions about the characteristics of asset bundles causing innovation performance to occur. Notably, we have even fewer insights into the effects an absence of certain asset bundles will have on innovation performance in foreign-owned subsidiaries. Consequently, it would become an over-simplification to claim that a lack of innovation success results from a paucity of certain assets deemed insufficient to lead to innovation success (Pustovrh & Jaklic, 2013). For example, Monaghan et al. (2014) and Guimón and Salazar-Elena (2015) found that network relationships with local universities and governmental institutions are important for subsidiary innovation performance to happen. However, that does not imply that the absence of such network relationships also leads to a marked absence of innovation performance. This is the causal asymmetry principle (Fiss, 2011; Woodside, 2015) already emphasized in an increasing number of recent studies (e.g. Ospina-

Delgado & Zorio-Grimain, 2016; González-Velasco, González-Fernández & Fanjul-Suárez, 2019; Pineiro-Chousa, Romero-Castro & Vizcaíno-González, 2019; Balodi, 2016). Causal asymmetry means that the causal conditions leading to an outcome might be different from those leading to the absence of the outcome (Ospina-Delgado & Zorio-Grimain, 2016), and that the paths leading to the absence of the outcome are not merely the opposites of those paths leading to that outcome (Ordanini et al., 2014; Dahms & Kingkaew, 2019).

Pineiro-Chousa et al. (2019) have validated the causal asymmetry principle by exploring how different combinations of corporate financial performance and corporate sustainability disclosure indicators are related to either good or poor corporate sustainability performance. They found that configurations associated with poor corporate sustainability performance are not the mirror opposite of those associated with good sustainability indices. Ospina-Delgado and Zorio-Grimain (2016) have also revealed that the causes leading to the absence of outcome conditions ('massive online open courses/MOOC-intensiveness' at universities) do not mirror the opposite of the causes leading to the presence of that same outcome. Moreover, González-Velasco et al. (2019) have evidenced the causal asymmetry principle in showing that causal configurations with specific determinants of corporate performance (i.e., innovative effort, liquidity, sales growth, indebtedness) used to predict high corporate performance are not the mirror opposites of causal configurations with the same attributes used to predict the negation of high corporate performance. In our case, causal asymmetry means that the factors that imply a company's lack of innovation are not necessarily the negation of those factors leading to high innovation performance. As the explanation of the occurrence of the outcome does not necessarily help us to explain its non-occurrence (Schneider & Wagemann, 2012), it is of equal importance to our study to explain both favorable and unfavorable conditions and to reveal those configurations leading to each of the two possible outcomes, high innovation performance and the absence of high innovation performance. In several recent articles and literature reviews (e.g. Cucari, 2019; Kraus, Ribeiro-Soriano & Schüssler, 2018; Misangyi et al., 2017; Schiehll, Lewellyn & Muller-Kahle, 2018) authors recommend future configurational research was necessary for investigating configurations combining elements in complex manners either to facilitate or to hinder company outcomes. These configurations may lead simultaneously to both effective and ineffective outcomes, with important practical implications for researchers and policymakers. For example, Wu, Li and Zhang (2019) explored both existing drivers and barriers of female entrepreneurship through a fuzzy-set QCA approach, which also found causal asymmetry.

Statistical correlation and regression-based methods are inherently symmetrical and struggle to show causally complex results since they are unable to unravel set relations and the concomitant form of causal complexity (Pustovrh & Jaklic, 2013). Therefore, we effectively lack an understanding of when the absence of certain assets also causes the absence of the desired outcome. Causal asymmetry has important theoretical implications in that it allows us to determine alternative configurations that may lead to a second outcome (e.g. exclusion or rejection), and that are unique and do not the mirror opposites of configurations with different outcomes (e.g. inclusion or acceptance) (González-Velasco et al., 2019). Meaning, this research goes beyond a single theory perspective often used in symmetric studies in order to understand in which contexts a certain theory is dominant and in which contexts are substitutable or become complementary. Returning to the network relationships with local universities example from above, there is some doubt as to whether those relationships have the same singular impact, or are indeed interdependent, on other factors such as the general competencies of a subsidiary in order to convert local university knowledge into innovative performance at the subsidiary level. Based on the discussion above, our third research question is as follows:

Research question 3: In addition, is the absence of certain asset bundles causing the absence of high innovation performance in foreign-owned subsidiaries?

Our last research question further differentiates between innovation performance and market performance. We define market performance to encompass the dimensions of market share, profitability, and sales growth. Ultimately, it is likely that market performance will decide the fate of the subsidiary rather than innovation performance alone (Gilmore et al., 2018). While the majority of studies indicates that a positive association exists between innovation and market performance (e.g. Cabrilo & Dahms, 2018) that is by no means universally confirmed (Ciabuschi et al., 2017). This remains true because a focus on innovation, just like other managerial activities, comes with high opportunity costs attached to the allocation of managerial resources. For subsidiary managers, that means that sometimes resources might remain un-allocated in a way headquarters had intended, which could lead to undesirable consequences for the subsidiary and MNE management (Verbeke & Greidanus, 2009). Hence, our final research question is as follows:

Research question 4: What role does innovation performance play in high market performance configurations?

3. Research Design

3.1. Sample

In order to empirically answer our research questions, we conducted a survey of foreign-owned subsidiaries located in Singapore and Thailand. Both countries occupy prominent positions in the

Southeast Asian region with a long tradition of attracting Foreign Direct Investment (AT Kearney, 2017). The countries are also of interest because many other studies have been conducted in Europe (e.g. Ferraris et al., 2017) or other parts of Asia (Najafi-Tavani et al., 2018). Both countries are at different developmental stages, with Singapore being considered an advanced economy and Thailand a mid-income emerging economy, each therefore providing different challenges and opportunities in their business ecosystems (Aarikka-Stenroos & Ritala, 2017). The Singaporean sample has been developed from a Dun & Bradstreet database of subsidiaries with more than 50% foreign ownership. The Thailand sample was based on the Department of Business Development database published by the Ministry of Commerce which provided the contact details for subsidiaries with the same ownership share as in Singapore. Both, the Department of Business Development database published by the Ministry of Commerce and the Dun & Bradstreet database, have been used to provide a meaningful sample universe in a number of studies (e.g. Cantwell & Mudambi, 2005; Sebora, Lee, & Sukasame, 2009; Kingkaew & Dahms, 2018; Dahms, 2019a)

The data collection took place in the second half of 2018. The data collection research teams were in two prominent universities in the respective countries. In line with the guidelines provided by the World Enterprise Survey, a survey regularly conducted globally by the World Bank (World Bank, 2011), the data collection teams received several hours of training before the companies were contacted. The managing directors were contacted personally by letter or phone in order to increase response rates. Personal contact is important for research conducted in emerging economies (Najafi-Tavani et al., 2018).

Before that, however, the questionnaire has been pilot tested by a panel of practitioners and academics to ensure face validity. Those sessions resulted only in minor wording changes. This was expected since the questionnaire constructs used in the survey have been adapted from prominent international studies. After several phone calls, emails, and postal waves, we received 116 usable responses from Thailand (net response rate=7.9%) and 121 from Singapore (net response rate=8.1%). The response rates are in line with previous studies which targeted the management directors of foreign-owned subsidiaries (Harzing, 2000; Mellahi & Harris, 2016). Sample characteristics are provided in table 1.

Table 1: Sample characteristics (about here)

We conducted a wave analysis to test for potential bias between early and late respondents. However, the results showed no significant differences between early and late respondents along the dimensions of industry, home region, or size. In addition, Chi-square tests have been conducted in order to test the representativeness of the sample. Following Harzing (1999), non-respondents have been compared with the respondents according to their industry (i.e. service or manufacturing sector) and home-region (i.e. Asian or Non-Asian home country). The information for the non-respondents has been obtained from the respective databases in Singapore and Thailand. The Chi square tests returned non-significant results. Lastly, we also included a table in the appendix B to indicate the title and position of the respondents in the sample.

In order to minimize common method bias threats, we included secondary data (e.g. home region, industry) as well as objective measures (e.g. relative size, location) (Chang et al., 2010). In addition, the constructs have not been placed on the questionnaire in a specific order. For instance, the performance construct has been placed in the middle of the questionnaire in order to reduce issues with social desirability bias (Christmann & Taylor, 2001). We also conducted post-hoc statistical tests such as the Harman's one-factor test, which showed the highest loading factor only at 18.6%, which indicates little evidence of common method bias in our dataset (Podsakoff & Organ, 1986). Furthermore, in line with the recommendations by Hair et al. (2012), we also assessed common method bias through the variance inflation factors (VIF). In particular, following Kock (2015) we used a full collinearity assessment approach. The average block VIF was 1.262, and the average full collinearity VIF was 1.473. Both well below the conservative threshold of 3.3, and well below the more common threshold of 5. Hence, common method bias is not seen as a severe threat to the interpretation of our results.

3.2. Ex post case narratives

After the survey had been conducted and the data analyzed, we approached several subsidiary managers in both countries, in order to discuss the configurations that we had identified, and to better interpret our quantitative results. The intention was to hold short informal interviews with key decision makers and gain first-hand feedback that would take us from numbers to a deeper understanding of the configurations, cases, and observed patterns (Eisenhardt, 1989; Dess, Newport, & Rasheed, 1993; Miller, 2018). This is a key feature in many studies that use qualitative comparative analysis method (e.g. Bromley, Hwang, & Powell, 2012; Aversa, Furnari, & Haefliger, 2015). Our efforts resulted in three managers agreeing to meet us. Before the meetings, the managers where given our initial report and the preliminary results. The meetings were held at different locations either inside the firm or outside. The meetings lasted between 20 to 30 minutes. While this is short, we need to take into consideration that our target sample are high level managers with a busy agenda. The resulting insights, or case narratives (Siggelkow, 2007; Miller, 2017), have then been used by the authors to inform our manuscript throughout.

3.3. Measurement

We used well established constructs in our survey design in order to increase comparability of our results and rigor. Following the recommendations of Harzing et al. (2009) for international business surveys, the scales have been extended were necessary from an initial one to five Likert-scale to one to seven to increase measure equivalence. The full description of the scales and their item loadings are shown in table 2.

Innovation performance is defined as a measure of how effectively a firm has been able to achieve innovation goals compared to its competitors (Daft, 2009). Innovation performance is herein considered as a holistic construct that is derived from four dimensions: innovations in products and services for consumers, production methods and processes, management, and marketing practices. The four-dimensional innovation performance measure has been adapted from Cabrilo and Dahms (2018) and Weerawardena (2003). Network strength is measured in line with the two main schools in network theory of structuralist and relationalist. Concerning the structuralists (Burt, 1992; Granovetter, 1973), we include a comprehensive set of network actors such as intra-organizational, interfirm, and non-business network actors, as derived from the reviewed literature (e.g. Ciabuschi, Dellestrand &Martín, 2011; Ferraris, Santoro & Dezi, 2017). We focus on the strength of network relationships in line with the relationalist school in network theory (e.g. Nahapiet & Ghoshal, 1998) that suggest that the importance of network relationships on innovation and market performance depends on the strength or weakness of ties between actors (e.g. Phene & Almeida, 2008; De Beule & Van Beveren, 2019). Accordingly, the network strength dimensions were adapted from Gammelgaard et al. (2012).

Deeply rooted in the resource-based view of the firm and imperfect factor markets (Barney, 1991; Peteraf, 1993), competencies in value adding activities can be a crucial driver for innovation and market performance of firms in general, but also for subsidiaries (e.g. Phene & Almeida, 2008; Nagy, Jaakkola & Koporcic, 2018; Najafi-Tavani et al., 2018; Dahms, 2019b). The competencies construct was adapted from Birkinshaw et al. (1998) and covers all major value adding activities in the subsidiaries. IT advancement explicitly addresses the competencies the subsidiary has in regard to exploitation of information technologies in business processes (Jean et al., 2010). Use of IT is a crucial capability that impacts organizational performance (Bharadwaj, 2000). The IT advancement construct has been adapted from Jean et al. (2010) and Sinkovics and Kim (2014). The market performance construct focuses on economic outcomes such as profitability, market share, and sales growth (Gammelgaard et al., 2012; Singh et al., 2016; Dahms, 2017b). In line with the holistic nature of the construct, it measures performance along these three dimensions. It was adapted from Gammelgaard et al. (2012) and Singh et al. (2016). We measured performance subjectively for several reasons. For example, accounting data is relatively difficult to obtain from respondents and might not be insightful from subsidiaries due to transfer pricing policies. Furthermore, some managers might be reluctant to share this kind of information, which might reduce response rates. Lastly, research has showed measures of perceived organizational performance to correlate positively with objective measures of firm's performance (Dollinger & Golden, 1992) revealing that the analysis of subjective and objective performance data leads to similar conclusions (Singh et al., 2016).

We also included the following control variables: host location to control for local context (Rugman & Verbeke, 2001), relative size of the subsidiary to control for the importance and influence of the subsidiary (Dahms, 2017a, 2019a), age of the establishment to control for experience in the host country (Forsgren et al., 2005), industry to control for sectoral differences between service and manufacturing subsidiaries (Rugman & Verbeke, 2008), and home region to control for stark institutional differences between home and host regions (Rugman & Verbeke, 2008).

Table 2: Measurement (about here)

4. Analysis & Key Findings

The analysis proceeded in two steps. In the first step, we employed structured equation model-partial least squares (SEM-PLS). We did so to ensure the constructs show appropriate reliability and validity, but also to provide z-scores for the subsequent fuzzy set qualitative comparative analysis (fsQCA). Accordingly, in the second step we employed fsQCA to identify asset bundle configurations that lead to high and low innovation outcomes as well as market performance in foreign-owned subsidiaries. We used WarpPLS 6.0 software for SEM-PLS, and fs/QCA 2.5 software for fsQCA.

4.1. Structured equation model-partial least squares analysis

Construct validity and reliability has been assessed through a confirmatory factor analysis. The full results can be found in table 2. Overall, we found good support for both. The convergent factor validity reached from 0.554 to 0.901. Composite reliability values were all above 0.8, most Cronbach Alpha values were above the 0.7, and most average variance extracted above 0.5 (Hair et al., 2012). Subsidiary competencies, intra-organizational networks, and non-business networks just fell short of either Cronbach alpha value or average variance extracted thresholds. However, given that those constructs are generally well-established and the overall divergence from the threshold was small, we decided to keep all the items for data richness, rather than drop items to reach the thresholds (Petter et al., 2007). In addition to that, the SEM-PLS results are not the focus of our analysis. Hence, we felt confident to move on to the structural model.

We used a stable path coefficient estimation method to assess statistical significance of the path coefficients. This is because a stable method does not rely on the replication of samples alone and produces stable path coefficients (Kock, 2014). The resulting z-scores have been used to calibrate the fsQCA conditions as discussed next. In order to avoid common issues with high-level interactions in symmetric analysis techniques (c.f., Cabrilo & Dahms, 2018; Feurer, Baumbach, & Woodside, 2016); we tested the direct associations and the results of the SEM-PLS analysis can be found in Table 3. The SEM-PLS model for innovation performance is shown in figure 2. Model fit results are presented in appendix A for the innovation and market performance runs.

Figure 2: Symmetric Innovation Performance Model (about here)

Table 3: Descriptive statistics, correlations, and SEM-PLS results (about here)

4.2. Fuzzy set qualitative comparative analysis

fsQCA is a relatively recently developed analytical method (Ragin, 2008). fsQCA provides configurations of conditions that emerge from its algorithm. Configurations can be seen as outcome variables, and conditions resemble explanatory variables as found in regression analysis. However, the main difference between more commonly applied symmetric methods such as multiple regression and fsQCA is that fsQCA allows conditions to be part of several configurations that is, outcomes. In other words, while symmetric methods allow variables only to have a onesided effect, fsQCA removes that restriction. This is important given that innovation and other performance outcomes can have multiple causes (Fiss, 2011; Woodside, 2013; Brenes, Ciravegna & Woodside, 2017; Hughes et al., 2017; Nagy et al., 2018).

Accordingly, fsQCA requires us to calibrate our data into fuzzy sets. In line with the method suggested in Jackson and Ni (2013) we use the z-scores from the SEM-PLS model to do so. The z-scores help us to decide which cases are seen as fully in, fully out, or in between of certain sets. In particular, we chose a z-score of 1 as being fully in, −1 of being fully out and 0 as 0.5 cutoff point. For example, in terms of innovation performance, if a firm shows the expected innovation performance that is, a z-score of 0 given our SEM-PLS model results, then it is considered as a 0.5 cutoff case. This is because our goal is to identify high innovation performance subsidiaries relative to their networks, competencies, and IT advancement. Our chosen method has the advantage of being somewhat objective in calibrating the conditions, but nevertheless takes the characteristics of the dataset into account. Ragin (2008) suggests using theoretical reasoning to guide the calibration process wherever possible. However, in our case, no such background information is available, which justifies the usage of a sample specific calibration method (Greckhamer et al., 2018). The results of using alternative calibration methods are presented in Appendix C with the other robustness tests.

4.3. Necessary conditions (RQ1)

After the calibration, we tested in a first step for necessary conditions in order to answer research question 1. However, none of the conditions reaches a consistency value of >0.9 (Ragin, 2008). This indicates that none of the conditions is necessary on its own to determine innovation performance. This result confirms the expected underlying complexity of performance outcomes (e.g. Fiss, 2011). In our case, we can derive that instead of a single asset, it is more likely that a combination thereof is required to explain high performance outcomes. It also lends support to critics of symmetric thinking in that single factors and theories are unlikely to explain the whole performance picture (Fiss, 2011; Woodside, 2013). The full results are shown in Table 4.

Table 4: Necessary condition analysis (about here)

4.4. Sufficient conditions (RQs 2-4)

After testing for necessary conditions, we proceed to test for sufficient conditions. fsQCA delivers truth tables according to which causal combinations are evaluated along their consistency level. In line with Ragin (2008) and Fiss (2011), we chose a consistency level of around 0.80 and a frequency threshold of 3 as cutoff points.

We focus in all models on the intermediate solutions that emerge from the Boolean algorithm to gain an understanding of sufficient conditions that lead to the desired outcomes (Ragin, 2008). The most interesting solutions are the ones with the highest raw coverage. Raw coverage in fsQCA can be seen as the equivalent to the "R" value in traditional regression models. The full results are provided in tables 4a to 4d. Following the usual conventions, '●'means the condition is present, '⊗'means the condition is absent, and "blank space" means do not care.

Table 4a contains the results of our sufficient condition analysis for high and low innovation performance outcomes in the full sample. Solutions 1 to 7 contain the configurations for high innovation performance. The highest raw coverage can be found in solution 1 and 3 with a rounded value of 0.63 and 0.48 respectively. Solution 1 contains the conditions of IT advancement and competencies, solution 3 contains the conditions interfirm network strength, non-business network strength and IT- advancement. Solutions 8 to 15 contain the configurations for low innovation performance outcomes. The highest raw coverage value is 0.59 for solution 8, which indicates that the absence of IT advancement and competencies are the main drivers for low innovation performance outcomes.

Tables 4b and 4c show the sufficient condition analysis results for high and low innovation performance in the subsamples of Singapore and Thailand. The highest rounded raw coverage value for high innovation performance is 0.63 of solution 1 in the Singapore subsample and contains the conditions of intra-organizational network strength, IT advancement, and competencies. Low innovation performance is characterized by the absence of interfirm network strength, IT advancement, and competencies as shown in solution 5 with a raw coverage of 0.49. For the Thai subsample in table 4c, solution 2 shows the highest raw coverage with 0.45, it contains interfirm network strength, IT advancement and competencies. Solution 5 shows the determinants of low innovation performance with a raw coverage value of 0.47, displaying the absence of interfirm network strength, non-business network strength, and IT advancement.

Table 4d shows the high and low market performance outcomes for the whole sample. The highest raw coverage for high market performance was solution 3, which contains the conditions innovation performance, intra-organizational network strength, IT advancement, and competencies. The highest raw coverage score for the market performance outcomes can be found in solution 7 with a value of 0.46. It shows that the absence of innovation performance, IT advancement, and competencies as the main drivers for low market performance outcomes. The results are further discussed in the light of our research questions and related literature in the following sections.

Tables 4a-d: Sufficient condition analysis results (about here)

4.4.1. Characteristics of causal asset bundles for high innovation performance (RQ2)

In our second research question we wanted to know what the characteristics of asset bundles in subsidiaries with high innovation performance are. In table 4a, the configurations with the highest raw coverage are number 1 and 3. Configuration 1 shows that high IT advancement and high competence levels are important determinants of innovation performance. That is largely in line with previous studies that emphasized the role competencies including technological capability play (Cantwell & Mudambi, 2005; Hutzschenreuter & Matt, 2017; Najafi-Tavani et al., 2018; Jean, Sinkovich, & Cavusgil, 2010; Andersson et al., 2016; Koch & Windsperger, 2017). The novelty of our finding, however, becomes clearer when we look at all the configurations for high innovation performance. We find that either IT advancement or competencies are part in all the other solutions. That might indicate that a FOS needs either IT advancement or competences in their asset bundles, but the best is to have both, to achieve high innovation performance. Regarding networks, there is no configuration in which the subsidiary has strong relationships with all three networks. This reveals that a FOS does not need to be engaged in all kind of networks, but to carefully develop relationships with different stakeholders depending on its IT advancement and/or competences. As a basis for networks of any kind to play a role, either high IT advancement or competencies need to be present for high innovation performance (Cantwell & Piscitello, 2014; Mudambi & Navarra, 2004). Configuration 3 indicates that the presence of high IT advancement as well as strong interfirm networks and non-business networks lead to high innovation performance. This seems to confirm the arguments by Koch and Windsperger (2017) and Pagani and Pardo (2017) about the prominent role IT plays in network and value cocreation. It also expands the findings by Najafi-Tavani et al. (2018) in showing that, at least in the context of our study, the role of information technology matters even in the presence of high overall firm competencies. This highlights the important role competencies play for network and relationship development and subsequent value creation (Gorovaia and Windsperger, 2018; Gorovaia, 2019).

As indicated, a FOS needs either IT advancement or competences in their asset bundles, but the best is to have both, to achieve high innovation performance. This implies that if a FOS lacks some competences, it can overcome this shortcoming through strong networks, but should stay focused on one or combination of two different networks (e.g. interfirm and non-business; non-business only; intra-organizational network only, etc.). From our results, we observe that there are no cases in which FOSs develop strong relationships in all networks. Reasons for this might be that the increased complexity of FOS's operations creates challenges such as the limitation of managerial bandwidth (Verbeke & Greidanus, 2009; Narula, 2014), and conflicts generated because of the embeddedness in different networks (Cantwell & Piscitello, 2015). For example, local network participation may increase outsider influence and consequently carries a risk of diminished HQ control (Cantwell & Piscitello, 2015; Mudambi & Navarra, 2004; Yamin & Forsgren, 2006). Figure 3 summarizes the findings in graphic form for the innovation performance causal recipes.

Figure 3: Innovation performance causal recipes (whole sample) (about here)

We also split the sample into FOSs located in Singapore and Thailand in order to see if our general conclusions are robust in the subsamples as well. The results can be found in tables 4b and 4c and largely confirm the importance of IT advancement and competencies for subsidiaries located in both countries, but there are also interesting differences.

Singapore case: The key assets for high innovation performance of FOSs in Singapore seem to be networks as in all configurations there are at least one or two network conditions present. However, here too is no configuration with all three kind of networks present. The configuration with the highest raw coverage in the Singapore sample contains the assets of high IT advancement and competencies as well as strong intra-organizational relationships. In the case of FOSs in Singapore, our findings differ nevertheless somewhat from studies that showed that connecting with all local organizations enables a subsidiary to potentially improve innovation performance (e.g. Almeida & Phene, 2004; Frost, 2001; Hobady & Rush, 2007; Holm et al., 2005). This is somewhat contrary to traditional linear models arguing that more is often better, in our case that more networking and stronger relationships with various stakeholders always brings more benefits for innovation performance (Chesbrough, 2003). Instead, our configurations reveal that the majority of FOSs in Singapore have a more closed than open approach to innovation as they rely more on intra-organizational networks in their innovation process. That somewhat challenges the open innovation concept (Chesbrough, 2003, 2012; Koch & Windsperger, 2017). One reason may be that although Singapore has become known for its strength in new technological development, it is still a small country without munificent global knowledge resources (Cantwell & Piscitello, 2015). Another reason might be that MNEs operating through their subsidiaries in Singapore need close control over all technology, know-how, intellectual property and innovation process. As a manager in a semiconductor subsidiary in Singapore stated in an ex post interview: although they maintained links with suppliers and buyers of their products through information technology in a global network, most information on the final products in this fast paced industry is too sensitive to be shared with external networks (even with their partners such as Samsung, Nokia, among others). This manager stated further that they adopt a "we don't ask, and they don't tell" approach in the specific semiconductor development process. Hence, they are not informed about the final usage of their output, which demonstrates a more closed innovation approach.

Thailand Case: All configurations in the Thailand sample contain IT advancement. This finding reveals the key role technological competence plays in FOSs' innovation performance in Thailand. This is in line with Hobady and Rush (2007) who revealed that some MNE subsidiaries in Thailand gradually upgraded their technological capabilities, thus increasing their contributions to the MNE network. However, only IT advancement is not sufficient for innovation success and must be complemented with competences and/or one of the network dimensions. Configuration 2 in the Thailand sample contains IT advancement, competences and strong interfirm networks. Based on our results, FOSs in Thailand appear to be best advised to focus their network development efforts to interfirm networks. This might indicate a more open approach to innovation. For example, if a FOS is not able to build strong external networks (configurations 1 and 3 in Table 4c) to achieve high innovation performance, it needs to complement its technological competence either with other competences or with strong networks within the MNE. However, there are also cases in which local non-business networks play a decisive role as suggested in solution 4. For example, a R&D manager of a European hair shampoo manufacturer stated in another ex post interview that they worked closely with local universities to develop shampoo formulas better tailored to the Thai and Asian market.

Comparing the configurations for high innovation performance in FOSs in Singapore and Thailand, the major difference seems to be the role networks play as complementary assets. While at least one or a combination of two networks are important conditions for high innovation outcomes in Singapore, in Thailand IT advancement is more important. Furthermore, while the Singapore sample shows the importance of intra-organizational networks and a more closed approach to innovation, the Thailand sample shows the importance of interfirm network strength as a complementary asset to high IT advancement and competence levels, and a more open approach to innovation. This is somewhat surprising given that Singapore, as an advanced economy, would be expected to provide more opportunities for subsidiaries to access innovation driving knowledge locally. However, our findings seem to show that in emerging markets interfirm networks might be of greater importance for innovation performance. It appears that in advanced but small economies (in our case Singapore), FOSs have more opportunities to transfer MNE's best global practices and apply it in the host market, and therefore should stress intra-organizational networks in order to achieve global integration and access the global knowledge they need for innovation. In emerging markets (in our case Thailand), FOSs have to be more responsive to market changes and for that they need to place emphasis on market-specific business knowledge and develop local know-how through strong interfirm networks to drive their innovation performance. This is an important addition to the ongoing discussion given that such differentiation is not commonly made in the literatures (e.g. Koch & Windsperger, 2017; Najafi-Tavani et al., 2018). The similarities within configurations for high innovation performance in different contexts (the whole sample, Singapore, and Thailand) are summarized in Table 5.

Table 5: Patterns for high innovation performance (About here)

4.4.2. Absence of causal asset bundles (RQ3)

The idea of asymmetric causality was addressed in research question 3 in which we asked if the absence of certain asset bundles is also causing the absence of innovation performance. As almost all configurations in Table 4a for low innovation performance (8-15), except configuration 14, show the absence of competence or/and IT advancement, the lack of these two assets (one or both) might be the main reasons for low innovation performance in FOSs. If we compare configuration 1 (the highest raw coverage for high innovation performance) and configuration 8 (the highest raw coverage for low innovation performance), we find that although competencies and IT advancement are the best configurations for high performance, the lack of these assets also leads to the absence of innovation performance. This seems to hold for a large number of FOS but by far not for all of them. This indicates that while our main results show that there is a tendency for the absence of competencies and IT advancement to cause low innovation performance outcomes, it is by no means uniformly the case.

Solution 11 for example, which has the second highest raw coverage, shows that the absence of competencies in combination with the absence of intra-organizational networks as well as weak non-business network relationships also cause low innovation performance. Configuration 14 is also of interest as it indicates that the presence of IT advancement, in combination with strong non-business network relationships, and weak interfirm and intra-organizational networks also lead to low innovation performance outcomes. Comparing configuration 14 with configurations 3 and 2, we conclude that IT advancement and strong non-business network may lead to both high and low innovation performance depending on complementing assets in the configuration. For example, they lead to high innovation performance if a FOS has a strong interfirm network or even if a FOS lacks strong internal relationships within MNE. However, if a FOS lacks both, interfirm and intra-organizational networks even with IT competence and non-business networks, this FOS is likely to experience low innovation performance.

Similar insights can be drawn from the subsample analysis for low innovation performance configurations. From the Singapore subsample in table 4b, we observe two solutions in which IT advancement is present, but complementary factors such as general competencies are missing and hence resulting in low innovation performance outcomes. The Thailand subsample in 4c indicates in solution 6 that the presence of strong interfirm networks and non-business networks leads to low innovation performance outcomes in the absence of IT advancement.

4.4.3. Role of innovation performance in high market performance configurations (RQ4)

The last research question asked what role innovation performance plays in high market performance configurations. From table 4d and figure 4, we observe that all but one set of configurations contains high innovation performance as a sufficient condition for high market performance outcomes. In addition, in order to be able to efficiently transfer knowledge and innovative solutions from internal or external sources to the market and transform high innovation performance into high market performance, FOS inevitably needs IT advancement, which besides innovation performance plays a crucial role for high market performance. We focus on configurations 3 and 4 with the highest raw coverage score. Solution 3 highlights the role of intra-organizational networks in combination with high competence levels, IT advancement and innovation performance. This is in line with literatures that emphasize innovation in FOS from internal sources of the MNE (Kostova, Marano & Tallman, 2016; Ciabuschi, Forsgren & Martín, 2017). It indicates that transfer of MNEs' best practices and knowledge through intra-organizational networks assists subsidiaries in their efforts to respond rapidly to local environmental changes (Najafi-Tavani, 2018). FOS's innovation performance, high competence and IT advancement supported by internal knowledge transfers enhances the subsidiary's ability to adopt and implement global innovative solutions, and thus respond to market changes and consequently facilitate subsidiary's market performance.

Solution 4 highlights the key roles of strong interfirm networks, non-business network relationships, innovation performance, and IT advancement. This is more in line with the recent suggestions for the importance of external networks in combination with technology and innovation that drive market performance (Doz et al., 2001; Koch & Windsperger, 2017). In addition, it appears that for such subsidiaries, no comparatively high overall competence base is required.

In addition to that, there are also interesting observations to be made from the causal recipes for low market performance outcomes in table 4d. Especially the aspect of causal ambiguity is highlighted there. This can be observed in two ways. Firstly, the larger number of configurations that lead to low performance outcomes compared to the high market performance outcomes. Second, and on a more detailed note, we also find that while IT advancement was an important driving force for innovation performance, its impact on market performance is far more mixed. Hence, while the presence of certain conditions such as high IT advancement is a good indicator for high market performance, our analysis also showed that this very much depends on the presence of other relevant conditions. Lastly, we observe that although with a comparatively low raw coverage, we also have two configurations that indicate that even with the presence of high innovation performance, in certain constellations, subsidiaries might show a low market performance. Figure 4 summarizes the findings in graphic form for the market performance causal recipes.

Figure 4: Market performance causal recipes (whole sample) (about here)

4.4.4. Evaluation of symmetric and non-symmetric results

As suggested in various recent studies (e.g. Cuervo-Cazurra et al., 2016, Woodside, 2013; Ritala et al., 2016; Cabrilo and Dahms, 2018; Kraus et al., 2018) the combination of symmetric and non-symmetric analytical methods can help to provide a better understanding of the underlying issues that are being empirically tested. Accordingly, we want to briefly evaluate and compare the differences in the results between the symmetric SEM-PLS and non-symmetric fsQCA in this section. Our fsQCA results helped us to identify patterns that were not possible to disentangle from the SEM-PLS results only. For instance, we found a strong association between IT advancement and innovation performance in the SEM-PLS results. However, our necessary condition analysis in fsQCA showed that IT advancement is not a necessary condition. Instead, we found that IT advancement complements network relationships to achieve superior innovation performance. On the other hand, interfirm network strength showed no significant association with innovation performance in the SEM-PLS result. However, fsQCA identified several solutions that showed interfirm relationships can drive innovation performance when combined with other network dimensions and competencies in many cases. fsQCA allows us to identify combinations of asset bundles that help several subsidiaries to achieve innovation performance, even though those would be considered as irrelevant in the symmetric analysis alone. With the help of fsQCA, we were also able to identify cases that differed from the SEM-PLS results concerning market performance determinants. For instance, SEM-PLS identified innovation performance as the strongest association with market performance. However, fsQCA revealed that certain configurations of networks and IT advancement might be able to substitute the lack of innovation performance in some subsidiaries.

4.4.5. Robustness tests

We also included robustness tests for our fsQCA model. First, we changed the calibration of the conditions. In line with Wu et al. (2014) and Lowik et al. (2016), we changed the calibration by using firstly the measurement scale as anchor point and secondly quartiles. Hence, the calibrations were firstly changed to, 7 means fully in, 1 means fully out, and 4 is the mid-point cut off. We found that the solutions with the highest raw scores are also present in our initial model. For instance, the results suggest that the presence of IT advancement and competencies are key conditions for predicting high innovation performance. The same has been confirmed in the quartiles calibrated configurational causal recipes. The strongest configurations to determine high innovation performance included strong external network relationships and IT advancement. Again, we believe that this contributes to the findings from the initial symmetric analysis in that it shows more clearly which effects are pronounced once all possible combinations of conditions are considered simultaneously.

In a last test, in line with Crilly (2011), we reduced the consistency threshold of 0.857. In line with our previous results, the strongest solutions are comparable with the ones found in our initial specification models. For instance, the two strongest solutions for high innovation performance also include presence of high competencies as well as IT advancement. Hence, we find our initial results characterized by some robustness. The full details of our robustness tests can be found in appendix C.

5. Discussion

5.1. Contributions to literature

We use a relatively new approach by employing a configurational perspective and fsQCA to understand the combination of asset bundles that drive innovation and market performance outcomes. By developing and empirically testing a configurational perspective-based framework that encompasses networks, information technology, and competencies, we investigated not the isolated effects of each asset, but their bundling characteristics and interplay. This provides several contributions to ongoing discussions in the literature.

Our first contribution is to show that there is no single asset that determines innovation performance in FOS (RQ1). This finding highlights the limitations inherent in symmetric conceptual and statistical approaches. Performance in general and innovation performance in particular are holistic concepts, and as argued by Hennart (2009) and others (e.g. Fiss, 2011), determined by a combination of asset bundles. This, however, also implies that for complex issues, such as in the case of foreign owned subsidiaries innovation performance, the use of single theory frameworks might be limited in fully capturing the phenomena.

The second contribution of our study was to empirically identify combinations of asset bundles that determine high innovation performance outcomes (RQ2). Our findings highlight the importance that IT advancement plays in combination with a high overall competence level of the subsidiary. We also showed that interfirm networks play a crucial role, but only in combination with high IT advancement. This provides some empirical evidence for much of the still rather conceptual literature that argues that innovation is driven by interfirm networks and information technology (Koch & Windsperger, 2017). We believe this also extents the discussions in the field concerning access to interfirm networks by outsiders such as FOS (Johanson & Vahlne, 2009; Hennart, 2009), in that IT advancement might be one way to reduce additional costs incurred through liabilities of foreignness and outsidership. It is also worth noting that our subsample analysis indicated that the asset bundles that determine innovation performance do seem to also depend on context in which they are deployed, in our case Singapore and Thailand. This dimension of the argument is slowly gaining traction in the broader business ecosystem literature on innovation performance and interfirm networks (e.g. Aarikka-Stenroos & Ritala, 2017). But we are one of the first studies to provide indicative empirical insights.

We also contribute by providing evidence for causal asymmetry (RQ3). While the results suggest that a low competence level and low IT advancement lead to low innovation performance outcome, that was by no means uniform across the firms in the sample. Indeed, we found that even asset bundles that included high IT advancement, but without strong interfirm and intra-organizational networks, could still lead to low innovation performance. This is important to better understand boundaries and contingencies of theories in that we show that the sheer absence of a condition does not by itself mean that it results in a negative outcome.

Our fourth contribution to the literature shows the important role innovation performance plays in determining market performance of the subsidiaries (RQ4). Our findings in relation to networks provides support for both sides of the ongoing discussions. On the one hand, the traditional view that subsidiaries receive much of their innovation from intra-organizational networks (Gorovaia & Windsperger, 2013; Kostova et al., 2016; Ciabuschi et al., 2017). On the other hand, we also found that interfirm network configurations are important which is in line with recent research on open innovation ecosystems and value cocreation (Chesbrough, 2012; Koch & Windsperger, 2017). In addition, especially for the interfirm network asset, IT advancement asset plays also a crucial role, with or without the presence of a substantial overall competence level in the subsidiary. It seems that besides IT advancement and competencies, companies need either strong external networks or internal networks for superior innovation performance. Using internal networks, they transfer knowledge from the MNE to be implemented in the local market and therefore bringing innovation to the market. FOS with strong external networks build knowledge about local market and enhance their innovation potential through localization.

In this study, we discuss intangible assets (competences, IT advancement, and network relationships) that drive according to resource-based view of the firm value creation via the development of competitive advantage and superior performance (Barney, 1991; Sirmon et al., 2007; Gorovaia and Windsperger, 2018; Gorovaia, 2019). However, with the help of the configurational perspective we point out that merely possessing such assets does not guarantee the development of competitive advantages or the creation of value (Barney & Arikan, 2001; Priem & Butler, 2001; Teece et al., 1997; Teece, 2007). With the identified patterns of asset configurations, we highlight the role of bundling (the process of combining firm resources to construct or alter firm's capabilities) in value creation, and shed more light on the link between asset management and the creation of value (Sirmon et al., 2007; Hennart et al., 2015). This has also important implications for managerial practice.

5.2. Managerial implications

Our study stresses the importance of different kinds of assets, such as networks, IT advancement and competencies in supporting FOS innovation and market performance. Managers at the subsidiary and headquarters level of modern MNEs are well advised to focus their attention on specific asset bundles that drive innovation performance, rather than attempting to rush forward on all fronts simultaneously. Given managerial resource constrains, managers need to understand the asset bundles available in their subsidiary and base their next steps to drive innovation performance accordingly. For example, the costly development of strong interfirm network relationships to drive innovation performance might only make sense if the subsidiary has the required underpinning complementary assets. A further result that is of importance to managers is the role of IT advancement. It appears that IT advancement might help in reducing the costs of liability of foreignness in the development of interfirm networks. At face value, our results indicate that this might even be more important for subsidiaries located in emerging economies.

In summary, our findings show that to realize value creation, managers must accumulate, combine, and exploit specific combination of assets. In particular, we guide managers in FOSs in how to transform intangible assets such as competences, IT advancement, and networks to create value through superior innovation and market performance.

5.3. Limitations and future research

Our research also has several limitations. For example, while we applied the configurational perspective and fsQCA to better understand the interplay between various assets bundles, it should also be noted that the results of fsQCA cannot be generalized without reservations (Fiss, 2011; Greckhamer et al., 2018). Furthermore, we applied the key informant approach to data collection. This approach assumes that the key informants are knowledgeable "by virtue of their position within the firm" (John & Weitz, 1988, p. 344). However, it would have been also of interest to consider an external view of network actors in the host country. However, due to time and resource constrains, this was not possible. In addition, we used survey method because we wanted to get as broad a picture as possible about the FOS landscape in the two countries. This was also justified because much of the information required would not have been available at other levels of the MNE hierarchy (Harzing, 1999). However, this cross-sectional design leaves questions open as to how network relationships develop over time. Finally, our study does not identify theoretical archetypes, i.e. configurations that are context specific and are identified based on an array of organizational features (Hinings, 2008; Short et al., 2008). We believe that this might also require further study of the issue with greater host country variety and diversity. Hence, comparing and grouping configurations derived from our research into archetypes for superior performance in FOS and MNE would be a worthwhile area for future conceptual and empirical research.

5.4. Conclusions

While the influence of assets such as network relationships, competence levels, or IT advancement on innovation performance has been investigated before, those studies have mostly looked at each in isolation. This is one of the first studies to focus specifically on asset bundle configurations to understand which assets determine innovation and subsequently market performance. By suggesting a conceptual framework that is based on configurational perspective that encompasses the network theory and competence based view of the firm, we have contributed to the literature in indicating that rather than through single variables, innovation performance is more likely to be determined by configurations of asset bundles.

Appendix A: SEM-PLS model fit (about here)

Appendix B: Respondents profile (about here)

Appendix C: Robustness tests (about here)

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Tables and Figures

Figure 1: Venn diagram illustrating the conceptual pillars identified from the literature

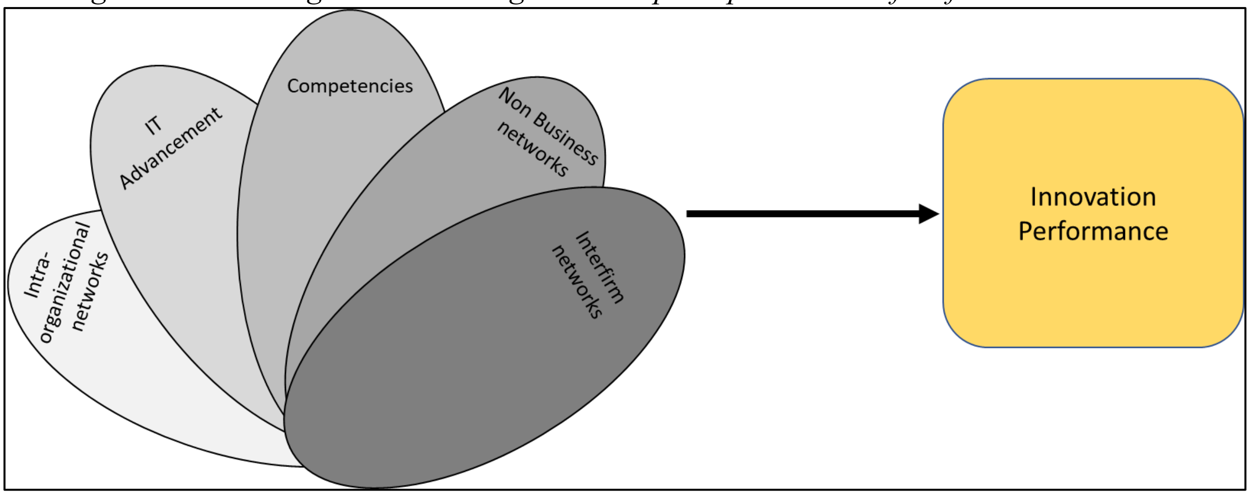

Figure 2: Symmetric Innovation Performance Model

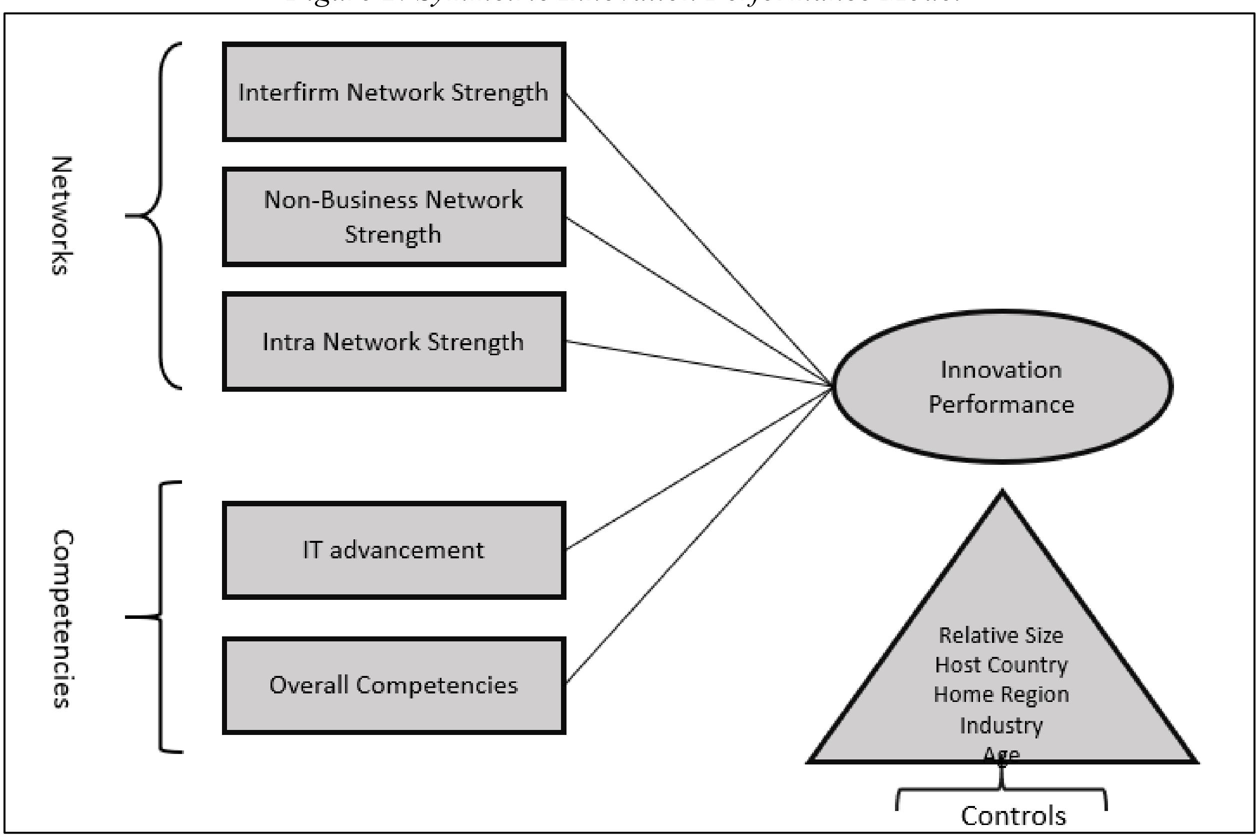

Figure 3: Innovation performance causal recipes (whole sample)

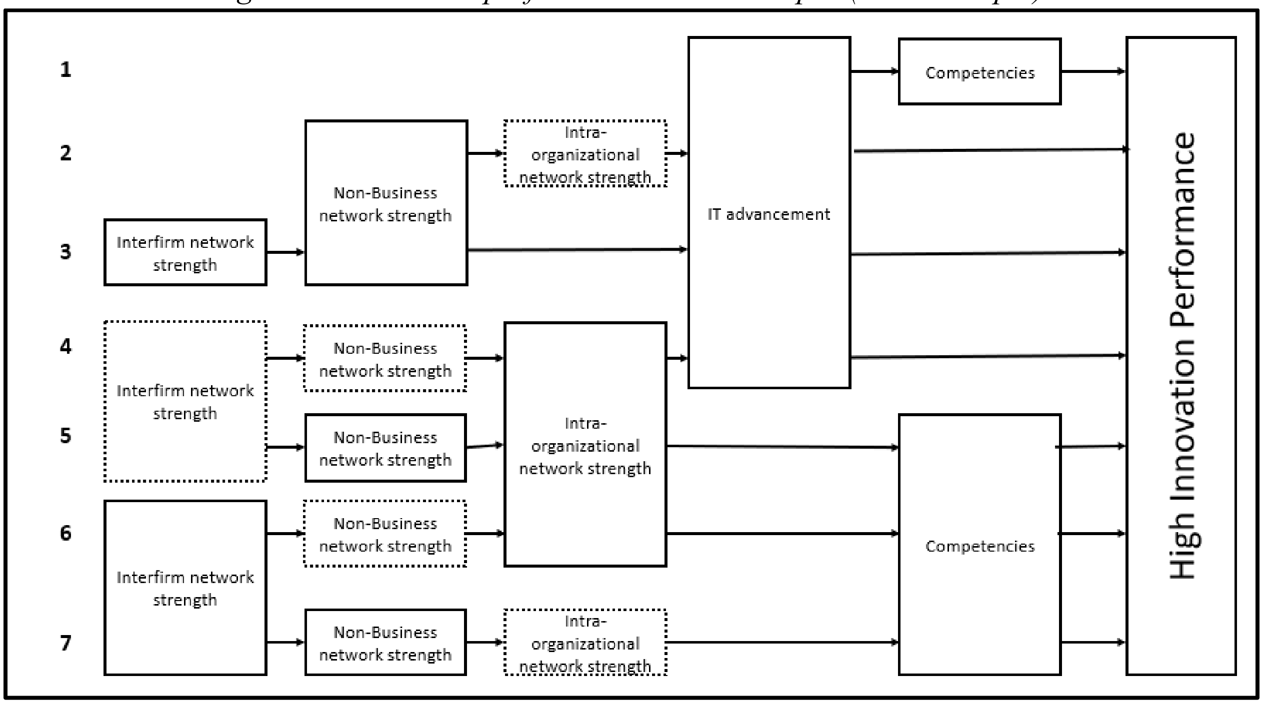

Figure 4: Market performance causal recipes (whole sample)

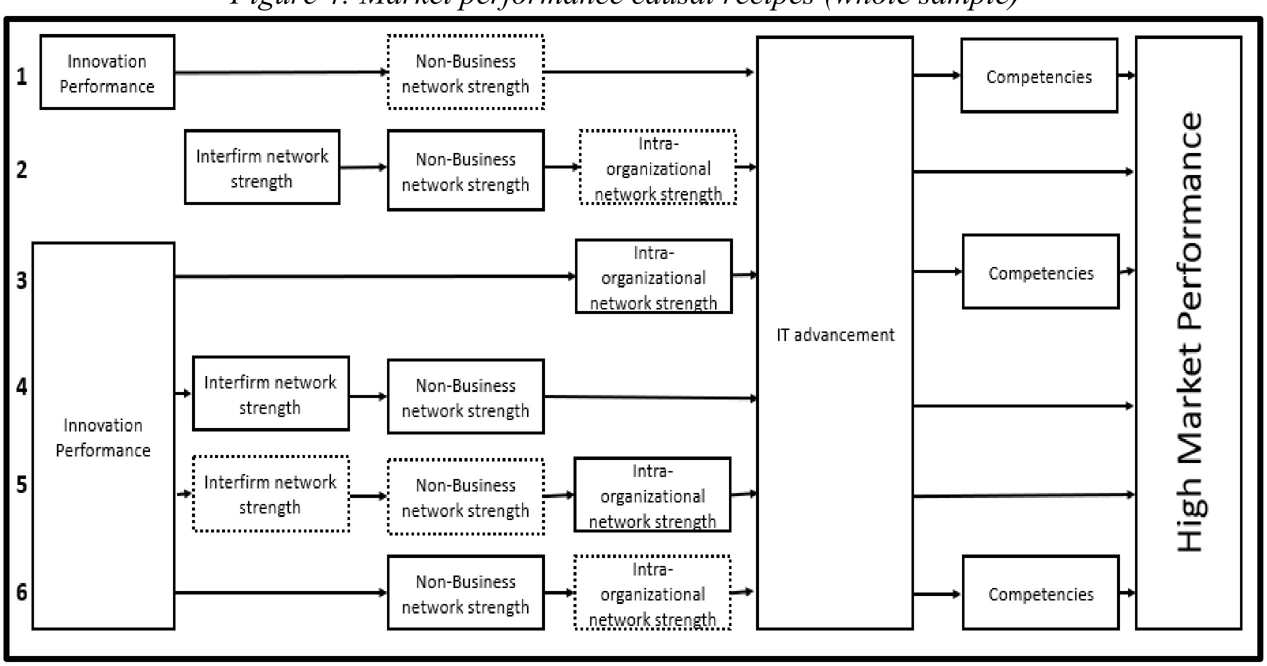

Table 1: Sample characteristics

Size (number of employees)		
Employees	Freq.	%
<70	68	29
70-200	59	25
>200	108	46
Total	*235*	*100*

Years in foreign ownership		
Years in FO	Freq.	%
<7years	65	28
7-19years	72	31
>20years	98	42
Total	*235*	*100*

Entry mode		
	Freq.	%
Greenfield	134	57
Acquisition	35	15
Joint Venture	66	28
Total	*235*	*100*

Industry		
	Freq.	%
Manufacturing	124	53
Service	111	47
Total	*235*	*100*

Table 2: Measurement

		Convergent validity	Composite reliability	Cronb. Alpha	AVE
Innovation Performance					
Relative to competitors in your industry, how successfully has your subsidiary managed to create innovations in the following areas over the past three years? (1 = far below average, 7 = far above average).					
	Products and services for customers	0.842	0.887	0.829	0.662
	Production methods and processes	0.784			
	Management practices	0.826			
	Marketing practices	0.801			
Subsidiary competencies					
Please indicate the capability or distinctive expertise of your site in the following areas relative to other units in the corporation e.g. headquarters and/or other subsidiaries (1 = far below average, 7 = far above average).					
	Sales / Marketing	0.711	0.869	0.823	0.487
	Production of Goods or Services	0.640			
	Logistics/Distribution	0.747			
	Purchasing	0.605			
	Research & Development	0.727			
	Human Resource Management	0.745			
	Other Administrative Functions (e.g. Legal, Financial, etc.)	0.698			
Network strength					
Indicate the strength of relationships you have with each of the following actors (please note: Local stands for businesses and other organisations in Thailand). (1 = Very weak, 7 = Very strong).					
Interfirm networks	Local Customers	0.827	0.832	0.696	0.624
	Local Suppliers	0.830			
	Local Competitors	0.706			
Non-Business networks	Governmental Institutions in Thailand/Singapore	0.846	0.834	0.602	0.716
	Science Centres, Universities in Thailand/Singapore	0.846			
Intra-organisational networks	Buyers within your Corporation	0.735	0.809	0.708	0.467
	Suppliers within your Corporation	0.760			

	R&D and Innovation Centres within the MNE	0.682			
	Headquarters	0.554			
	Other units within the Corporation	0.624			
IT Advancement *To what extent do the following statements on Information Technology (IT) apply to your subsidiary? (1 = Fully disagree; 7 = Fully agree).*					
	Our subsidiary uses the most advanced IT.	0.851	0.939	0.919	0.756
	Our IT is always state-of-the-art technology.	0.901			
	Our subsidiary is always first to use new IT in our industry.	0.882			
	Relative to our competitors, the IT we use is more advanced.	0.853			
	In our industry our subsidiary is regarded as an IT leader.	0.860			
Market performance *Relative to your competitors in your industry, how would you rate your subsidiary's performance on each of the following over the last three years? (1 = Fully disagree; 7 = Fully agree).*					
	Our profitability has been much better than our competitors	0.866	0.903	0.838	0.756
	Our sales growth has been higher than our competitors	0.852			
	Our market share has been much higher than our competitors	0.890			

Table 3: Descriptive statistics, correlations, and SEM-PLS results

		Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1	Innovation Performance	5.01	1.03	*0.813*											
2	Market Performance	4.75	1.09	0.405**	*0.869*										
3	Interfirm Network Strength	5.09	1.15	0.311**	.324**	*0.79*									
4	Non-Business Network Strength	4.64	1.27	0.250**	.161*	.530**	*0.846*								
5	Intra Network Strength	4.87	1.05	0.343**	.257**	.486**	.496**	*0.683*							
6	IT advancement	4.53	1.24	0.573**	.364**	.245**	.224**	.355**	*0.87*						
7	Competencies	4.71	1.04	0.403**	.226**	.313**	.161*	.442**	.322**	*0.698*					
8	Relative Size	15.33	30.66	-0.064	0.009	-.146*	-0.015	-0.004	-0.062	-0.095	*0.683*				
9	Host country	0.49	0.50	-0.031	-0.035	-0.057	-0.078	-0.113	-0.086	-.156*	0.034	*1*			
10	Home Region	0.38	0.49	-0.130	-0.065	-0.11	-0.047	-0.08	-0.001	0.026	-0.066	-.386**	*1*		
11	Industry	0.47	0.50	0.061	0.038	0.001	-0.014	0.026	.134*	.136*	-0.102	-.449**	.201**	*1*	
12	Age	18.51	14.82	0.011	.175**	0.056	0.031	-0.004	0.103	-0.045	-0.046	-0.127	-0.028	-0.029	*1*

Note: Diagonals in Italic are the square roots of the average variance extracted and off-diagonal are the bivariate correlations between the constructs. **. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

SEM-PLS results	Innovation Performance		Market Performance	
	Path coefficients	P-Value	Path coefficients	P-Value
Innovation Performance			0.204	<0.001
Interfirm Network Strength	0.047	0.232	0.193	0.001
Non-Business Network Strength	0.020	0.379	0.046	0.241
Intra Network	-0.094	0.073	0.047	0.233
IT advancement	0.440	<0.001	0.178	0.003
Competencies	0.249	<0.001	0.119	0.076
Relative Size	-0.061	0.173	0.061	0.174
Host country	-0.003	0.484	0.033	0.308
Home Region	-0.098	0.064	0.014	0.416
Industry	-0.011	0.435	0.009	0.443
Age	-0.052	0.213	0.144	0.012

Table 4: Necessary condition analysis

	Innovation Performance	
Conditions	*Consistency*	*Coverage*
Interfirm Networks	0.704	0.695
~ Interfirm Networks	0.498	0.542
Non-Business Networks	0.673	0.677
~Non-Business Networks	0.515	0.551
IT advancement	0.772	0.770
~IT advancement	0.427	0.460
Intra-organisational Networks	0.723	0.715
~Intra-organisational Networks	0.461	0.502
Competencies	0.759	0.747
~Competencies	0.441	0.483

Note: The highest values are shown in bold, but none was >0.9. "~" stands for not.

Table 4a: Sufficient condition analysis results innovation performance (full sample)

	High Innovation Performance							**Low Innovation Performance**							
Condition / Solution	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Interfirm Network Strength			●	⊗	⊗	●	●		⊗	⊗		⊗		⊗	●
Non-Business Network Strength		●	●	⊗	●	⊗	●		⊗	⊗	⊗		⊗	●	●
Intra-organizational Network		⊗		●	●	●	⊗				⊗	●	●	⊗	⊗
IT advancement	●	●	●	●				⊗	⊗			⊗	⊗	●	⊗
Competencies	●				●	●	●	⊗		⊗	⊗				
Raw coverage	0.63	0.25	0.48	0.24	0.23	0.24	0.20	0.59	0.46	0.46	0.47	0.29	0.29	0.20	0.22
Unique coverage	0.09	0.02	0.04	0.02	0.01	0.02	0.01	0.06	0.02	0.01	0.03	0.02	0.02	0.02	0.01
Consistency	0.86	0.77	0.86	0.86	0.84	0.84	0.81	0.85	0.87	0.85	0.87	0.83	0.82	0.78	0.85
Solution consistency	0.793							0.758							
Solution coverage	0.790							0.783							
frequency cutoff:	3							3							
consistency cutoff:	0.799							0.804							

Note: '●'means the condition is present, '⊗'means the condition is absent, and "blank space" means do not care

Table 4b: Sufficient condition analysis results innovation performance (Singapore)

	Singapore High Innovation Performance				Singapore Low Innovation Performance					
Condition \ Solution	1	2	3	4	5	6	7	8	9	10
Interfirm Network Strength			⊗	●	⊗		⊗	●		●
Non-Business Network Strength		●	●	●		⊗	●	●	●	●
Intra-organizational Network	●	●	●			⊗	●		⊗	⊗
IT advancement	●		⊗	●	⊗	●	⊗	●	⊗	
Competencies	●	●		⊗	⊗	⊗		⊗	⊗	⊗
Raw coverage	0.63	0.59	0.23	0.20	0.49	0.30	0.24	0.23	0.31	0.24
Unique coverage	0.11	0.03	0.03	0.04	0.14	0.06	0.04	0.04	0.00	0.00
Consistency	0.90	0.87	0.83	0.77	0.91	0.90	0.78	0.79	0.92	0.87
Solution consistency	0.819				0.824					
Solution coverage	0.770				0.718					
frequency cutoff:	3				3					
consistency cutoff:	0.807				0.799					

Note: '●'means the condition is present, '⊗'means the condition is absent, and "blank space" means do not care

Table 4c: Sufficient condition analysis results innovation performance (Thailand)

	Thailand High Innovation Performance				Thailand Low Innovation Performance			
Condition \ Solution	1	2	3	4	5	6	7	8
Interfirm Network Strength		●	⊗	⊗	⊗	●		⊗
Non-Business Network Strength	⊗		⊗	●	⊗	●	⊗	
Intra-organizational Network			●	⊗			⊗	⊗
IT advancement	●	●	●	●	⊗	⊗	⊗	⊗
Competencies	●	●		⊗			⊗	⊗
Raw coverage	0.33	0.45	0.21	0.17	0.47	0.33	0.40	0.24
Unique coverage	0.05	0.19	0.03	0.04	0.07	0.12	0.01	0.00
Consistency	0.89	0.88	0.85	0.89	0.87	0.80	0.87	0.83
Solution consistency	0.858				0.814			
Solution coverage	0.620				0.668			
frequency cutoff:	3				3			
consistency cutoff:	0.821				0.812			

Note: '●'means the condition is present, '⊗'means the condition is absent, and "blank space" means do not care

Table 4d: Market performance outcomes whole sample

	High Market Performance						Low Market Performance								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Innovation Performance	●		●	●	●	●	⊗	⊗	⊗	⊗		⊗	⊗	●	●
Interfirm Network Strength		●		●	⊗				⊗	●	⊗	●	●	⊗	⊗
Non-Business Network Strength	⊗	●		●	⊗	●		⊗			⊗		●	⊗	●
Intra-organizational Network		⊗	●		●	⊗		⊗	●	⊗	⊗	●	●	●	⊗
IT advancement	●	●	●	●	●	●	⊗		⊗		⊗			●	●
Competencies	●		●			⊗	⊗	⊗		⊗	⊗	●	●	⊗	⊗
Raw coverage	0.29	0.20	0.45	0.41	0.20	0.16	0.46	0.38	0.24	0.24	0.33	0.21	0.22	0.15	0.14
Unique coverage	0.05	0.03	0.02	0.03	0.01	0.01	0.04	0.02	0.02	0.01	0.01	0.02	0.03	0.01	0.01
Consistency	0.82	0.82	0.83	0.83	0.83	0.84	0.81	0.84	0.85	0.81	0.86	0.82	0.80	0.81	0.82
Solution consistency	0.797						0.754								
Solution coverage	0.628						0.690								
frequency cutoff:	3						3								
consistency cutoff:	0.811						0.795								

Note: '●'means the condition is present, '⊗'means the condition is absent, and "blank space" means do not care

Table 5: Patterns for high innovation performance

Whole Sample	Singapore	Thailand
- FOS needs either IT advancement or competences in their asset bundles, but the best is to have both - Hence, there is limited substitutability between IT advancement and competencies. - Lack of some competences can be overcome by strong networks, only one or combination of two different networks - Hence, networks seem to complement each other	- The key role of networks (one or combination of two) that complement competences - Lack of competences and IT advancement may be complemented by networks - More closed than open approach to innovation (based on the important role of intra-organizational networks)	- The key role plays IT advancement - Focus on only one type of networks (the best on interfirm networks) - This suggests a substitutability of network dimensions - More open approach to innovation (important role of interfirm networks).

Appendix A: SEM-PLS model fit

	Innovation model	Market model	Range
Average path coefficient (APC)	0.107, P=0.024	0.091, P=0.039	P <= 0.05
Average R-squared (ARS)	0.378, P<0.001	0.294, P<0.001	P <= 0.05
Average adjusted R-squared (AARS)	0.350, P<0.001	0.259, P<0.001	P <= 0.05
Average block VIF (AVIF)	1.332	1.443	acceptable if <= 5, ideally <= 3.3
Average full collinearity VIF (AFVIF)	1.45	1.464	acceptable if <= 5, ideally <= 3.3
Tenenhaus GoF (GoF)	0.547	0.481	small >= 0.1, medium >= 0.25, large >= 0.36

Sympson's paradox ratio (SPR)	0.700	0.818	acceptable if >= 0.7, ideally = 1
R-squared contribution ratio (RSCR)	0.910	0.993	acceptable if >= 0.9, ideally = 1
Statistical suppression ratio (SSR)	1.000	1.000	acceptable if >= 0.7
Nonlinear bivariate causality direction ratio (NLBCDR)	0.950	1.000	acceptable if >= 0.7
Standardized root mean squared residual (SRMR)	0.102	0.093	acceptable if <= 0.1
Standardized mean absolute residual (SMAR)	0.080	0.072	acceptable if <= 0.1
Standardized chi-squared (SChS)	with 464 degrees of freedom =19.706, P<0.001	with 560 degrees of freedom 20.820, P<0.001	
Standardized threshold difference count ratio (STDCR)	0.942	0.955	acceptable if >= 0.7, ideally = 1
Standardized threshold difference sum ratio (STDSR),	0.825	0.846	acceptable if >= 0.7, ideally = 1

Appendix B: Respondents profile

	Host country			
	Thailand		Singapore	
	Frequency	%	Frequency	%
Managing Director/ CEO	27	23.3	51	42.1
Other Board members such as HR, Marketing, etc.	80	69.0	46	38.0
Company affiliated experts and other advisors	9	7.8	24	19.8
Total	116	100.0	121	100.0

Appendix C: Robustness tests

	High Innovation Performance													
Set up change:	Calibrated according to Likert Scale 1-7							Calibrated according to quartiles			reduced consistency threshold of 0.85 for innovation performance			
Condition / Solution	1	2	3	4	5	6	7	1	2	3	1	2	3	4
Interfirm Network Strength			⊗	⊗	●	●	⊗	●		●		●	⊗	●
Non-Business Network Strength			⊗	⊗	●	●	●	●	⊗	⊗	●		⊗	●
Intra-organizational Network	⊗	●					●		⊗	●			●	●
IT advancement	●			●		●	⊗	●	●	⊗	●	●	●	●
Competencies		●	●		●				●	●	●	●		
Raw coverage	0.35	0.61	0.30	0.31	0.47	0.48	0.19	0.43	0.15	0.08	0.46	0.50	0.24	0.44
Unique coverage	0.04	0.08	0.01	0.02	0.01	0.04	0.01	0.38	0.10	0.03	0.03	0.06	0.06	0.04
Consistency	0.71	0.80	0.79	0.79	0.82	0.86	0.76	0.85	0.88	0.78	0.87	0.89	0.86	0.91
Solution consistency	0.721							0.844			0.853			
Solution coverage	0.866							0.570			0.652			
frequency cutoff:	3							3			3			
consistency cutoff:	0.745							0.782			0.857			
								Percentile cut off points						
								25th	*50th*	*75th*				
Innovation Performance								*4.5*	*5*	*5.75*				

Interfirm Network Strength		*4.33*	*5*	*6*	
Non-Business Network Strength		*4*	*4.5*	*5.5*	
Intra-organizational Network		*4.2*	*5*	*5.6*	
IT advancement		*3.8*	*4.6*	*5.4*	
Competencies		*4.14*	*4.86*	*5.43*	

Note: '⬤'means the condition is present, '⊗'means the condition is absent, and ''blank space'' means do not care