Plenty of Pipelines
& Barely Buzz

A research on network linkages for innovation:
Evidence from Thailand

Kevin van Lierop
Master Thesis Economic Geography

Radboud Universiteit

> "A good idea is a network. A specific constellation of neurons – thousands of them – fire in sync with each other for the first time in your brain, and an idea pops into your consciousness." … "The trick to having good ideas is not to sit around in glorious isolation and try to think big thoughts. The trick is to get more parts on the table."
>
> *Steven Johnson, author of the book 'Where good ideas come from'*

Author

Kevin van Lierop
s4835123
lieropkevinvan@hotmail.nl
https://www.linkedin.com/in/kevinvlierop/
Master Thesis - MSc. Economic Geography
Radboud University Nijmegen
November, 2018

Scientific supervision

Dr. Lothar Smith
Department of Human Geography
Nijmegen School of Management
Radboud University Nijmegen
The Netherlands

Summary

"The 21st century will be the Asian century" - a prediction which we have heard for many years now. Asian countries have indeed achieved rapid growth in the past 30 years but today many people are experiencing a certain doubt whether Asia can continue to grow at the pace it has previously enjoyed. Recent discussions have tended to focus on the 'middle-income trap' – the inability to reach advanced country status without structural reforms. Thailand is one of these "trapped" countries and struggles to find a way towards an innovative and creative economy. The generation of continuous innovation is essential in making the transition from being a middle-income country at the catch-up stage to an advanced country situated at the leading edge (Fagerberg & Srholec, 2008). Innovation is considered to account for roughly 80% of economic growth in modern world nations and is widely seen as one of the solutions for escaping the middle-income trap (Agénor, 2016; Jitsuchon, 2012).

From a regional point of view, innovation is locally embedded and arises from both formal and planned, as well as, informal and unplanned forms of contact. In this view, innovation is often a result of social interaction in which individuals are interacting, collaborating, and sharing ideas and solutions with others – the key to creativity is with whom and how people interact (Bogilović & Škerlavaj, 2015; Perry-Smith & Shalley, 2003). Although the role of face-to-face networks within regional environments has often been addressed, argue others that the fortunes of regions are not only shaped by what is going on within them, but moreover by what is happing externally (Bathelt, Malmberg & Maskell, 2004). Partners on four spatial scales have been distinguished in this thesis. Firstly, collaboration on local level with partners in the same city or province. Secondly, collaboration with partners in the same region (e.g. north, south). Thirdly, collaboration on inter-regional level, these are national ties with partners elsewhere in Thailand. Fourthly, collaboration on international level with partners located outside Thailand. Making a distinction here between the national level and the international level is critical. Especially since the national level still tends to provide a distinct and often dominant legal, institutional, social and cultural context (Lundvall, 1992; Trippl et al., 2009). Therefore, one can argue that international linkages are more likely to bridge different environments than national ones. However, this would also mean that these differences make establishing international networks more challenging (Leung, 2013). In this train of thought, this thesis argues that the possession of cultural intelligence (CQ) contributes to a firm's ability to successfully engage in international partnerships and cross-cultural collaborations. CQ is the "*individual's capability to function and manage effectively in culturally diverse settings*" (Earley & Ang, 2003). Based on this discussion in the literature, this thesis examines to what extent network linkages contribute to the innovation performance of Thai firms and how cultural intelligence influences collaboration across borders. Therefore, this thesis answers the following main research question: *How is the innovation performance of Thai firms influenced by network linkages and cultural intelligence?*

In order to give an adequate answer to the main research question, this thesis looks for significant associations and relations between four independent variables (type of partner, geographical proximity, firm size, and cultural intelligence) that have come forth from the literature, and innovation performance.

A mixed methods approach has been used to collect quantitative and qualitative data, and enables for the collection of more information than either method could alone. It combines the strengths of both approaches in order to best understand research problems and works particularly well for case studies. This research is designed as single instrumental case study, which enables the researcher to gain a better understanding of the main problem and allows the researcher to explain not just what is happening but also why it is happening (Kitchin & Tate 2013). In an instrumental case study, the case itself is secondary to understanding a particular phenomenon (Mills, Durepos & Wiebe, 2010). For this research, six semi-structured expert interviews were conducted and an online questionnaire was distributed among managers in Thailand, which resulted in 142 respondents.

This thesis distinguishes between two types of partners: partners in the Doing, Using, and Interacting (DUI) sphere and those involved in Science, Technology and Innovation (STI) activities (Jensen, Johnson, Lorenz & Lundvall, 2007). Typical outputs from collaborating with DUI-partners are incremental product or process innovations that come forth from the need of problem-solving when interacting with partners within the supply-chain (customers, suppliers and other firms in the same conglomerate) and partners outside the supply-chain (competitors and rivals). Collaboration with STI-partners, such as consultants, universities and research institutes, leads to the development of new applications of already existing technologies and/or radically new technologies (Fitjar & Rodríguez-Pose, 2013). This thesis found that both partner types are equally important for the innovation performance of Thai firms. However, Thai firms that collaborate with other companies in the same conglomerate and research institutes on different geographical scales are significantly more successful in product innovation than those who collaborate with fewer of these partners. The literature argues that successful partnerships are those with partners who are cognitive, social, institutional, organizational, and geographical close to the firm (Boschma, 2005). However, too much proximity in these dimensions leads to being locked-in in existing knowledge circuits. For example, cognitive proximity is defined as the similarities in the way actors perceive, interpret, understand one another. Too little of it means that actors don't understand one another, too much proximity, on the other hand, means that both actors possess the same knowledge, which implies problems of communication. Social proximity is generally associated with personal relationships between actors at micro-level and arise from the idea that economic relations are to some extent embedded in social context. On the contrary, institutional proximity is based on the relations between actors that share the same norms, practices and incentives on macro-level. Organizational proximity is the extent to which actors share the same organizational entity, which can for instance be through subsidiaries or departments of the same parent company. A final dimension is geographical proximity, which emphasises the importance of spatial proximity in knowledge exchange, learning and innovation. However, there are also examples of studies where the importance of low geographical proximity is emphasized (Bathelt et al., 2004; Fitjar & Rodríguez-Pose, 2011; Gertler, 2003). Globalization has increased the importance of cross-border collaboration in innovation – both in obtaining inputs for innovation (ideas, finance, skills, technologies) from abroad and in exploiting its outputs (products and services, patents, licenses, etc.) in foreign markets (OECD, 2017a). The interaction between the different dimensions of proximity and partners work different from each other: (a) interaction when partners are not located nearby, which means a lack of geographical

proximity, but strong cognitive, organisational and, most likely, social and institutional proximity – so-called 'global pipelines' and (b) interaction at close quarters, when different agents share the same location, adding geographical proximity to all the other types of proximity – so-called 'local buzz'.

Local buzz is the feeling that 'something is in the air' and emphasises the importance of face-to-face contacts and geographical proximity in order to reap local spillovers and the tacit knowledge (Bathelt, et al., 2004; Fitjar & Rodríguez-Pose, 2013). Global pipelines emphasize the importance of collaborating with partners in other regions within the same national territory (Gertler & Wolfe, 2006) but increasingly occur on an international level (Bathelt et al., 2004). In this research it was found that indeed these international linkages positively contribute to the innovation performance of Thai firms. The importance of global pipelines is that in order to avoid lock-in and decline, clusters depend on new knowledge and networks. These pipelines offer access to resources and assets which are not available locally. In this thesis it was found that especially personal contacts in Europe and the rest of the world were considered important for gaining work-related knowledge in product innovation. Whereas local buzz is characterized by being frequent, broad, relatively unstructured and largely 'automatic', function global pipelines in a very different way. Global pipelines are channels of communication and interaction between locally based firms in a region or cluster and selected partners outside the region (Aarstad, Kvitastein & Jakobsen, 2016). The selection of partners abroad requires firms to invest resources in purposely selecting partners that complement the firm's knowledge and its absorptive capacity. This process of identifying and connecting to the appropriate knowledge partners is not self-evident for all firms. SMEs generally have less resources to address this process than large firms. This thesis found that Thai SMEs are more often embedded in local systems that represent their primary source of knowledge skills and networks. Large firms, on the other hand, are better able to reap the benefits from international network ties, since they have better access to key resources and employ larger R&D staff. Collaborations are only fruitful when firms are able to reap the benefits that partners offer and when they are able to absorb and process the information given. As Nooteboom (2000, p. 153) argues: "*Information is useless if it is not new, but it is also useless if it is so new that it cannot be understood*". Recall that the key to creativity is with whom and how people interact; motivational and metacognitive cultural intelligence increase an individual's understanding of similarities and differences between culturally diverse colleagues from the East and the West (Earley & Ang, 2003). This thesis found that possessing a high level of motivational and metacognitive cultural intelligence positively contributes to engaging in international network linkages and firms that score high on these dimensions are better able to reap the benefits coming from these international linkages, with innovation as result.

Although inter-firm networks with partners within Thailand as well as with partners abroad are important for innovation, concludes this thesis that merely networks are not sufficient. The quality of the local buzz is an important factor for global pipelines to function effectively and useful. The educational level of a country's labour force and the skills and knowledge it has to offer stand at the core of a well-functioning local buzz. Only when local buzz works in terms of novelty, and its spillovers lead to new insights and ideas, are global pipelines useful in complementing this knowledge. Ultimately, this leads Thailand to turning from a country with a few high-tech sectors, to a country with a high-tech economy.

Glossary

Term	Definition
Analytical knowledge	Knowledge linked to scientific findings based on formal models, codified science and rational processes, rather than applied research (Jensen et al., 2007)
Cultural intelligence (CQ)	An individual's capability to function and manage effectively in culturally diverse settings (Earley & Ang, 2003).
DUI-partners	Doing, Using, and Interacting partners – Other companies in the same conglomerate, suppliers, customers, competitors (Jensen et al., 2007)
Global pipelines	A variety of carefully chosen channels for the exchange of knowledge with relevant hotspots around the globe (Bathelt et al., 2004). Global pipelines play the role of bridging structures that provide access to novel and non-redundant information that can create further technological spillover and spur innovation (Aarstad et al., 2016).
Incremental innovations	Innovations that were new to the company only (OECD, 2005).
Local buzz	The learning processes taking place among actors embedded in a community by just being there. An embedded context of local bonding which will induce trust, reduce transaction costs, create technological spillovers, and provide fine-grained information sharing to enable the mingling of different ideas (Bathelt et al., 2004; Aarstad et al., 2016).
Metacognitive CQ	The mental processes that individuals use to acquire and understand cultural knowledge and relevant capabilities including planning, monitoring, and revising mental models of cultural norms for countries or groups of people ("thinking about thinking") (Earley & Ang, 2003).
Motivational CQ	The capability to direct attention and energy toward learning about and functioning in situations characterized by cultural differences (Earley & Ang, 2003).
Networks	Networks encompass a firm's set of relationships, both horizontal and vertical, with other organizations – be they suppliers, customers, competitors, or other entities – including relationships across industries and countries (Gulati, Nohria & Zaheer, 2000).
Process/method innovations	Think for instance of the introduction of new production techniques, new organizational features, new technologies or new professional software (OECD, 2005).
Product/service innovations	Think for instance of the usage of new materials, new intermediate products, new functional parts, radically new technology or the introduction of new functions and new products (OECD, 2005).
Radical innovations	Innovations that were new to the market as a whole (OECD, 2005).
SMEs & Large firms	Small and medium-sized enterprise are companies with less than 250 employees. Large firms are those with more than 250 employees (European Commission, 2018). The terms firm, company and enterprise are used interchangeably in this thesis.
STI-partners	Science, Technology and Innovation partners – Consultants, universities, research institutes (Jensen et al., 2007)
Synthetic knowledge	Knowledge that arises from shop floor experience, on-the-job training, and resides in concrete know-how, craft and practical skills (Jensen et al., 2007)

Table of Contents

Chapter 1: Introduction

> "The country [Thailand] continues to depend on the same model of development that lifted it out of poverty—cheap labour, and low innovation, with technological acquisition mainly through technology importation."
>
> Somchai Jitsuchon, research director at TDRI on the middle-income trap in Thailand

This first chapter gives an introduction into this thesis and explains its objective and structure. The first paragraph examines the problem statement of this research, which is followed by the research objective in paragraph two. The third paragraph introduces the research questions of this thesis whereas paragraph four deals with the societal and scientific relevance of this research. Finally, paragraph five concludes this first chapter with an overview of the structure of this thesis.

1.1 Thailand: The next tiger economy?

Thailand transformed in the last quarter of the 20th century from a poor, heavily rural economy, to a middle-income, semi-industrialised and globalised economy. Between the 1960s and 1990s, Thailand's economy grew at an average annual rate of 7.5% and the liberalization of trade and finance accelerated the pace of industrialization and urbanization (Warr, 2011). In that period, the balance of economy and society shifted decisively from rural to urban, and from parochial to open and globalized. The middle class grew larger and more assertive and millions were pulled out of the villages to swell the urban working class (Baker & Phongpaichit, 2014). In as little as ten years, the country has shifted from 36% urban to almost 53% urban, with the capital Bangkok as epicentre, which accounted in 2010 for nearly 80% of the total urban area in Thailand (World Bank, 2015). Already in 2000, the city housed 10 million of the country's 69 million inhabitants (World Bank, 2016b) whereas Nonthaburi, Thailand's second largest city, deals with only one quarter of a million inhabitants (Statista, 2018a). Despite the country's rural but shifting population, is population growth only minimal. The country's fertility rate is low (below the natural replacement rate) due to birth control campaigns, rising prosperity, and delayed child-bearing for education and careers (Baker & Phongpaichit, 2014). As a result, Thailand is rapidly aging and annual population growth dropped from 3% in the 1950s to 1% in the 1990s. Currently, more than 7.5 million Thais are 65 years or older (11% of the population) and it has been estimated that in 2040, more than one quarter of the population will be 65 or older (17 million people) (World Bank, 2016c).

Along with the trend of urbanization decreased the share of agriculture in the nation's gross domestic product (GDP). Since the 1990s, agriculture makes up 9% of GDP whereas this used to be 36% in 1960. However, many of the Thai agricultural products are not destined for own consumption but are moreover an important source of income from exporting and constitute about 25% of the total export value (Statista, 2018b; World Bank, 2017b). Overall, the Thai economy is heavily export-dependent, with exports accounting for more than two-thirds of its GDP. In 2017, Thailand was the 8th largest economy of Asia (IMF, 2018) and besides agriculture, contribute the industrial (35%) and service (56%) sectors a large share to the nation's GDP (Statista, 2018b). Within the industrial sector, manufacturing is contributing most to GDP (34.5%) and the two major categories of goods manufactured in Thailand

are automotive (cars and delivery trucks) and electronics (computers, integrated circuits) (OEC, 2018). On average, approximately two million vehicles are being produced in Thailand every year, making it the largest automotive industry in Southeast Asia. Cars and trucks from General Motors, Ford, BMW, Daimler and Volvo, in addition to all major Japanese manufacturers – Toyota, Mitsubishi, Honda, Mazda, Isuzu and Nissan, are all being manufactured in Thailand, making it the most vulnerable country to a potential disruption in Japan's supply of automotive parts and components (AseanUp, 2018; Ferrarini, 2011). The electronics manufacturing industry in Thailand produces the largest percentage of exported goods, and accounts for 15% of total exports leaving the country. Its top imports are crude petroleum, integrated circuits, vehicle parts, and petroleum gas (OEC, 2018).

When in the early 1980s Thailand's agricultural export growth faltered and the second oil crisis raised the cost of the country's single largest import, the emphasis of the economy shifted away from agriculture towards industry. Boonchu Rojanastian, former managing director of Bangkok Bank and deputy prime minister of finance, said "*we should run the country like a business firm*". Boonchu wanted 'Thailand Inc.' to follow Japan and the East Asian Tiger economies in producing manufactured goods for export (Baker & Phongpaichit, 2014, p. 202). Through a devaluation of the national currency (Thai Baht) and a revision of tariffs, tax systems, and investment promotion, foreign direct investment (FDI) accelerated as East Asian firms moved export-oriented manufacturing to Thailand and other low cost sites in Southeast Asia. For three decades, Thailand was among the top recipients of FDI, drawn by low labour costs, local market potential, political stability, and tax incentives (Poapongsakorn & Tangkitvanich, 2014). Textile, garment, and other labour-intensive industries were the first to arrive. Japanese investors already found their way to Thailand in 1960 and exceeded the FDI of the USA by almost 3 times in only 20 years. Some Japanese investments went into labour-intensive manufacturing, especially textiles, for both the local market and export. Later, Japanese trading companies invested in assembling automobiles and household goods from imported components for domestic sale. They often linked up with a joint-venture partner and strengthened the leading Thai conglomerates that were responsible for local marketing, government contacts, and public relations. Other East Asian firms followed and used Thailand as a part of complex multi-country systems for manufacturing technology based goods.

From 1990 onwards, technology-based goods, such as integrated circuits, computer parts, electrical goods, and automobiles, were the fastest-growing sector of exports. Japanese computer-part maker Minebea had transferred 60% of its world production into Thailand and became the country's largest private employer by the end of the 1980s. In 1991, the government deregulated the automotive industry, encouraging Japanese and later US firms to increase their investments and between 1993 and 1996, a new Japanese factory opened in Thailand every three days (Baker & Phongpaichit, 2014). The majority of these investments were concentrated in and around Bangkok. In 1981, 75% of the total value of manufacturing was located in the Bangkok and its vicinity. After 1990, congestion, pollution, and labour shortages, led to an urge of need within the government and investors to move industrial activities to other regions in the country, mainly the Central, Eastern, and Southern regions. However, despite governmental fiscal incentives to encourage business relocation, most industries are still

located in the Bangkok vicinity where they can benefit from a large consumer market and the availability of better infrastructure facilities and social services (Poapongsakorn & Tangkitvanich, 2014).

Where agriculture in the early 1980s still supplied almost half of exports was this share a decade later a little over a tenth. As labour moves from low-productivity agriculture to more rewarding alternatives elsewhere, wages are eventually driven up. When unskilled labour is exhausted and wages start to rise rapidly, the comparative advantage in labour costs reaches a so-called 'Lewis turning point' and many labour-intensive export-oriented industries start to move to other lower-wage countries (Gill & Kharas, 2015). Although the pattern of labour-intensive production and exports remained broadly unchanged in Thailand for the past two decades, was there a growing need for a more trained and settled workforce by the technology firms that led the industrial growth in the late 1980s (Baker & Phongpaichit, 2014; Jitsuchon, 2012). Simultaneously, Thailand faced growing competition from other low-cost producers like China and India, and more recently, Cambodia and Vietnam (Agénor, 2016). While the computer-part maker Minebea was the country's largest single employer in the early 1990s, five years later its workforce had dwindled to a tenth. Many computer disk-drive firms moved from Singapore to Thailand in the early 1990s, making the sector one of the largest employers, and then moved on to China a decade later (Baker & Phongpaichit, 2014). Jitsuchon (2012) states, "*the country [Thailand] continues to depend on the same model of development that lifted it out of poverty—cheap labour, and low innovation, with technological acquisition mainly through technology importation*" (p. 15). The county's inability to tap along into the production of innovation-based products and services, and fast-growing markets for knowledge, led to the middle-income trap (MIT) (Agénor, 2016; Mare, Promphaking & Rigg, 2015; Ye & Robertson, 2016).

In the last years, various economists have tried to give a concrete and consistent definition of what it exactly is but the approaches are varying widely from one study to the other. Consequently, there is no commonly accepted terminology for the MIT, its determinants or the crucial factors that help countries avoid the trap. The phenomenon was initially coined by Gill and Kharas (2007) and used to describe apparent growth slowdown in many of former East Asian miracle economies and a general pattern of slow growth among many middle-income countries, such as Albania, Algeria, Bolivia, Botswana, Brazil, Congo, South Africa and Sri Lanka (Cardenas, 2016). Being stuck in this 'trap' means basically that the growth strategies that these countries used successfully while they were poor, no longer suit their current economic circumstances. They are basically unable to move from a low-cost economy to a high-value one, which makes it difficult to compete with both the low-wage poor countries, dominant in immature industries, and innovative rich countries, dominant in technology-intensive industries (Agénor, 2016; Warr, 2011). In this sense, the MIT literature can be seen as a response to Rostowian "take-off" or "flying geese" conceptualizations of development, by arguing that high-income status is not a natural end-state of industrialization, and that there are actually limits to growth derived from technology transfer and catch-up industrialization (Cardenas, 2016).

1.2 Research objective

Many countries struggle to escape from the middle-income trap (MIT). In Thailand, being stuck in this trap means not being able to take production and innovation to a next level where they can compete with other high-income countries. Although productivity slowdown is being seen as the main source of the MIT are there different reasons to find in the literature on why this slowdown occurs (Agénor, 2016; Jitsuchon, 2012). The creation of knowledge and the innovation that is supposed to result from it, play an important role to economic development and competitiveness for firms, industries, regions and nations. Innovation is widely seen as an important factor in stimulating productivity and generating economic growth and hence increasing the overall welfare in the society (Lundvall, 1992). The importance of innovation in developing countries' economies makes it one of the solutions for escaping the middle-income trap (Agénor, 2016; Jitsuchon, 2012).

Generally, two streams of innovation theories can be distilled from the existing literature. The first is the linear model of innovation, in which theories on knowledge spillovers have looked at innovation from a scientific and technical perspective. Here, information and communications technology (ICT) expenditures, the use of research and development (R&D), patenting, and the level of education and training of the labour force, have been used as the main forces behind innovation (Audretsch & Feldman, 1996; Griliches, 1992; Jaffe, 1986). The second stream focuses on the role of institutions, interactions, networks and informal relationships that facilitate the generation and exchange of knowledge (Lundvall, 1992). This stream is rather sceptical about the relevance of R&D, patenting and ICT expenditure as sources of innovation and portray innovation as a territorially embedded phenomenon, which is determined by the social and institutional conditions in a given territory (Cooke, 2001).

In line with the second stream of literature, Bathelt et al (2004) state that new and valuable knowledge will always be created in other parts of the world and firms who can build pipelines to such sites of global excellence gain competitive advantage. Decisive, non-incremental knowledge flows are often generated through 'network pipelines', rather than through undirected, spontaneous 'local broadcasting' (Aarstad et al., 2016). Access to new knowledge results thus not just from local and regional interaction but is often acquired through strategic partnerships of interregional and international reach (Owen-Smith & Powell, 2002). This thesis uses theories from the second stream of literature and aims to understand how network linkages between economic partners influence knowledge creation and innovation in Thailand. Additionally, it aims to understand the role of cultural intelligence in using international partners for innovation. More specifically:

This thesis aims to understand the importance of engaging in successful partnerships for innovation by researching to what extent international network linkages and cultural intelligence contribute to the innovation performance of Thai firms.

1.3 Research questions

From the research objective given in the previous paragraph, the following main research question has been formulated:

How is the innovation performance of Thai firms influenced by network linkages and cultural intelligence?

This research question implies that the innovation performance of companies in Thailand is influenced by international network ties and is strengthened or weakened by the existence of cultural intelligence. In order to give an adequate answer to this research question, four sub-questions have been drafted. These sub-questions collectively aim to answer the main research question. The sub-questions will be explained and introduced below:

Firms acquire knowledge from different sources and partners, which can be divided in those linked to 'Doing, Using and Interacting' (DUI) activities and those in the area of 'Science, Technology and Innovation' (STI). The first sub-question aims to understand to what extent both partner types influence innovation.

    a) *What type of partners are important to collaborate with for the innovation activities of Thai firms?*

These partner types are located on different geographical levels. Especially external linkages with partners located abroad are an important source of novel ideas and inputs, and offer access to knowledge and assets that are not available locally. This second sub-question aims to understand to what extent the geographical proximity of partners plays a role in the knowledge exchange between economic actors.

    b) *To what extent does geographical proximity of partners influence the innovative performance of Thai firms?*

In general, SMEs innovate differently than larger firms. Overall, large firms are more engaged in international collaboration networks for innovation whereas SMEs are often embedded in local systems that represent their primary source of knowledge, skills and networks. Therefore, the third sub-question of this thesis is:

    c) *How do network linkages for innovation in Thailand differ between SMEs and large firms?*

Fourthly, innovation is often a result of social interaction in which individuals are interacting, collaborating, and sharing ideas and solutions with others. International partnerships are only fruitful when firms are able to understand, exploit and utilize the knowledge coming from external partners. Cultural intelligence (CQ) reflects an individual's capability to function and manage effectively in culturally diverse settings. The final sub-question aims to find out whether CQ positively contributes to engagement in international network:

    d) *How does cultural intelligence influence a firm's engagement in international network ties for innovation?*

1.4 Why this research matters

To clarify further why innovation and knowledge creation is an important remedy for the middle-income trap, this sections will elaborate on the societal and scientific relevance of this thesis.

Societal relevance

The generation of continuous innovation is essential in making the transition from being a middle-income country at the catch-up stage to an advanced country situated at the leading edge (Fagerberg & Srholec, 2008). Innovation is considered to account for roughly 80% of economic growth and development in modern world nations (Sternberg & Arndt, 2001). Druckner (1998) states that the importance of knowledge and technology has increased in the modern capitalist economy compared to the traditional factors of production; labour, capital and land. Smith (2000) goes even further and states that knowledge has become one of the main factors of production. Bearing this in mind, it is not surprising that the Thai government is keen on stimulating innovation and perceiving it as a way out of the middle-income trap.

Innovation is an important way for firms to become and remain competitive and to strengthen the comparative advantage of a country as a whole (OECD, 2017a). This thesis gives Thai policy makers insight in the role that network linkages play for innovation and helps them to develop policies that make collaboration among economic actors easier and more prevailing. Knowing which partnerships on what scale are frequently used by Thai firms, and knowing whether they are significantly linked to innovation, helps policy makers to promote those partnerships in particular. As Bathelt et al (2004) state, cluster policies are often so predisposed toward local networking that the importance of external, trans-local communication is often overlooked.

Furthermore, knowing that small and medium-sized enterprises (SMEs) and large firms innovate different from each other, and therefore collaborate for different reasons with partners, helps policy makers to differentiate in promoting partnerships for SMEs and large firms. Especially, since 99.7% of the firms in Thailand are SMEs whereas only 0.3% are large firms (ADB, 2015). Gaining insight in the differences between the two firm sizes is beneficial for policymakers and managers as it allows for a more detailed approach in promoting or utilizing partnerships.

From a managerial perspective, the relevancy of this research is that it helps managers to understand what role network linkages play in their innovation performance and which partners are beneficial for what type of innovation. It helps them to get a better view on the importance of collaborating with partners on different scales, something which is normally not easy to get insight in. Additionally, the possible role of motivational and metacognitive cultural intelligence on innovation aims to convince managers to allocate resources to increase one's knowledge about its international partners, which may ultimately result in a better and more useful cross-cultural relationship.

Scientific relevance

This thesis contributes to the literature in several ways. First, it expands the 'global pipelines' and network linkages theories by using it in a Thai context. It therefore answers the call of Malmberg and Power (2005) in which they state that empirical testing in the field of local and non-local knowledge network is needed. While there are many studies of innovation conducted in the USA and Europe, is there little research in this area conducted in Thailand. This is especially relevant since there is no doubt that geographical location, economic conditions, and the culture in Thailand substantially differ from those in the West (Rujirawanich, Addison & Smallman, 2011). Additionally, it applies the global pipelines and local buzz theory in the context of a developing country. A context which has not yet been examined by researchers in this field.

Secondly, Fitjar and Rodríguez-Pose (2013) call for more in-depth analyses of how collaborations work. Therefore, this thesis looks into two types of partners and their corresponding modes of learning and innovation in Thailand. One is based on the production and use of codified scientific and technical knowledge, the Science, Technology and Innovation (STI) mode, and one is an experienced-based mode of learning, based on Doing, Using and Interacting (DUI-mode) (Jensen et al., 2007). Adding Boschma's (2005) proximity dimensions allows for examining the reasons behind the existence of particular partnerships in Thailand.

Thirdly, by investigating the role that cultural intelligence (CQ) plays in the use of international network linkages and innovation, the existing literature in the field of cultural intelligence will be broadened. To the best of my knowledge, no studies have examined the role of CQ in innovation and few have examined its role on the usage of international network linkages (Charoensukmongkol, 2015). This thesis contributes to the existing CQ literature through testing the relevancy of metacognitive and motivational cultural intelligence in the collaboration with international partners and in innovation.

1.5 How to read this thesis

In this paragraph the structure of the rest of the thesis is outlined. The (geography of) innovation literature is rich and extensive and exists of a broad range of theories, concepts and perspectives. The next chapter introduces the theories used in this research and summarizes this by visualizing it in a conceptual model. Additionally, it introduces several hypotheses that arise from the theory, which will be tested later in this research.

Chapter three examines the methodology used in this research. This includes the research method, design and material. For this research, six semi-structured expert interviews were conducted and quantitative data from 142 respondents was collected through an online questionnaire. The chapter concludes with methodological justifications and limitations, and a reflection on the six months of fieldwork in Thailand.

Chapter four is used to introduce the contextual background of Thailand. The chapter starts off by examining the Thai middle-income trap and dives deeper in the country's innovative performance. Next, the descriptive statistics of the respondents from the questionnaire are being discussed, which includes their economical, industrial and regional background.

Chapter five and six analyse the results from the data collection and emphasize the local buzz and global pipelines, and cultural intelligence concepts. By doing so, it looks for significant associations and relations between the four independent variables (type of partner, geographical proximity, firm size, and cultural intelligence) and innovation performance. At the end of each chapter a conclusion will be drawn in which the hypotheses will be supported or rejected. Together, these hypotheses answer the sub-questions, which in turn answers the main research question.

Finally, chapter seven concludes this research by answering the main research question of this research. Additionally, it gives recommendations and possible directions for further research. Finally, its limitations are discussed and the research ends with a critical reflection.

Chapter 2: Innovation as a way out

"When an inventor in Silicon Valley opens his garage door to show off his latest idea, he has 50 per cent of the world market in front of him. When an inventor in Finland opens his garage door, he faces three feet of snow."

J. O. Nieminen (1984), CEO of Nokia-Mobira on cluster-based advantages

In this chapter, relevant theories concerning innovation and its creation are being discussed and further explained. In order to understand the importance of geography for knowledge creation, paragraph one first examines the notion of knowledge and its creation. Paragraph two, explains the relevancy of agglomeration economies and clusters in knowledge creation and innovation. Paragraph three goes beyond the importance of geographical proximity alone and introduces four other proximity dimensions. In section four, elements of the first three paragraphs come together and are assembled into the differentiation between local network linkages (local buzz) on one hand and those externally from the region of the firm (global pipelines) on the other. In paragraph five, the idea of cultural intelligence, and its relevance in international networks for innovation, is being discussed. Paragraph six summarizes the chapter and introduces the hypotheses and a conceptual model of this chapter.

2.1 Knowledge (and its creation)

Epistemology – the study of the theories of knowledge and its limits and validity – knows a long tradition in social science. Already in 1890, Alfred Marshall recognized that knowledge changes economic activity, and economic activity changes knowledge. In turn, the rate of learning determines the speed of economic activities while the kind of learning determines the direction of economic activities. Firms, industries, regions and nations that can learn faster, or better, become competitive because their knowledge is scarce and therefore cannot be immediately imitated by new entrants or transferred to competitive firms, regions or nations (Beerepoot, 2004).

Until the mid-1980s, much of the mainstream theory considered 'knowledge' to be interchangeable with 'information'. Here, in the classical view of economics, the task of the 'homo economicus' was to maximize profit and to gather information to solve a given problem or situation without taking into account any other factors (Mariotti, 2005; Nonaka, von Krogh & Voelpel, 2006). Later, scholars began to understand that cognitive constraints affect rational behaviour and that knowledge needs to processed in order to be able to solve problems. As Nonaka, Toyama and Nagata (2000) put it, "*Information becomes knowledge when it is interpreted by individuals and given a context and anchored in the beliefs and commitments of individuals*" (p. 7). Knowledge without context is just information. For example, 'ABC Street 35, Nijmegen' is just information. However, when put into a context, it becomes knowledge: 'The house on ABC Street 35 is an old monumental building from the 18th century in the centre of Nijmegen'.

Knowledge can be separated in two forms: tacit and explicit. Tacit knowledge was first coined by Michael Polanyi (1966) as "*an inherent knowledge of something that you cannot necessarily put into*

words, or give reasons for your conclusion". It is knowledge tied to the senses, movement skills, physical experiences, intuition or implicit rules of thumb. It underscores that knowledge is never free from human values and ideas (Nonaka et al., 2006). Dicken (2015) explains tacit knowledge as "*the deeply personalized knowledge possessed by individuals that is virtually impossible to make explicit and to communicate to others through formal mechanisms*" (p. 104). Tacit knowledge is sticky and may thus not travel easily beyond the context in which it was generated and only moves with a small group of people sharing common traits or practices (Gertler, 2003). Explicit knowledge, on the other hand, can be expressed, formulated in sentences and captured in drawings and writing, and thus, it can be codified (Nonaka et al. 2006). This codified knowledge can be expressed formally in documents, blueprints, software, hardware, etc. (Dicken, 2015).

While explicit knowledge is often created by scientific and technological R&D, remains knowledge that is related to processes of doing certain tasks, using certain technologies and interaction among economic actors often tacit and highly localized, drawing on previous experience rather than codified and transferable knowledge (Jensen et al., 2007). Nonaka et al. (2000) state that tacit and explicit knowledge are complementary and that both types of knowledge are essential to knowledge creation. Explicit knowledge without tacit insight quickly loses its meaning. Knowledge is created through interactions between tacit and explicit knowledge and not from either tacit or explicit knowledge alone (Asheim & Gertler, 2005).

Often, the central argument given for the stickiness of tacit knowledge is that its exchange and creation occurs most effectively among economic actors that are located close to each other. The process of acquiring new knowledge is facilitated by proximity to critical sources of knowledge, especially when the relevant knowledge is located at the research frontier or involves a largely tacit dimension (Gertler & Wolfe, 2005). The next paragraph will elaborate on this.

2.2 The role of clusters

Innovation, or moreover the knowledge that is needed to foster innovation, has the tendency to concentrate itself in specific regions that bring forward certain regional assets. These regional assets can consist of technologies, organization, territory, industrial base, or domestic capital (Howells, 2005). The observation that knowledge it is highly clustered in space has led to a new field of research: the geography of innovation (Asheim & Gertler, 2005; Audretsch & Feldman, 1996). Much of these theories are rooted in the idea that clustering and cooperation facilitates learning processes and stimulates the generation of a local knowledge base (Petruzzelli, Albino & Carbonara, 2018). The benefits derived from being located in such a local knowledge base originate from two types of economies: localization economies and urbanization economies (Lagendijk & Oinas, 2005).

Localization economies versus Urbanization economies
Localization economies are general economies of regional and urban concentration that apply to all firms and industries in a single location. Alfred Marshall was the first to notice the geographical concentration of companies operating in the same industry. He attributed the phenomenon to the

accumulation of knowledge in the area, the formation of a specialized labour pool, and to the attraction of support and supplier industries. Large and densely populated urban agglomerations benefit from localization externalities arising from the concentration of firms belonging to the same industry (Breschi and Lissoni, 2001; Duranton and Puga, 2004). Later, Porter (1998) defined such geographical concentration of firms as clusters: "*geographic concentrations of interconnected companies and institutions in a particular field, linked by commonalities and complementarities*". The benefits deriving from localization economies has become known in the literature as Marshall-Arrow-Romer (MAR) spillovers. When firms are located in a cluster, they contribute to an enhanced productivity, higher wages and an increased innovativeness by providing cheaper and easier access to specialized inputs, such as components, machinery, services, and personnel (Gertler and Wolfe, 2005). Successful clusters often act as magnets for specialized personnel, which in turn attracts more firms that require such skilled labour (Gertler and Wolfe, 2005). As Porter (1998) argues, the presence of competition and rivalry within a specific geographic region facilitates knowledge spillovers across firms and is an important incentive for innovation and product differentiation. An important assumption of MAR spillovers is that it acknowledges the existence of knowledge externalities and spillovers, but only for firms within the same industry.

A second type of agglomeration economies are urbanization economies: firms engaged knowledge creation and creativity in a region without any sectoral boundaries (Malmberg, Sölvell & Zander, 1996). Instead of specialization and spatial clustering of related industries, emphasis is placed upon the presence of a regional variety of skills and competencies, where the often-unplanned interaction among different actors can generate new and sometimes radical ideas and creative designs, products, services and business concepts. The benefits deriving from urbanization economies have become known as Jacobian spillovers. The famous urban theorist Jane Jacobs (1969) argued that restricting knowledge externalities to occur only within the same industry ignores an important source of new economic knowledge. She argues that it is the exchange of complementary knowledge across diverse firms and economic actors in the horizontal dimension of the firm that facilitate spillovers in knowledge. These are needed since too much proximity and specialization may lead to the lack of new ideas and information, drawing local actors toward inferior solutions (Boschma, 2005).

Both streams received much attention in the literature in the past decades. After the 1940s, much of the geography literature tended to emphasise urbanization advantages over localization advantages (Dicken & Lloyd, 1990). However, since the 1980s the main focus has shifted back to localization economies due to the revival of industrial districts and high-tech agglomerations (Lagendijk & Oinas, 2005). Today, both notions of economies have left a substantial ambiguity in their definitions, applicability and status as empirical phenomena. However, the value of the debate on agglomeration economies are important to understand spatial economic processes and knowledge exchange.

STI and DUI-partners

The possibility to produce and transfer knowledge across geographical distance differs per industry and depends on the industry's dominant knowledge base, which is either analytical (science-based) or synthetic (engineering-based) (Asheim & Gertler, 2005; Storper & Venables, 2004). Analytical knowledge bases are those in industries where scientific findings are important and where the knowledge creation is based on formal models, codified science and rational processes, rather than applied research. The core activity in many of these industries (e.g. pharmaceutical, nanotechnology, biotechnology) is generating new products and processes both through collaboration with science, technology and innovation (STI) partners, as well as, internally. Academic research from STI-partners, like consultancies, universities and research institutes, has been shown to be complementary to a firm's own innovation activities, and contributes to its ability to create innovations (Jensen et al., 2007). Engaging in partnerships with STI-partners can lead to the development of new applications of already existing technologies and/or radically new technologies. Collaboration with universities, for instance, offers inexpensive and low-risk access to specialist knowledge and generic, basic R&D (Azagra-Caro, Pardo & Rama, 2014; Fitjar & Rodríguez-Pose, 2013).

Synthetic knowledge bases are often linked to novel combinations of existing knowledge. Here, innovations tend to be driven by the need to solve specific problems that arise from the interaction with customers and suppliers in engineering based industries such as automotive and machinery. Typical outputs are incremental product of process innovations to solve technological or production problems that are created through a process of testing, experimentation, and simulation. Although the type of knowledge embodied in these technical solutions is at least partially codified, tends tacit knowledge to be more important. Here, the knowledge generation arises from shop floor or office experience, on-the-job training, and resides in concrete know-how, craft and practical skills (Asheim & Gertler, 2005; Jensen et al., 2007). The knowledge acquired through these processes are by Jensen et al. (2007) defined as 'Doing, Using and Interacting' (DUI) modes of firm learning and encompass linkages with other firms in the conglomerate, suppliers, customers, and competitors.

Within the 'Doing, Using and Interacting'-mode, a distinction can be made between interaction *within* the supply-chain and interaction *outside* the supply-chain. Spillovers from interactions within the supply-chain are vertical with backward (to suppliers) and forward (to customers) linkages (Fitjar & Rodríguez-Pose, 2013). Backward linkages to suppliers tend to contribute to innovation by improving design processes, helping to secure vital inputs, sharpening its focus on core competences, and increasing a firm's knowledge of cost-reducing technologies (Amara & Landry, 2005; Belderbos, Carree & Lokshin, 2004). Forward linkages to customers, on the other hand, reduce the risks of new product market introductions and can facilitate commercialization of innovations. It helps to improve the understanding of customers' unmet needs and increases the attractiveness of a firms' products (Jeppsen & Molin 2003; Tidd, Bessant & Pavitt, 2005). Although linkages to both suppliers and customers are beneficial to vertical spillovers, are the knowledge sources different. Nonaka et al. (2006) state that new knowledge from the customers' usage of the products may be inherently tacit and can be made explicit through intense collaboration between the firms' engineers and the customers. This explicit knowledge

can be communicated through information systems and insights are created through the synthesizing of different reactions from the marketplace (Nonaka & Toyama, 2005). Sajarattanochote and Poon (2009) state that these vertical linkages within the supply-chain are MAR spillovers, whereas horizontal linkages, with competitors and rivals, are linked to Jacobian spillovers. These spillovers happen outside the supply-chain and tend to be more informal and often an unintended consequence of the relationship (Fitjar & Rodríguez-Pose, 2013). This is because firms can (or at least try) to avoid direct transfer to rivals but cannot control indirect transfer. Cantwell and Santangelo (2002) therefore argue that competitors do often not locate their R&D activities close to other firms in the same field. However, engaging in partnerships with competitors may create access to (scarce) external expertise and can help resolve common technological issues, for instance in the development of industry standards (Gnyawali & Park, 2011). For example, in research consortia where competitors work together in order to share the costs and risks of research, pool scarce expertise and equipment and aim to develop far-from-market technology (Miotti & Sachwald, 2003; Tidd et al. 2005). Table 1 gives an overview of the main differences between STI and DUI modes of innovation.

Table 1. STI and DUI modes of innovation

STI - Science, Technology and Innovation	DUI - Doing, Using and Interacting	
Global	Local	
Analytical knowledge base	Synthetic knowledge base	
Mainly explicit and codified	Mainly tacit	
Mainly formal relationships	Mainly informal relationships	
	Within the supply-chain	Outside the supply-chain
	Vertical dimension	Horizontal dimension
	MAR spillovers	Jacobian spillovers
	Intended spillovers	Unintended spillovers
Consultants, research institutes, universities	*Suppliers, customers, other companies in the conglomerate*	*Competitors, rivals*

2.3 Proximity dimensions

Although agglomeration of economic activities influences the creation and exchange of knowledge, argue Breschi and Malerba (2001) that this perspective overestimates the benefits of geographical proximity alone. They state that a broader set of factors and conditions support the effective transfer of knowledge in clusters: "*a key feature of successful clusters is related to the high level of embeddedness of local firms in a very thick network of knowledge sharing, which is supported by close social interactions and by institutions building trust and encouraging informal relations among actors*" (p. 282). Others also argue that there is no reason why knowledge exchange should be limited territorially (Amin & Cohendet, 2004; Giuliani & Bell, 2005). Boschma (2005) proposed a proximity framework which refers to the types of inter-organizational relationships that are expected to facilitate collaborative innovation. Besides geographical proximity are cognitive, organizational, social, and institutional proximity emphasized as factors that support inter-organizational collaboration. Empirical evidence supports the

notion that multiple dimensions of proximity are associated with increased levels of collaborative innovation, and that distance in one dimension can be compensated by the presence of proximity in another. Some industries are reliant on particular forms of knowledge and learning processes in which proximity between partners is essential; for others, this mutual attraction may indeed be far less powerful (Balland, 2012; Breschi & Lissoni, 2009; Davids & Frenken, 2018; Petruzzelli et al. 2018).

Cognitive proximity

In order to communicate and transfer knowledge effectively and efficiently, actors need to have similar (but not necessary identical) knowledge backgrounds (e.g. scientific discipline or specific technology) (Davids & Frenken, 2018; Petruzzelli et al. 2018). Cognitive proximity is commonly defined as the similarities in the way actors perceive, interpret, understand one another (Boschma, 2005). Too little cognitive proximity increases the difference between actors and decreases the absorptive capacity (see chapter 2.6) that firms need to use knowledge possessed by other firms (Petruzzelli et al. 2018). On the other hand, too much proximity implies problems of communication and has a negative effect on innovation as well. The notion of cognitive proximity is that people that share the same knowledge base and skills may learn from each other (Nooteboom, 2000). Boschma (2005) gives three reasons why it is important to encourage a certain level of cognitive distance. The first one is that the development of new knowledge often needs dissimilar and complementary bodies of knowledge; novelty of sources triggers new ideas and creativity. The second reason is that too much cognitive proximity may result in cognitive lock-in. Meaning that similar knowledge bases within an organization limit the rising of new technologies or new market possibilities. Lawson and Lorenz (1999) state that this leads to the 'competency trap': "*becoming quite good at doing any one thing reduces the organization's competency to absorb new ideas and to do other things*". In order to maintain some cognitive distance, firms should therefore secure access to heterogeneous sources of information and a certain openness to the outside world (Fitjar & Rodríguez-Pose, 2013). Cognitive proximity at a distance may maximise the returns of specialisation and related variety spillovers, without falling into the trap of excessive repeated interaction. By contrast, excessive cognitive proximity in limited geographical spaces may lead to repeated interaction in which no new information and knowledge is exchanged (Asheim, Coenen & Vang, 2007; Fitjar & Rodríguez-Pose, 2011). Thirdly, cognitive proximity increases the risk of unintended spillovers (Boschma, 2005; Petruzzelli et al. 2018). In sum, Nooteboom (2000, p. 153) states that "*a trade-off needs to be made between cognitive distance, for the sake of novelty, and cognitive proximity, for the sake of efficient absorption. Information is useless if it is not new, but it is also useless if it is so new that it cannot be understood*".

Organizational proximity

Organizational proximity is the extent to which actors share the same organizational entity. This can for instance be through subsidiaries or departments of the same parent company (Balland, 2012). In the literature, organizational proximity is often treated as a broad category, including a cognitive dimension and a distinction is often being made between an inter-organizational and an intra-organizational relation between actors (Boschma, 2005; Davids & Frenken, 2018). A high organizational proximity means that there are strong ties, as in hierarchically organized firm or in strategic alliances between

autonomous entities. On the contrast, a low proximity means that there are no ties between the independent actors, for example with actors in the pure market (Petruzzelli et al. 2018). However, too much proximity can negatively affect learning and innovation because of a lack of flexibility. Too little proximity, on the other hand, leads to a lack of control and too much opportunism (Petruzzelli et al. 2018). Boschma (2005) suggests that grouping together people with a certain degree of cognitive proximity (though securing some cognitive distance) may be achieved either through organizational arrangements with more or less autonomous divisions within an organization, or through trust-based networks between organizations.

Social proximity

Social proximity is generally associated with personal relationships between actors at micro-level and arise from the idea that economic relations are to some extent embedded in social context (Uzzi, 1996; Boschma, 2005). These relationships may result from friendship or family ties but can also be revealed through past collaborations between actors (Petruzzelli et al. 2018). The literature suggests that the more socially embedded the relationships of a firm are, the more interactive learning, and the better its innovative performance. One of the reasons is that trust among the actors involved. Trust facilitates the exchange of tacit knowledge, something that is much more difficult to communicate and to trade through markets (Storper & Venables, 2004; Maskell & Malmberg, 1999). However, too much social proximity may lead to an overload of trust which weakens the innovative capacity of firms and may lead to lock-in. On the other hand, too little social proximity harms interactive learning and innovation due to a lack of trust and commitment (Boschma, 2005). In this light, Breschi and Lissoni (2002) found that social, rather than, geographical proximity, plays an important role in knowledge spillovers. Dense social networks not only provide the main channels for knowledge diffusion, they also produce most knowledge. These social networks may still be geographically localized, which means that the spillovers are localized as well (Boschma, 2005).

The role of social proximity is however highly related to the other dimensions of proximity. Organizational proximity may go along with a lack of social proximity, because both are characterized by strong ties between partners, although different mechanisms are involved (hierarchy and trust, respectively). Furthermore, social proximity may decrease cognitive proximity over a longer period of time whereas geographical proximity is most likely to stimulate social proximity because short geographical distances favour social interactions and trust building.

Institutional proximity

Whereas social proximity is associated with relationships on micro-level (friendship, kinship and past experiences), is institutional proximity based on the relations between actors that share the same norms, practices and incentives on macro-level. A common language, shared habits, a law system securing ownership and intellectual property rights, etc., they all provide a basis for economic co-ordination and interactive learning. A culture of shared trust, for instance, is often regarded as a capability that support learning and innovation: information is transmitted more easily with 'small cultural distance, common language and shared values' (Maskell & Malmberg, 1999). As a result, institutional,

organizational and social proximity are highly interconnected with one another. Especially since the ways how intra- and inter-organizational relations are governed are deeply embedded in institutional settings (Boschma, 2005). When there is too much institutional proximity, it negatively affects innovation due to institutional lock-in (obstructing awareness of new possibilities) and inertia (impeding the required institutional readjustments). Too little proximity, on the other hand, leads to a lack of social cohesion and common values (Boschma, 2005). As mentioned, institutional proximity is associated with other proximity dimensions such as organizational, social and also geographical. However, the extent to which this is noticeable depends on the type of institutions involved. Shared informal institutions that stimulate the everyday life are often geographically localized (in e.g. cities or municipalities), whereas the impacts of laws and regulations are more likely to operate nationwide or even beyond.

Geographical proximity

The final proximity dimension is geographical. Although a lot already has been written on the importance of spatial proximity in knowledge exchange, learning and innovation in this thesis, are there also examples of studies where the importance of low geographical proximity is emphasized. Geographical proximity therefore does not only refer to the spatial distance between economic actors in absolute terms, but also the distance in relative meaning. As we saw with localization and urbanization economies and the Jacobian and MAR spillovers, bring short distances people together, favour information contacts, and facilitate spillovers of tacit knowledge. However, when this exchange of information is not novel or varied, repeated local interaction may not only counter innovation, but can also stifle change (Gertler, 2003; Fitjar & Rodríguez-Pose, 2011). Therefore, the size of agglomerations is also important. Large agglomerations increase the likelihood of a variety of knowledge exchanges and limit the circulation of repetitive information. Smaller agglomerations may lack the possibility to renew knowledge and thus limit the scope for innovation (Asheim et al., 2007).

Bathelt et al (2004) state that the more codified the knowledge involved, the less space-sensitive knowledge creation processes tend to be. When the knowledge involved is diffuse and tacit, interaction and exchange is dependent on spatial proximity between the actors involved. The process of producing and using new knowledge involves a dynamic interplay between tacit and codified knowledge in almost all industries. Meaning that both forms of knowledge are complements, not substitutes, to each other (Gertler & Wolfe, 2005). Therefore, geographical proximity plays a complementary role in building a strengthening social, organizational, cognitive and institutional proximity (Boschma, 2005). This role is being further explained in the next section, in the concept of local buzz and global pipelines.

2.4 Local buzz and Global pipelines

Globalization has increased the importance of cross-border collaboration in innovation – both in obtaining inputs for innovation (ideas, finance, skills, technologies) from abroad and in exploiting its outputs (products and services, patents, licenses, etc.) in foreign markets (OECD, 2017a). The interaction between the different dimensions of proximity and partners within and outside the supply-chain work different from each other. Collaboration with partners within the supply-chain depends on the location of the suppliers and customers, which can be two kinds: (a) interaction when customers and suppliers are not located nearby, which means a lack of geographical proximity, but strong cognitive, organisational and, most likely, social and institutional proximity – so-called 'global pipelines' (Boschma, 2005; Fitjar & Rodríguez-Pose, 2013) and (b) interaction at close quarters, when different agents in the production chain share the same location, adding geographical proximity to all the other types of proximity. The feeling that 'something is in the air' (Gertler, 2003) is embodied in the concept of 'local buzz' which emphasises the importance of face-to-face contacts and geographical proximity in order to reap local spillovers and the tacit knowledge (Bathelt et al. 2004). Partnerships outside the supply-chain, thus those with competitors and rivals, will in all likelihood be much more constrained geographically (Fitjar & Rodríguez-Pose, 2013). The line of reasoning behind the concepts of local buzz and global pipelines is linked to writings on weak and strong ties (Granovetter, 1973), structural holes and network closures (Burt, 1992), and bridging and bonding social capital (Putnam, 2000). The following sections examine local buzz and global pipelines separately (see Figure 1).

Figure 1. Local Buzz and Global Pipelines (Bathelt et al., 2004)
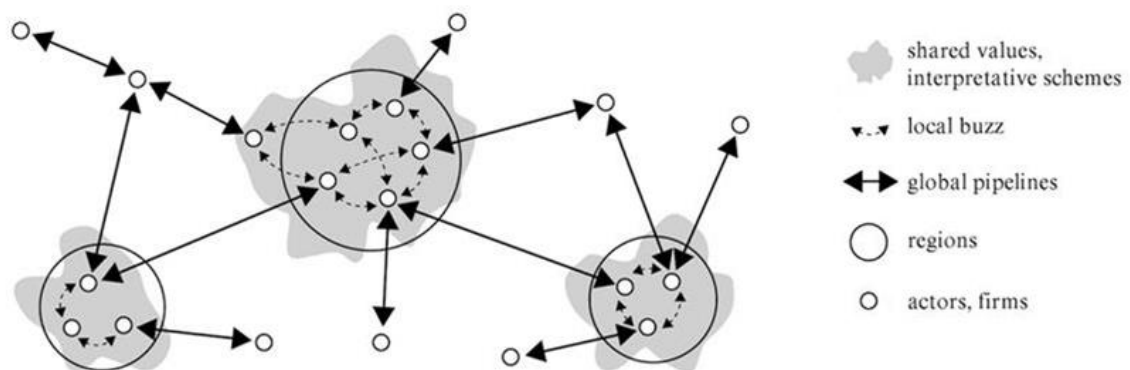
Local Buzz

'Local buzz' arise from both formal and planned, as well as, informal and unplanned forms of contact and originate from face-to-face contact, co-presence and co-location of people and firms within the same industry and place or region (Bathelt et al. 2004; Gertler & Wolfe, 2005; McCann, 2007). Bathelt et al (2004) state that '*buzz consists of specific information and continuous updates of this information, intended and unanticipated learning processes in organized and accidental meetings, the application of the same interpretative schemes and mutual understanding of new knowledge and technologies, as well as shared cultural traditions and habits within a particular technology field, which stimulate the establishment of conventions and other institutional arrangements*' (p. 38). Local buzz is beneficial to

innovation processes because it generates opportunities for a variety of spontaneous and unanticipated situations where firms interact and form interpretative communities (Nonaka et al., 2000). For example, Franke and Shah (2003) show that local buzz plays a role in the development of a product prototype, after which firms receive constructive ideas from peers and other community members for improvements. An example of these community members is the large group of middle and lower level managers and workers (Malmberg et al., 1996). They make up an important part of the formal and informal relationships between firms and are typically less mobile than top management and experts. It is argued that the larger the distance, the less the intensity of these positive externalities are, and the more difficult it becomes to transfer tacit knowledge (Howells, 2002).

Global Pipelines

Although the role of face-to-face networks within regional environments has often been addressed, argue others that the fortunes of regions are not only shaped by what is going on within them, but moreover by what is happing externally (Oinas, 2002; Coe et al., 2004; Dicken, 2005). These external linkages – called 'global pipelines' by Bathelt et al (2004) – may be with partners in other regions within the same national territory (Gertler & Wolfe, 2006) but increasingly occur on an international level (Bathelt et al., 2004). In order to avoid lock-in and decline, clusters depend on new knowledge and networks. According to Aarstad et al (2016), decisive, non-incremental knowledge flows are often generated through 'network pipelines' rather than through undirected, spontaneous 'local broadcasting'. Owen-Smith and Powell (2002) write in their paper that access to new knowledge results not just from local and regional interaction but is often acquired through strategic partnerships of interregional and international reach of such global pipelines.

Whereas the literature characterizes local buzz as being frequent, broad, relatively unstructured and largely 'automatic', are global pipelines seen as channels of communication and interaction between locally based firms in a region or cluster and selected partners outside the region. Global pipelines are constituted through *complex social processes*, which are often based on informal personal networks rather than only on formalized linkages. Lorenzen and Mudambi (2013) distinguished between organization-based and person-based global linkages. Moodysson (2008) showed that knowledge exchanges occur in carefully chosen, globally configured professional inter-personal communities or inter-organizational alliances.

Making a distinction here between the national level and the international level is critical. Especially since the national level still tends to provide a distinct and often dominant legal, institutional, social and cultural context (Lundvall, 1992; Trippl et al., 2009). Therefore, one can argue that international linkages are more likely to bridge different environments in various dimensions (cognitive, institutional, etc.) than national ones. However, this would also mean that these differences make establishing international networks more challenging (Leung, 2013). Yet, they might also provide innovation benefits from tapping into a new knowledge base. These network ties are valuable sources of new ideas, innovations and perspectives and are mostly discussed as formal firm networks (Fitjar & Huber, 2015) that offer access to knowledge and assets not available locally (Bathelt et al., 2004; Keskin, 2011). Pipelines to the

outside world are thus regarded as a key source for radical innovation while local interaction represents a more genuine vehicle for incremental innovation (Fitjar & Rodríguez-Pose, 2011). Trippl et al (2009) add, "*the more radical the innovation, the larger the variety of sources of knowledge and the stronger the diversity of mechanisms for transferring knowledge*" (p. 458). Bathelt et al (2004) argue that a large number of similar and related firms contribute to a more vibrate and valuable local buzz although this cannot function without the existence of global pipelines. With more similar firms, the potential for well-developed global pipelines are bigger and with more well-developed pipelines, the more refined the local buzz shall be. Therefore, it has been acknowledged that such ties need to be balanced between the local and the global (Nadvi & Halder, 2005). Global pipelines are only beneficial for the accumulation of knowledge if the cluster is either characterized by a high-quality local buzz or is small and weakly endowed in terms of knowledge (Morrison, Rabellotti & Zirulia, 2013).

Following the work of Bathelt et al (2004), researchers tried to demonstrate the existence of both global pipelines and local buzz in practice. Owen-Smith and Powell (2004) presented evidence of the presence of local buzz and global pipelines in a biotechnology cluster in Boston. They confirmed the importance of pipelines, showing that new and important knowledge is gained from knowledge sources outside the region. Fitjar and Rodríguez-Pose (2011) found that firm innovation in Norway is mainly driven by global pipelines, rather than by local interaction and the most innovative firms are those with a greater diversity of international partners. In their study, local and even national interaction seems to be irrelevant for innovation. Fitjar and Huber (2015) found that relations between Norwegian firms and global partners play an important role in innovation. In their paper they state that collaboration with foreign suppliers has a significant positive relationship with product innovation, while collaboration with foreign customers is significantly positively associated with radical product innovation and with process innovation. Conversely, collaboration with foreign competitors tends to be negatively related to innovation and radical product innovation. In the Netherlands, Bahlmann, Huysman, Elfring and Groenwegen (2009) found the existence of local buzz and global pipelines in a cluster of New Media in Amsterdam. Belderbos, Carree, and Lokshin (2004) find that R&D collaboration between Dutch firms and a supplier or competitor is associated with incremental product improvements whereas radical production innovation stems from relationships with universities. Benneworth and Hospers (2007) presented a case study where they considered universities as important players in regional innovation system in which they provide access to global pipelines and build up a network for local buzz. Oerlemans and Meeus (2005) use survey data from service and manufacturing firms to proof that close proximity between buyers and suppliers with innovative ties tends to result in these firms outperforming their less-connected peers. Other authors also found proof of the importance of highly formal global pipelines to the region and intensive local buzz interactions within the region (Breshnan, Gambardella & Saxenian, 2001; Uzzi, 1996). Also in case of the Salo region in Italy, Malinen and Simula (2005) confirmed the existence of local buzz and global pipelines and they state "that the co-existence of buzz and pipelines may provide firms located in outward looking and lively clusters with advantages not available to others".

2.5 Why firm size matters

Since the building of global pipelines is based on selecting specific partners that match the company's need outside the region, does it imply some sort of cognitive or organizational type of proximity (Fitjar & Rodríguez-Pose, 2013). However, identifying and connecting to appropriate knowledge partners abroad is not equally doable for all firms and seems to be a key challenge for many small and medium-sized enterprises (SMEs). As Figure 2 shows, large firms are more engaged in international collaboration networks for innovation than SMEs in all OECD countries.

Figure 2. Firms engaged in international collaboration for innovation, 2010-12 (OECD, 2017a)
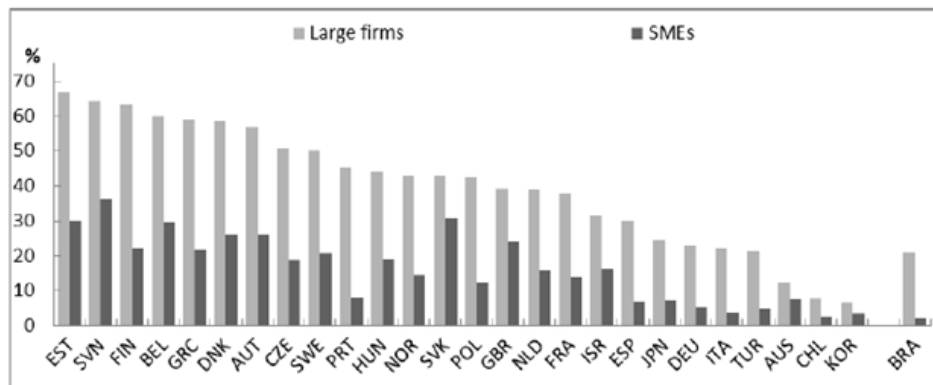
In general, SMEs innovate differently than larger firms and are often embedded in local systems that represent their primary source of knowledge, skills, finance, business opportunities and networks (OECD, 2017a). They have fewer resources, less R&D, and generally face more uncertainties and barriers to innovate and are therefore more dependent on external knowledge supply for their innovations (Tödtling & Kaufmann, 2001). Innovation by SMEs is therefore largely influenced by knowledge spillovers, access to networks and opportunities to partner with other players, including larger enterprises (OECD, 2017a). Oke, Burke and Myers (2007) found that SMEs tend to focus heavily on incremental, rather than radical innovation whereas large firms are considered to be positively related to radical innovation. Additionally, large firms are more involved in partnerships with STI-partners than SMEs (OECD, 2017b). Large firms have the ability to access key resources and employ larger R&D staff, which in turn allows the firm to generate and accumulate a larger store of analytical knowledge (McDermott & Prajogo, 2012).

The advantages of global pipelines are associated with the integration of multiple environments that open different potentialities and feed local interpretation and usage of knowledge hitherto residing elsewhere (Bathelt et al., 2004). The integration with these environments is however time consuming and involves costs. Actors need to make well calculated decisions about what global pipelines to address and how much knowledge to request. But there are also limitations to the amount of knowledge and linkages a firm can have simultaneously. The ability of firms to access such global pipelines and to identify both the location of external knowledge and its potential value depends on the internal organization of the firm (Bathelt et al., 2004). The next paragraph will elaborate on the absorptive capacity of the firm to handle and exploit information from abroad.

2.6 Cultural Intelligence: "Thinking about thinking"

In order to benefit from international collaboration, firms need to possess absorptive capacity, which refers to routines and processes through which firms acquire, assimilate, transform, and exploit knowledge (Cohen & Levinthal, 1990; Escribano, Fosfuri & Tribó, 2009; Gölgeci, Swiatowiec-Szczepanska & Raczkowski, 2017). In this train of thought, Earley and Ang (2003) developed the construct of cultural intelligence (CQ), which reflects "*an individual's capability to function and manage effectively in culturally diverse settings*". The relatively new concept has been widely discussed in the international human resources (e.g. Chen et al., 2010; Chen & Lin, 2013) and started to receive some attention in the (global) marketing literature (e.g. Magnusson et al., 2013). To my knowledge, the concept of CQ hasn't been used in the economic geography or innovation literature as such. The applicability of the concept for these fields of research lies in the fact that CQ acknowledges the practical realities of globalization and focuses on a specific domain – intercultural settings (Earley & Ang, 2003). Additionally, in contrast to other intelligences like general mental ability and emotional intelligence is CQ culture free.

Although participating in international networks for innovation not necessarily requires a deep understanding of different cultures, argues this thesis that firms with a higher motivational and metacognitive CQ engage more in international networks and perform better on innovation than those that score low on these dimension. For this, the following reasons can be given: Firstly, innovation, and the preceding creative process, is often a result of social interaction in which individuals are interacting, collaborating, and sharing ideas and solutions with others. Thus, the key to creativity is with whom and how people interact (Bogilović & Škerlavaj, 2015; Perry-Smith & Shalley, 2003). Knowing that global pipelines are constituted through *complex social processes* with international partners, increases the relevancy of knowing how to function in these culturally diverse settings. Secondly, innovativeness is distinct, but also embedded, in its cultural settings (Rujirawanich et al., 2011; Golgeci & Ponomarov 2013). One may argue that the ability of the firm to generate and sustain a competitive advantage (in this case through innovation and knowledge generation) is based on the skills and competences of its managers (Griffith & Hoppner, 2013). Thirdly, openness to experience – the tendency to be creative, imaginative and adventurous, values that are strongly linked to innovativeness, all relate to CQ (Ang et al., 2007).

Constructing CQ

The concept of cultural intelligence was initially conceptualized and empirically validated as a four-dimensional construct consisting of: (1) Motivational, (2) Behavioural, (3), Cognitive, and (4) Metacognitive dimensions (Earley and Ang, 2003; Ang et al., 2007). Ang et al (2007, p. 338) define each of the dimensions as follows: Motivational CQ reflects "*the capability to direct attention and energy toward learning about and functioning in situations characterized by cultural differences.*" Behavioral CQ reflects "*the capability to exhibit appropriate verbal and non-verbal actions when interacting with people of different cultures.*" Cognitive CQ entails "*knowledge of norms, practices, and conventions in different cultures. This includes knowledge of the economic, legal, and social systems of different*

cultures." Finally, metacognitive CQ refers to "*the mental processes that individuals use to acquire and understand cultural knowledge*" and "*relevant capabilities include planning, monitoring, and revising mental models of cultural norms for countries or groups of people*". Early empirical studies have examined all four dimensions and suggest that it is significantly related to an improved adjustment of expatriates (Wu & Ang, 2011), more positive outcomes in international negotiations (Imai & Gelfand, 2010), improved density of social networks (Fehr & Kuo, 2008), reduced stress from international travels (Ramsey et al., 2011) and enables managers in multinational corporations to implement organizational innovations more effectively (Elenkov & Manev, 2009). Charoensukmongkol (2015) found a positive association between the cultural intelligence of Thai manufacturing SMEs and the quality of the relationships with foreign customers, foreign suppliers, and foreign competitors. Other studies examined the four dimensions separately and found differential effects. For example, Ang et al (2007) found that metacognitive CQ is significantly related to cultural judgement and decision making, whereas motivational CQ is related to interactional adjustment and well-being. Motivational and metacognitive CQ are stated to be one of the most relevant predictors of effective performance outcome in a culturally diverse environment (Chua & Morris, 2009; Imai & Gelfand, 2010; Bogilović & Škerlavaj, 2015). Magnusson et al (2013) give three clear reasons why much of the existing literature focus primarily on metacognitive and motivational CQ: Firstly, metacognitive CQ is more than just knowledge (cognition) and behaviour because it includes the awareness of one's understanding of cultural differences, planning for how to use one's knowledge before an intercultural encounter, and adjusting assumptions when expectations and actual experiences differ (Ang et al., 2007). Secondly, motivational CQ does not capture a person's ability but is rather focused on the desire to gain understanding and knowledge of different cultures and a self-efficacy dimension (the belief in one's ability). Thirdly, the operationalization of cognitive and behavioural CQ is often perceived as more difficult and problematic. Assessments on both dimensions require respondents not just to tell about their knowledge and behaviours but rather require respondents to engage in problem-solving exercises and cultural sensitive behaviours (Magnusson et al., 2013).

In line with the above given argumentation, this thesis focuses on the motivational and metacognitive CQ dimensions of engaging in international networks and innovation. Both dimensions increase the individual's understanding of similarities and differences between culturally diverse colleagues from the East and the West (Earley & Ang, 2003). As a result, it is more likely that managers with a high motivational CQ are able develop positive relations with people from different cultures and to 'translate' ideas into concepts that could be applied in domestic situations. Individuals with high motivational CQ may look for opportunities to interact with people from a different cultural background as they value the benefits of cross-cultural interactions, tend to be more engaged in intercultural interactions, and are thus more likely to overcome obstacles, setbacks or failures due to cultural misunderstandings (Bogilović & Škerlavaj, 2015). On the other hand, metacognitive CQ is linked to having a greater capacity to be aware of other's cultural preferences and ability to questions cultural assumptions. Chua et al (2012, p. 117) describe metacognitive CQ as "*thinking about thinking, comprising the processes of monitoring and adjusting one's thoughts and strategies as one learns new skills*". Metacognitive skills positively impact individual creativity and creative thinking (Bogilović & Škerlavaj, 2015).

2.7 Hypotheses and Conceptual Model

The prior sections explained the theoretical framework of this research and showed that different concepts are required to understand the role of external knowledge sources in innovation. The theories used in this research will be summarized below and linked to hypotheses that are going to bested in chapter five and six. This paragraph concludes with a conceptual model.

In sum, two main partner types have been distinguished; those in the Doing, Using, and Interacting (DUI) mode of collaboration are suppliers, customers, competitors, and other firms in the same conglomerate. Typical outputs are incremental product or process innovations that come forth from the need of problem-solving when interacting with partners. The second type of partners are Scientific, Technology and Innovation (STI) partners. Scientific knowledge created by consultants, universities and research institutes may spillover to firms and lead to the development of new applications of already existing technologies and/or radically new technologies. In this light, the following hypotheses have been drafted:

- ***H1a****: Collaboration with DUI-partners is more important for incremental product and process innovations than radical product and process innovations.*
- ***H1b****: Collaboration with STI-partners is more important for radical product and process innovations than incremental product and process innovations.*

Collaboration with these DUI and STI-partners happens on four spatial scales. Firstly, on local level with partners in the same city or province. Secondly, on regional level with partners in the same region (e.g. north, south). Thirdly, on inter-regional level, these are national ties with partners elsewhere in Thailand. Fourthly, on international level with partners located outside Thailand. Engaging in these external partnerships is important for firms to acquire new knowledge and to avoid lock-in and decline. Especially the importance of partnerships on international level for innovation and knowledge creation has received increasingly attention in the literature and this thesis therefore argues that they are more relevant and vital for innovative firms than for non-innovative ones. Non-innovative firms have less need to source cutting-edge knowledge internationally. Furthermore, product innovation is positively associated with exporting. Since non-innovative firms do not tend to introduce new products, services or processes in foreign countries, networks are less important for market entry. The hypothesis therefore is:

- ***H2a:*** *Collaborating with international partners is more important for innovative firms than for non-innovative firms.*

Additionally, one can expect that international networks are more important for radically innovative firms than for incrementally innovative firms. External cooperation and access to cutting-edge technological or market knowledge tends to be more essential for radical innovation than for incremental innovation (Tether, 2002). Moreover, radically innovative firms are more likely to enter international markets, which make international networks more likely to be useful for accessing market knowledge and serving international markets (Huber, 2013). The following hypothesis will be tested in this research:

- **H2b**: *Collaborating with international partners is more important for radically innovative firms than for incrementally innovative firms.*

The quality of these network linkages depends on whether the partners are cognitive, institutional, organizational, social and geographical close to the firm. Although proximity in all five dimensions to a certain degree is preferred, has too much proximity a negative influence on the quality of knowledge creation between firm and partner. Too little proximity, on the other hand, also negatively influences knowledge creation. The right balance is thus needed to ensure a healthy collaboration in which partners trust each other and where both parties reap the benefits of working together but which simultaneously leaves enough room for other sources of knowledge and avoid becoming locked-in in existing knowledge circuits. The selection of partners abroad requires firms to invest time and resources in purposely selecting partners that fit the firm's capacity to cope with these proximity advantages and limitations. This process of identifying and connecting to the appropriate knowledge partners is not self-evident for all firms. As stated, SMEs innovate differently than larger firms and are often embedded in local rather than international systems, focus on incremental rather than radical innovations, and are less involved in STI-partnerships than large firms (OECD, 2017a). This leads to the following two hypotheses:

- **H3a**: *SMEs are more linked to incremental innovations than radical innovations whereas large firms are more linked to radical innovations than incremental innovations*
- **H3b**: *Collaboration with DUI-partners for innovation is more important for SMEs than for large firms whereas collaboration with STI-partners for innovation is more important for large firms than for SMEs*

Additionally, SMEs generally have less resources to address this process than large firms. Therefore, SMEs are more often embedded in local systems that represent their primary source of knowledge skills and networks. Large firms, on the other hand, are better able to reap the benefits from international network ties since they have better access to key resources and employ larger R&D staff. Therefore, the following hypothesis has been drafted:

- **H3c**: *Collaboration with international partners for innovation is more important for large firms than for SMEs whereas collaboration with local partners for innovation is more important for SMEs than for large firms*

Collaborations with international partners are only fruitful when firms know where to look for information and how to absorb this. This thesis argues that a high motivational and metacognitive cultural intelligence (CQ) positively contributes to engaging in international network linkages and to innovation. Individuals with a high motivational CQ to tend to be more engaged in intercultural interactions whereas metacognitive CQ is linked to individual creativity and creative thinking (Bogilović & Škerlavaj, 2015). Therefore, the following two hypotheses have been drafted.

- **H4a:** *Collaboration with international partners for innovation is more prevalent for firms with a high motivational CQ than firms with a low motivational CQ*
- **H4b:** *Firms with a high metacognitive CQ are more innovative than firms with a low metacognitive CQ*

Figure 3 illustrates the conceptual model that emerges from the concepts discussed in this chapter, including the created hypotheses.

Figure 3. Conceptual Model
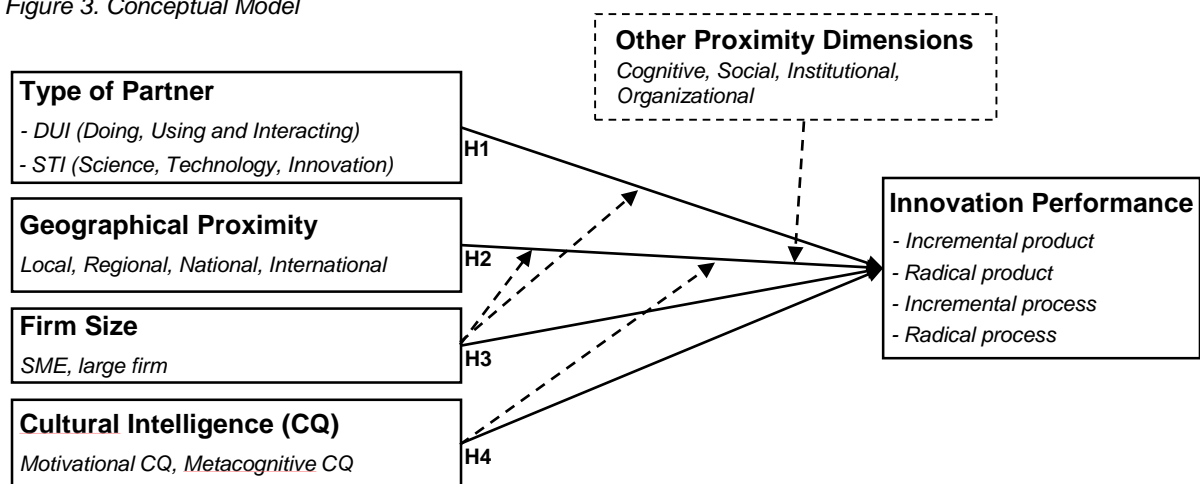
Chapter 3: Methodology

"All geographers undertaking fieldwork overseas [or in more local 'different' cultures] need to be sensitive to local attitudes and customs, in a manner that respects the cultural as well as the physical environments you encounter".

<div align="right">Professor David Nash (2000) on fieldwork in 'different' cultures</div>

This chapter explains the methodology used in this research. Paragraph one and two examine the mixed methods used in this research strategy and the research design. Paragraph three explains the main research material: an online questionnaire and interviews. Paragraph four discusses the methodological limitations and its justifications. This chapter ends with paragraph five in which is explained how the results in the following chapters can be interpret.

3.1 Mixed methods

In order to answer the research questions, comprehensive and thorough research has been conducted in the form of a quantitative and qualitative research methods. This mixed methods research means combining the strengths of both approaches in order to best understand research problems. The most used definition of mixed methods (or mixed research) is "*research in which the inquirer or investigator collects and analyzes data, integrates the findings, and draws inferences using both qualitative and quantitative approaches or methods in a single study or a program of study*" (Given, 2008; Johnson, Onwuegbuzie & Turner, 2007). The integration of both quantitative and qualitative approaches permits a more complete and synergistic utilization of data and provides a more complete understanding of the research problem than either approach could do alone (Given, 2008; Wisdom & Creswell, 2013). Quantitative research methods are beneficial for testing and describing predefined concepts through a quantitative data collection (Baarda, 2009). In this research, quantitative data has been collected to test the previously drafted hypotheses. This research has an explanatory nature, which aims to identify the existence of significant relations between the four independent variables (type of partner, geographical proximity, firm size, and cultural intelligence) and innovation performance.

Additionally, the use of qualitative research methods allows for gathering more contextual and detailed data such as patterns, perspectives and perceptions (Harrell & Bradley, 2009). Due to the complexity of innovation and network linkages this is beneficial for understanding how firms in Thailand do innovation and how other actors are involved. Both the quantitative as well as the qualitative data has been collected roughly at the same time and merged in order to provide a comprehensive analysis of the research. In this convergent parallel mixed methods design are contradictions or incongruent findings explained. This design views mixed methods as an umbrella term that includes a research method of data collection and analysis (Creswell, 2014).

Advantages & limitations

Using a mixed methods approach has several advantages. Firstly, mixed methods are especially useful in understanding contradictions between quantitative results and qualitative findings. Secondly, it

involves the participants' point of view and ensure that study findings are grounded in their experiences. Thirdly, mixed methods are flexible and adaptable to many study designs which enables it to obtain more information than can be done in either method alone. Fourthly, it collects rich and comprehensive data to provide a more complete story than either quantitative or qualitative could do alone (Wisdom & Creswell, 2013).

However, the usage of mixed methods also has some limitations. For instance, it increases the complexity of evaluations. Mixed methods require careful planning to describe all aspects of research (e.g. the study sample for qualitative and quantitative portions, timing, and the plan for integrating data) which makes them complex to plan and to conduct. Secondly, mixed methods is labour intensive that requires greater resources and time than those needed to conduct a single method study (Wisdom & Creswell, 2013). Due to the complexities in conducting mixed methods research, academics are concerned that the qualitative share will be regarded as secondary status in mixed methods experiments that include a small, embedded qualitative component (Given, 2008).

3.2 Single instrumental case study

Mixed methods research works particularly well for case study research as it allows the researcher to apply either quantitative or qualitative methods, or quantitative and qualitative methods to the data (Mills et al, 2010). In a case study the emphasis is normally not being put on the case itself but is also the context in which the case lies involved in the research. This makes the research less abstract and allows the researcher to consider closely related characteristics of the phenomena being researched as well (Bryman, 2012). According to Yin (2003), a case study is the most likely to be used appropriate for questions that start with "how" and "why". Additionally, it can be used to give a detailed description of one or multiple cases, that will help to understand a certain program, activity or event (Creswell, 2007). Since the focus of the research was already known in advance and designed around established theory or methods, a single instrumental case study has been done. Contrary to a multiple case study, a single case study design enables the researcher to gain a better understanding of the main problem and allows the researcher to explain not just what is happening but also why it is happening (Kitchin & Tate 2013). In an instrumental case study, the case itself is secondary to understanding a particular phenomenon (Mills et al., 2010). One of the main benefits of using such a design is that the researcher has the time to understand and to discover the various different aspects of a particular case. Secondly, it allows the researcher to use different types of sources and data collection strategies due to the complexity of a particular case (Kitchin & Tate, 2013). These different sources and strategies contribute to the triangulation of data and methods, and therefore, the validity and credibility of the results (Given, 2008; Verschuren & Doorewaard, 2010).

However, the level of generalizability of an instrumental case study design is questionable. Case work in general does not fit well into conventional notions of generalization and the instrumental case should be primarily about the extension of experience. However, patterns and themes may be compared with

other cases where the same phenomenon has been explored to emphasize the transferability of the case findings. Therefore, richness should be emphasized rather than generalizability (Mills et al., 2010).

3.3 Research material and data collection

Different types of research material are being used to triangulate the findings in this research. Triangulation was first coined by Denzin (1978) as "*the combination of methodologies in the study of the same phenomenon*" (p. 291 – see Johnson et al., 2007). Here, a division was made between within-methods and between-methods triangulation. Within-methods triangulation refers to the use of multiple quantitative or multiple qualitative approaches, whereas between-methods triangulation involves the use of both quantitative and qualitative approaches (Johnson et al., 2007). The latter method can be achieved through mixed methods research in a single instrumental case study.

Yin (2003) advises to use six types of information in a case study design like this. These are: documents, archival records, direct observations, participant observations, interviews, and physical artefacts. Each information source has its advantages and disadvantages and work complementary to each other. The main goal of using these different types of research material is data-triangulation: using more than one source in order to strengthen the opinions and conclusions (Baarda, de Goede & Teunissen, 2009; Given, 2008). The most information in this research is being collected through documents, which were used in the first phase of the research to determine the theoretical framework of the study. Documents can be divided into primary and secondary publications. Primary publications are academic papers, books, and policy- and governmental publications whereas secondary publications are newspaper articles and magazines. In this research, primary publications will be used to support statements and opinions whereas secondary publications are being used as instigator for further research through primary publications. These documents were acquired through internet searches and the RU online library. Documents are useful sources, even though they are not always accurate and may not be lacking in bias (Yin, 2003). Finally, one of the most important sources of case study information are interviews. The advantages of doing interviews is the possibility to discuss other aspects that don't align directly with the literature (Yin, 2003; Baarda et al., 2009).

The main data sources used for triangulation in this research are semi-structured interviews, an online questionnaire and primary documents. The next paragraphs give a more detailed insight in two of the three: semi-structured interviews and the online questionnaire.

3.3.1   Online questionnaire

In order to collect sufficient data, a questionnaire was created and distributed among managers of firms in Thailand (see *Appendix A: Questionnaire*). Fitjar and Rodríguez-Pose (2011) state that the use of quantitative methods to reveal the systems through which firms innovate has been largely overlooked. Much of the information on learning processes has been extracted from case studies which generally include interviews with key actors and surveys of representative firms. Although this approach gives an adequate insight in the interaction among different economic actors locally and beyond, does it not

always answers the question to what extent they are relevant for all local firms. The collection of quantitative data complements qualitative data in providing a useful understanding of innovation (Wolfe & Gertler, 2004; Fitjar & Rodríguez-Pose, 2011).

Construction Questionnaire

In constructing a questionnaire, one of the most important elements is the wording and language of the questions. Questionnaires should use language that is understandable for respondents Brislin (1986) suggests to avoid metaphors and colloquialisms; use simple, short sentences in active voice (rather than passive voice); repeat nouns instead of using pronouns; use specific rather than general and/or vague terms; and avoid complex sentence structures (as cited in Baumgartner & Weijters, 2017). A decentred approach of questionnaire building was used and the questionnaire was available in both Thai and English. This so-called "decentring" is defined as the simultaneous development of the same instrument in several languages and/or cultures from the initiation of the project (Baumgartner & Weijters 2017). The questionnaire was first created in English after which the questions were translated in close collaboration of a Thai native colleague to ensure meaning equivalence across both English and Thai language versions (Baumgartner & Weijters 2017; Davidov, Meuleman & Cieciuch, 2014; Smith, 2004). Secondly, the separate questions were translated back to English and possible incidental differences based on a comparison of the initial and the back-translated questionnaire were resolved. This translation/back-translation procedure was used to ensure that the content of the English origin stayed the same and to reduce the risk of translation errors (Baumgartner & Weijters 2017).

Another aspect to keep in mind is the sequencing of questions. A questionnaire should start with an introduction to the research in which aspects like the organization and person conducting the questionnaire is named, purpose of the research is explained, cooperation is requested and the degree of confidentiality is indicated (Given, 2008). Furthermore, opening questions should be pleasant, easy, interesting, broadly applicable, and relate to the introduction and study objectives. The methods mentioned above all contribute to an increased validity and reliability of the research. Internal validity is achieved when the survey's questions and answers accurately measure or reflect what the investigators want to know and are not distorted by some other factor. External validity refers to how representative a sample of the population is (see paragraph 4.3) (Given, 2008).

To construct the questionnaire used in this research, the survey of Fitjar and Huber (2015) was used as guideline. Already in an early phase of the research they were contacted and asked whether they would be willing to share the survey used for their paper. Their research was on the effect of global pipelines for innovation in Norway and contained both quantitative data from a telephone survey and a questionnaire. Their survey had two stages. In the first stage, an external third-party completed telephone surveys with managers of 1600 Norwegian firms. Secondly, after the call the interviewees were asked to fill out an additional online questionnaire. Due to a limitation in time, the questionnaires in this research has been distributed directly to the firms without an initial phone survey. The next paragraph elaborates on the research unit used in this thesis.

Research unit and sampling

For the quantitative data collection, a random sampling strategy was used to find suitable companies for the questionnaire (Robinson, 2014). Through the BOI, a directory was acquired that consisted of more than 10.000 names of foreign companies that have entered Thailand through the BOI until 2014-2015 (BOI, 2015). It gave an overview of businesses in seven separate industries: 1) agriculture and agricultural products, 2) mining, ceramics and basis metals, 3) light industry, 4) metal products, machinery and transport equipment, 5) electronic industry and electrical appliance, 6) chemicals, paper and plastics, and 7) service and public utilities. Unfortunately, not all the firms were included with e-mail addresses and of those available, many were double or not working. Ultimately, a final list remained of 2000 companies in Thailand. The firm's manager received an e-mail in both Thai and English in which their participation was requested in an online questionnaire. Figure 4 gives an overview of the 2000 companies that have been approached divided by their respective sectors.

Figure 4. Companies approached through Board of Investment Thailand divided by sector

- 1. Agriculture and Agricultural Products
- 2. Mining, Ceramics and Basis Metals
- 3. Light Industry
- 4. Metal Products, Machinery and Transport Equipment
- 5. Electronic Industry and Electrical Appliance
- 6. Chemicals, Paper and Plastics
- 7. Service and Public Utilities

The online questionnaire was created through Qualtrics and consisted of 18 questions. No additional incentive was given to those that participated and after 1.5 month (open from 10 August till 26 September) the questionnaire closed. In total, 259 companies opened the questionnaire of which 142 companies successfully completed the questionnaire (117 managers dropped out during the survey). The questionnaire had a response rate of 7.1%, which coincidentally aligns with the 'guideline'-questionnaire of Fitjar and Huber (2015). In their research, 418 managers completed both the telephone interview and the web questionnaire, a response rate of 7.1% from their initial random sample. Although this response rate seems low, is it comparable with other small innovation surveys. For instance, Caloghirou, Kastelli and Tsakanikas (2004) had a response rate of 9.6% (558 responses) in their postal survey, Trippl et al (2009) had a rate of 7% (73 responses) in an online survey and Tödtling, Lehner and Trippl (2006) had a response rate of 8.5% (189 responses) in a postal survey in Austria. Additionally, a study by Charoensukmongkol (2015) yielded a 12.9% response rate (129 responses) for his study on the effect of CQ on the usage of international networks among manufacturing companies in Thailand.

3.3.2   Semi-structured expert interviews

Additionally, six semi-structured expert interviews were conducted to collect qualitative data. Prior to the interviews, a list of topics to be covered was created and used during the interview (see *Appendix B: Interview guide*) (Given, 2008). The interviewees were encouraged to talk in depth about the main

subject of that interview and the questions were asked in in a semi-structured manner. It was semi-structured in a way that open-ended questions were used to steer the direction of the interview but which simultaneously left room for the interviewees to explore issues they felt that were important. By doing so, the interviews unfolded in conversational two-way communication without putting too much emphasises on the use of predetermined, focused, short-answer questions (Given, 2008; Kitchin & Tate, 2013). Each interview took approximately 1 to 2 hours on average and all interviews were conducted on location of the interviewee in Thailand. Each interview was recorded and transcribed in Microsoft OneNote. The reason for choosing this program is that it allows the transcriber to simultaneously listen to the audio file while transcribing the interview in the same program. When transcribing, the program automatically keeps track of the time when you enter the text in the program and anything typed is linked. This user-friendly way of transcribing enables the user to re-use certain statements easily and quick.

Research unit and sampling

To select the interviewees, a purposive sampling strategy was used. This is a non-random way to ensure that particular experts are represented in the data collection. The reason for such a strategy is that, based on the theoretical framework, some individuals may have a unique, different or important perspective on the phenomenon being studied (Robinson, 2014). These experts are often people of high economic, social, or political standing and who are chosen for a particular reason, rather than randomly or anonymously (Yin, 2003; Baarda et al., 2009) and varied in this study from businessmen to representatives of research institutes and semi-governmental institutions. The selected interviewees are significant samples: chosen for their theoretical significance, and are known for their contribution to a particular topic, field or study (Simonton, 1999). In case of this research, they all have a strong link to innovation and network linkages. Robinson (2014) states that this sampling strategy is most suitable for single case studies. Below the interviewees will be briefly introduced.

Manager at the National Innovation Agency (NIA)

The NIA is a public organization under the umbrella of the Ministry of Science and Technology and focuses on developing Thailand's innovation ecosystem by partnering with different organizations from various fields such as academia, technology, industry, finance and investment. The goal of the interview was to tap into their expertise in the field of partnering and networking for innovation. Date interview: 9th of August 2018.

Policy Developer, National Science Technology and Innovation Policy Office (STI)

The STI is an organization that formulates strategic policies and frameworks for science, technology and innovation. It facilitates academic, research and development collaboration among government agencies, academic institutes, research organizations and industry within and outside Thailand. The goal of the interview was to find out more about the science, technology and innovation institutions in the country and how they collaborate with the industry. Date interview: 17th of August 2018.

Peerayuth Charoensukmongkol, Ph.D. Assistant Professor at ICO NIDA

ICO NIDA, The National Institute of Development Administration, is a public graduate university in Thailand aimed to serve economics and social development. Mr. Charoensukmongkol wrote several papers about cultural intelligence and its effect on export performance and international network ties in a Thai context. The goal of the interview was to find out more about the role of CQ in international network ties and its possible relevancy for innovation in Thailand. Date interview: 20th of August 2018.

SME and MNE

In this research I also interviewed two representatives from Dutch companies in Thailand. Both parties preferred to be mentioned anonymously in the research and I refer to them as SME and MNE. SME was the CEO of a small and medium-sized firm, whereas MNE is an innovation manager in a multinational corporation. Both parties were interviewed for insights in innovation in their respective companies and enabled me to see first-hand differences between a SME and MNE. The goal of these interviews was to see whether their opinions and views aligned with the published questionnaire and to acquire more detailed background information on the usage of specific partners. Date interviews: 22nd and 29th of August 2018.

Somchai Jitsuchon, Ph.D., Research Director at the Thailand Development Research Institute (TDRI)

The TDRI is a non-profit non-government Thai policy think tank focused on social and economic development issues. Mr. Jitsuchon is specialized in macroeconomics, inclusive growth, poverty, social welfare, and wrote an article about the middle-income trap in Thailand. The reason for the interview with Mr. Jitsuchon was the relevancy of his paper on the MIT and the main reasons this could have been avoided. Date interview: 24th of August 2018.

3.4 Methodological limitations and justifications

Although the usage of interviews and online questionnaires are widely seen as valid methods to collect data, are they not without their criticisms. Below the limitations of both online questionnaires as interviews will be discussed.

Bias

In addition to the limitation for mixed methods mentioned earlier in this chapter, exist some general pitfalls that require attention. The first concern is the possibility of bias. According to Given (2008), "*researchers may show bias when they reach conclusions that ignore contradictory data or when the collection and analysis of data are designed to lead to predetermined conclusions.*" (p. 60). Biases can occur in both qualitative and quantitative research and come forth from decisions around research method, population sampling, and other design issues.

In quantitative methods, several methods and tests can be conducted to maximize confidence concerning reliable and valid findings. In qualitative research are biases often assessed in the context of the research and acknowledged and managed in the limitations of the research design. The perception of bias is most likely to appear when research challenges a particular status quo. Although

this did not appear in the interviews conducted for this research, did it affect the sampling of possible interviewees. Representatives from semi-government and Thai firms were difficult to get a hold of for interviews. Furthermore, the output of two firm representatives are treated confidentially. Here, the fear of giving sensitive information to possible competitors led to the decision to add the participants anonymously and to treat the data confidential. Although biases affect the outcomes of researches has it been argued that these are in-fact unavoidable. Since researchers are not value-free, personal and political views will enter a research agenda (Given, 2008). It is therefore important that researchers are aware of their values and predispositions and acknowledge them as inseparable from the research process. Looking for contradictory data and alternative interpretations of data help to manage bias. Although many of the social sciences aspire to objectivity, social scientists should acknowledge their own subjectivity in the research process. Additionally, triangulation is a valid method to minimize this effect (see paragraph 3.3) (Given, 2008).

Online questionnaire

Questionnaires are one of the most (if not the most) used methods in quantitative data collection. It is an affordable and practical way to collect data from a large group of individuals. However, questionnaires also have its limitations. Three sources of error have been distinguished by De Schrijver (2012): unit non-response, item non-response, and dishonesty. The first error refers to respondents refusing to participate in the questionnaire. Overall, the majority of recipients that received an invitation to participate did not follow up the request. The reasons for not participating can vary widely and are difficult to track down. However, it is very likely that companies that don't innovate are less likely to participate in a questionnaire about innovation. Also, the fact that there was no additional incentive (like a gift or discount voucher) makes participation less attractive.

A second possible error is the 'item non-response'. This occurs when participants refuse to answer a particular or set of question(s). An explanation may be that the subject of the question is sensitive, that the respondent does not know the answer or that the question is not clear. Some survey software programs allow the researcher to 'force' participants to answer certain questions. In this research, all questions were required to fill out in order to continue.

This brings us to the third error, dishonesty. Two types of behaviour are linked to giving dishonest answers: socially desirable behaviour and socially undesired behaviour. The first may be the over-reporting of certain things such as voting, seat-belt usage, and charitable giving. The latter one refers to under-reporting activities such as drug usage and alcohol consumption (Bradburn, Sudman, & Wansink, 2004). Dishonesty can also occur prior to the start of the questionnaire. When for instance asking for the input of business managers, there is no guarantee that they are the ones who actually fill out the questionnaire. The problem with systematic non-response and misreporting is that these lead to an over- or under-estimation of the behaviour under study, which then suggests false relationships between variables and leads to wrong conclusions (De Schrijver, 2012). Although participants often deliberately choose to give a dishonest answer in questionnaires, is this not always the case. In context of this research, over- and under-estimation of behaviour might affect the findings regarding the

influence of cultural intelligence on innovation. Not because participants deliberately give dishonest answers, but merely because they inaccurately estimate their own abilities. For the construct of metacognitive and motivational CQ, respondents were asked to indicate to what extent they agreed with a total of eight items on a 7-point Likert scale. Kruger and Dunning (1999) state that the skills needed to competently perform in a particular domain are often the same skills that are needed to accurately self-assess one's performance in that domain. Thus those that are unskilled in a particular domain, often also lack the metacognitive ability to judge their own ability in that domain.

Although errors like the ones mentioned in this paragraph cannot be totally avoided, may the assurance of confidentiality and anonymity, and the order and wording of the questions help to minimize the likelihood of such errors (Bradburn, Sudman, & Wansink, 2004). Additionally, qualitative data can be used to triangulate the findings (Given, 2008).

Semi-structured interviews

In addition to the collection of data through an online questionnaire, interviews were conducted. Although interviews are a great source for in-depth information, are they, just as with questionnaires, not without limitations. A first point is that interviews provide limited opportunity for interpretation by the researcher. This is because recalling an experience in an interview does not replicate actual observation of the experience or provide insight into the intentions or motivations of the various actors involved. In context of this research, it is very difficult to measure the importance of partners for innovation. As we saw in chapter 2.2, are knowledge exchange, interactive learning, and innovation in itself complicated processes that are difficult to address through interviews. Therefore, relying on interviews as the sole method of data collection might not allow a full investigation of the topic because the participant and researcher are limited by the recall of the participant (Given, 2008). Or to put it in the words of Michael Polanyi "*we know more than we can tell*" (1966, p. 4). As such, this thesis combines the usage of interviews with other forms of data.

Secondly, the researcher is dependent on access to sources that particular individuals hold (Harrell & Bradley, 2009). These sources often take form in terms of tacit knowledge and it is not always easy to get access to these knowledge sources. Once access has been received, the issue of confidentiality may be involved. Here, the background of the interviewee plays an important role. Academics didn't have any problem with being cited whereas those working for business didn't want to be cited at all. By guaranteeing anonymity, people are generally more willing to share information and personal opinions (van den Hoonaard, 1997).

A third limitation is the so-called observer bias, meaning that interviewees behave differently when they know that they are being interviewed for research and tend to give politically correct answers instead of their personal beliefs or perceptions (Given, 2008; Harrell & Bradley, 2009). Additionally, biased outcomes can come forth from interviews due to the wording of the interview questions or sampling. The wording of questions requires careful consideration in order to avoid biased responses (Given, 2008). In this research, questions were adapted to each interviewee in order to collect the most valuable

information and to avoid biased questioning. Furthermore, since the interviewees participated voluntarily, might self-selection bias occur. Individuals that voluntarily participate in interviews are different than those who deliberately choose not to participate (Costigan & Cox, 2001).

Despite the limitations discussed in this chapter, both data collection methods are considered as reliable and are frequently used in academic research. Therefore, this thesis uses both an online questionnaire as well as semi-structured expert interviews for its data collection.

Chapter 4: Thailand, a country profile

"Thai labour costs are not cheap and we are trapped in a middle-income sandwich"

Bonggot Anuroj (2017), deputy secretary general at the BOI

In this chapter, some causes for Thailand being stuck in the middle-income trap are being examined, which are complemented by findings from the interviews. The interviews with representatives from the NIA, STI and Mr. Jitsuchon (TDRI) proved to be very useful for analysing the current status of innovation in Thailand and the obstacles the country deals with. In the third paragraph, the respondents from the questionnaire will be introduced. This chapter will be finalized with a conclusion in paragraph four.

4.1 The Thai Middle-Income Trap and Thailand 4.0

As already indicated in the introduction of this research, Thailand depended too long on the model that lifted it out of poverty and proved to be unable to tap along into the production of innovation-based products and services. Not being able to catch up with high-value countries like Japan and Korea led to the Thai middle-income trap (Jarasooriya, 2017). In Thailand, the trap seems to relate to an institutional failure, reflected in long-standing educational shortcomings. Warr (2011, p.3) states that reforming Thailand's primary and secondary education system is the single greatest impediment to long-term economic progress in the country. Jitsuchon (2012) also identifies education as a key factor underpinning the MIT in Thailand but widens this by embracing human capital as in skills, tertiary education and R&D. In short, he gives the following reasons:

- Labour shortage – both skilled and unskilled;
- Incomplete market – supply of public training for unskilled does not meet demand;
- Education – educational system is unable to prepare graduates for the labour market;
- Low level of R&D activities and spending;
- Natural resources almost exhausted;
- Difficult to maintain macro-economic stability;
- Fiscal structure – lack of resources to invest in tax infrastructure and social programs;
- Monopolistic power among state owned enterprises and regulations prohibiting full competition;
- Dichotomous private sector – few global firms, and small and medium-sized enterprises (SMEs) are locked into low levels of innovation.

As final obstacle to long-term growth mentions Jitsuchon (2012) the country's institutional weakness. He states that all the above mentioned issues can basically be seen as failures on the part of those who are responsible for making crucial policy choices. As an example he mentions the lack of proactive innovation and R&D policies: "*There is simply no political will to make the country more innovative*" (Jitsuchon, 2012, p.16). However, four years after Jitsuchon's paper was published, the Thai government laid out its long-term economic goals in its 20-Year National Strategy (2017 – 2036) to overcome the middle-income trap. The plan addresses reforms to improve economic stability, human capital, equal economic opportunities, environmental sustainability, competitiveness, and effective

government bureaucracies. Simultaneously, the 'Thailand 4.0' strategy was launched: an economic model based on creativity, innovation, new technology and high-quality services. The first Thai economic model (Thailand 1.0) focused on the agricultural sector that was characterised by farmer mechanization and increased yields for agriculture. Later, Thailand 2.0 focused on light industry and utilized cheap labour to turn raw materials into finished goods for production and manufacturing such as textiles and garments. The government says Thailand is now in the era of Thailand 3.0, an era aimed at advanced industries with the assembly and production of products such as computer disks, electrical components and automobiles for export (Bangkok Post, 2017).

Shortly after Thailand 4.0 was presented, critics questioned whether the right local conditions were in place to achieve this progressive plan and whether Thailand is not punching above its own weight. An often heard doubt regards the emphasises on foreign direct investment (FDI) and infrastructural projects, whereas FDI attraction without building local technological capability can only take you so far. It has been argued that the plan is likely to overshoot its mark by not focusing enough on the development of human capital (Jitsuchon, 2012; Rattanakhamfu, 2017; Sachdev, 2018). Desatova (2018) goes even further and argues that Thailand 4.0 is an exercise of internal nation branding. Her interviews with different stakeholders suggest that many ministries in Thailand themselves were confused about what Thailand 4.0 was and how to achieve it. When she asked Dr. Suvit Maesincee, Thailand's Minister of Science and Technology, about examples of actual policies that would underpin the Thailand 4.0 project, Suvit did not have concrete answers; he added that policy creation was the responsibility of individual ministries (Interview, 25 July 2016 – as quoted in Desatova, 2018). Additionally, in the Bangkok Post (2017), Jitsuchon pointed out the bureaucratic nature of the Thai government administration. Every action plan is set to be done by several ministries, all of which are big, clumsily-run organizations, making the creation of such plans slow. Thus, although the Thailand 4.0 strategy seems to be a first step in the right direction does it require some clarification for the broad range of stakeholders involved.

Yet, one often heard doubt refers to the current lack of technical expertise and skilled workers. Jitsuchon states, "*It is completely true that we need innovations to create added value to flee the middle income trap, but we need to rethink whether Thailand 4.0 is a model that matches what we have now*" (2012). The country lacks the specialists and experts needed to modernise Thai industries, especially those in the field of high-technology. He states that most of the human resources in Thailand are still in the era of 3.0, working in large enterprises with traditional bureaucratic styles that cannot adapt easily. However, some companies that successfully entered high-tech production, ran into a lack of manpower with the skills and ingenuity needed to handle the machines or to internationalize their business via online channels. These online channels play an important role in driving Thailand into the innovative era of 4.0. However, one major backlash is that only 56% of Thailand's population has access to the internet. Additionally, only 45.5 % of Thai firms has their own website and only 52.9% of firms uses e-mail to interact with clients and suppliers (World Bank, 2016a). A survey from the global employment service operator Manpower Group found that Thailand is not ready to move to 4.0 due to a lack of a

qualified workforce. According to Suthida Kanjanakantikul, marketing manager at Manpower Group, are most workers stuck in the past and is half of the population not able to access the internet.

4.2 Innovation in Thailand

Jitsuchon (2012) states that one of the reasons for the middle-income trap in Thailand is the low level of R&D activities and spending, which are considered to be one of the main drivers of firm-level innovations. Thailand has been lagging behind many countries in the region in terms of R&D spending as part of GDP and the country's innovation performance has not materially changed over the past five years. Figure 5 shows that Thailand spends only 0.37% of its GDP on R&D, which is the same as India, a lower-middle income country. China, a country with a lower per capita GDP, spends almost six times as much on R&D as a percentage of GDP. In 2012, Thailand's Global Innovation index score was 36.9 (out of 100). It has only inched up since, to 37.6 by 2017, placing the country in 51st place out of 127. In contrast, Vietnam's score increased quite rapidly, from 33.9 in 2012 to 38.3 in 2017, overtaking Thailand's.

Figure 5. Research and development expenditure in 2015 (% of GDP) (World Bank, 2017b)
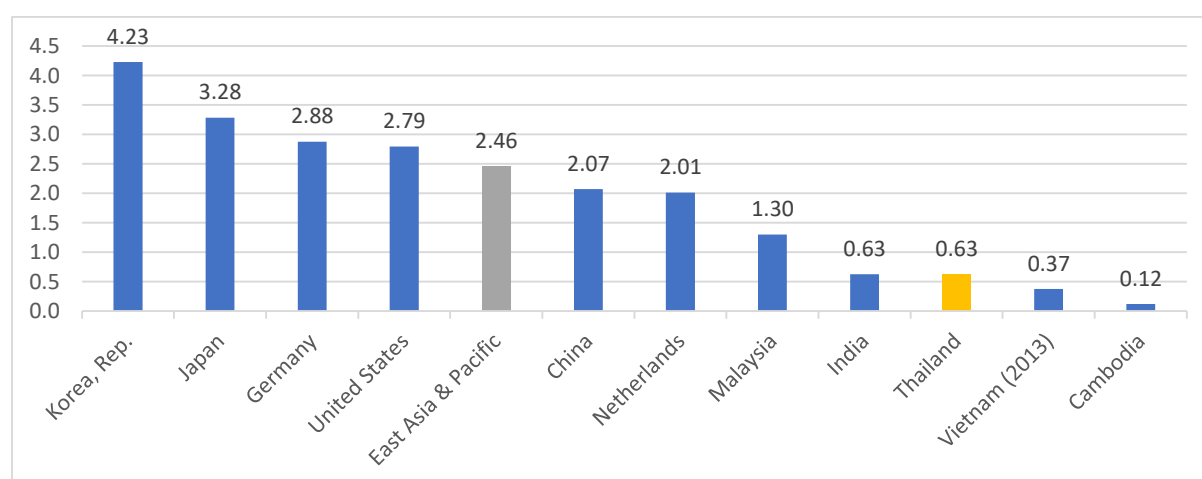
The public spending on R&D is not the only limitation. Overall, 99.7% of all Thai firms, 2.7 million enterprises, are small and medium-sized enterprises who contribute 37.4% to the total GDP. Thailand's development in the past decades has mainly been shaped by the arrival of multinational enterprises (MNEs) and their foreign direct investment (FDI) (ADB, 2015). With few big Thai firms competing in global markets, vast numbers of SMEs are locked into low levels of innovation. A mere 1.1% of the Thai firms spends money on R&D, whereas 14.4% of the companies in the East Asia and Pacific region do so. Only 8.2% of Thai firms introduced a new product or service in 2016 whereas the average in East Asia & Pacific region was 26.4% (and 36.7% globally). Of these product/service introductions was 85.8% radical innovations that were new to the market. The percentage of firms that did process innovation was only 11.9% in 2016 (38.1% East Asia & Pacific, 33.9% globally) (World Bank, 2016a).

To date, technology developed overseas and brought in by multinationals has been the major source of Thailand's innovation. This offers the potential to tap into new knowledge outside the country and raises the probability of collaborating for innovation (ADB, 2015; Gurría, 2017). For countries with low technical capabilities, trade in technology through licensing is one of the channels which can contribute to the international transfer of knowledge (Hobday, 2005). However, data from the World Bank (2016a) show that only 5,6% of the Thai firms use licenced technology from foreign companies, compared to 17.7% for the East Asia & Pacific region in general (14.6% globally). One of the reasons is the fact that the large majority of local Thai firms remain tier 2 and 3 suppliers. Although tier 2 and 3 suppliers are no less vital to the supply chain, are they usually limited in what they can produce and have a relatively low industrial sophistication. On the contrary, tier 1 suppliers often offer the most advanced processes in the supply chain. In Thailand, the finished goods assemblers and tier 1 suppliers are mainly foreign firms (ADB, 2015). For example, "*Japanese car manufacturers use Thai suppliers but also set up their own partners from Japan. In a sense, it is that they are operating in a closed system, which is an extension of their domestic system. Thai people get to participate a bit in low-tech supply chains as workers, engineers and office workers but that is pretty much it.*" (STI, personal communication, 2018). Thai SMEs are increasingly responsible for importing more goods than they export. This increase reflects a need to fuel production of high-tech items and vehicles and economists attribute this to the fact that the manufacturing industry has declined over the last few years, which means fewer goods are being produced for export (WorldAtlas.com, 2018). "*The majority of manufacturing industries are not technological sophisticated. Many of them just buy goods from abroad and sell them instead of developing their own technological assets. These are two problems in the Thai market*" (STI, personal communication, 2018). Thailand's technological sophistication is thus related to the extent of technological lending determined by those links of the production network conducted there. This technological lending has several limitations. The first one being that it creates a type of enclave industrialization in which the country possesses a few high-tech sectors, but not a high-tech economy. As just indicated by the STI, MNEs operate in a closed system in which the Thai get to participate in low-tech activities. The second one is that, as indicated in the introduction with the Japanese computer-part maker Minebea, these technologies can be "un-lent" or "retracted" to lower-cost destinations. Thirdly, Thailand fails to engage in the higher-value research and design stages of product development (ADB, 2015).

On reason for this is that the Thai educational system is unable to prepare graduates for the increasingly competitive global labour market (Jitsuchon, 2012). Additionally, Mr. Jitsuchon (personal communication, 2018) mentions that many Thai students prefer to study in the field of social sciences and are targeting to become a manager instead of an engineer; "t*echnical studies are not really popular and few students dream to become an engineer*". Although Thailand has achieved near universal access to education at primary level, remains the quality rather low. In general, Thai universities do not score highly internationally and its highest ranked university, Chulalongkorn, can be found on place 245 in the Quacquarelli Symonds World University rankings. The universities cannot keep up the pace with other universities abroad and when Chulalongkorn University was first ranked it came in at place 201 (TopUniversities.com, 2018).

The OECD's Programme for International Student Assessment (PISA) has shown that Thai students aged 15 underperform compared to students in Vietnam and Malaysia. Moreover, the 2015 PISA results show that outcomes in science, reading and mathematics have actually gone backwards since 2012. As of 2014, only 20% of people had completed tertiary-level education. And amongst graduates, too few have the skills required for high value-added sectors (Gurría, 2017). Relevant skills such as those needed for information technology, communication, and leadership are all lacking (Jitsuchon, 2012). The estimated skill shortages in the vocational sector are also large: one study found a 23% shortfall, meaning for every 100 job openings for vocational graduates, only 77 recruits were available. Not having the right people equipped with the right skills reduces Thailand's productive efficiency, hampers businesses' capacity to innovate and holds back economic growth (Gurría, 2017). As Mr. Jitsuchon indicates, "*Money is not a problem anymore. The bottleneck is the shortage of good researchers.*" (personal communication, 2018). This situation partly forces investors, foreign and domestic, to eschew investing in production that makes use of highly skilled workers and employees (Jitsuchon, 2012). Several investors have already stated that Thai managers need to improve their English proficiency in order to succeed, which, according to the CIA's World Factbook (2010), is often seen as secondary language of the elite only. The innovation manager of a MNE states that much of their production is being transferred from the West to the East, including Thailand. However, all R&D activities remain in the West. One of the reasons is the level of education and the way of educating. He states: "*they [Thai] are very well in understanding things but less so in improving things. I have given many trainings with theoretical as well as practical elements. But as soon as the practical element is supposed to start, hardly anyone knows where to begin or how to deal with the issue. People within the company are generally well educated and know how to work things out but starting from scratch is something which proofs to be difficult.*" (MNE, personal communication, 2018). Jitsuchon (personal communication, 2018) states "*it is important to teach students how to think independently in order to become innovative*".

4.3 Respondents Questionnaire

This paragraph examines the descriptives of the 142 respondents, including firms size, innovation performance, region, and industry. This paragraph ends with a comparison of the sample with the population and a conclusion.

Firm Size

As indicated in the previous chapters, small and medium-sized enterprises play an important role in a country's economy and the Thai are no exception. The Thai Ministry of Industry classifies SMEs as companies that have less than 200 employees and fixed capital less than 200 million baht, excluding land and properties. The EU, on the other hand, classifies SMEs as companies with less than 250 employees. Enterprises with less than 10 employees are considered as 'very small' (microfirms), those with 10–49 employees as 'small', and firms with 50–249 employees as 'medium' (European Commission, 2018). In this research the EU classification of SMEs has been used due to the complexity of finding out the fixed capital of Thai firms. Among the firms that completed the online questionnaire, 14.1% can be considered as very small (microfirms), 19.7% as small firms and 28.2% as medium firms. In total, SMEs account for 62% of the respondents (88 firms). The remaining 38% are considered as large firms, with more than 250 employees (54 firms). Overall, from the 142 responses, 23.2% finished the Thai language version whereas the remaining 76.8% finished the questionnaire in English.

Innovation performance

The existing literature on innovation is quite extensive and various definitions of innovation exist. In this research, the 'Oslo Manual' has been followed to define innovativeness (OECD, 2005). Here, two types of innovation are being distinguished: product (and service) innovation and process (and method) innovation. These new products and services can range from radical breakthroughs that create entirely new product categories to simple, incremental improvements that are small improvements to existing products (Feldman, 1996). In the questionnaire, the questions used by Fitjar and Huber (2015) were used to measure innovation. Here, managers were asked six questions about different categories and levels of innovation. The first set of three questions related to product or service innovation, the second set related to method and process innovation. In both sets, the first question was to investigate whether the firm had introduced any goods or services into the market during the preceding 3 years that were new to the company or significantly improved compared to their existing products (product and process innovation). Secondly, firms that gave a positive reply to the first question were asked whether any of these innovations were new to the market, or only new to the company and very similar to a product that already existed in the market (radical innovation). With these questions, a division can be made between four types of innovation: product innovation; radical product innovation; process innovation; radical process innovation.

Among the 142 firms that completed the online questionnaire, 77.5% reported product innovation and 74.6% reported process innovation. Of the product innovative companies, 64.5% of the innovations was new to the market (radical) whereas 35.5% was new to the company only (incremental). Among the

process innovative companies, 42.5% were radical innovations and 57.5% incremental. A survey from the World Bank (2016a) showed that only 8.2% of the Thai firms did product innovation in the last year whereas 11.9% did process innovation. Here, incremental product innovations (14.2%) were less frequently done than radical product innovation (85.8%). For process innovation, no figures for incremental or radical innovations were available. The respondents in this thesis that indicated to have done innovation were also asked about the origins of their innovations: were they developed (a) mainly by the company itself, (b) in cooperation with other companies or organisations, or (c) mainly by other companies or organisations? 45.1% of the innovative firms indicated that they developed the products and services mainly by themselves, and 30.3% of the process innovative firms. Another 23.9% reported to have collaborated with others in the development of new products, and 35.9% in the development of new processes. An additional 8.5% had introduced new products developed mainly by others, with the equivalent figure for process innovation being 8.5%. For process innovation this was 30.3%. Overall, 22.5% thus indicated not to have done any product innovations whereas 25.4% said not to have done process innovation. Fitjar and Rodríguez-Pose (2013) found similar results in the case of Norway. In the next chapter, a closer look will be taken on who these partners are.

Additionally, in order find differences between the respondents, a set of control variables were included, such as number of employees, firm location, educational level of the manager, percentage of foreign ownership, and type of industry.

Regional division of Thailand

In the questionnaire, respondents were asked to indicate in which region their company was located. The country was divided in the four regions of Thailand where Bangkok was extracted to be considered as a region in itself (see Figure 21 in the appendix). This regional division of Thailand is commonly used on national television, when discussing the weather or regional events, and in administrative and statistical contexts, such as the World Bank's Enterprise Survey (2016a) and the World Values Surveys (Inglehart et al., 2014; Schmutzler & Lorenz, 2018). The majority of respondents are located in the Bangkok region (46.5%) whereas 28.2% comes from the Central Region, 18.3% from the North, 4.2% from the Northeast and only 2.8% from the South. Not surprisingly, the majority of innovations also come from Bangkok and the Central Region. To be precise, 53% of the all radical innovations and 39% of all incremental innovations originate from Bangkok. The Northern region seems to perform well on innovation. More than a quarter of all incremental innovations originate from that area and 16% of all radical innovations, whereas they represent less than one fifth of the Thai firms (see Table 6 the appendix). Looking per region we see that the south brought only incremental innovations forth (of which 50% product, 50% process) and half of all innovation in the North were incremental as well whereas the central region and Bangkok mainly introduced radical new innovations (see Figure 6).

Figure 6. Percentile division of total innovation within each region
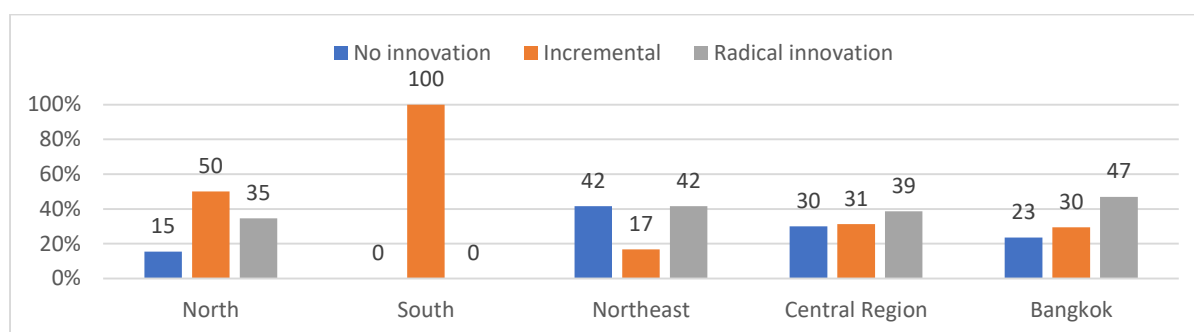
Industries

Furthermore, respondents were asked to indicate from 26 industries in which industry their company is active in (see Table 6 in the appendix). In order to increase interpretability, these 26 industries have been transformed to the seven industries indicated by the BOI (see Figure 4 in chapter 3.3.1). When looking at the overview in Figure 7, a couple of things stand out. Firstly, companies active in agriculture are well represented in the questionnaire, 20% versus 16% from the original BOI database. Furthermore, the representation from companies active in machinery and light industry is less than their share in the BOI database (respectively, 17% vs 29%, and 7% vs 16%). Representation from companies in the electronic industry and chemicals is approximately equal to those in the database (respectively 13% vs 14%, and 15% vs 16%). Furthermore, the option other was given for respondents who did not exactly know in which industry they 'officially' belong – 18% of the respondents chose this option.

Figure 7. Respondents and their industries

The dominance of respondents from the agricultural industry is also visible in terms of innovation. One fifth of all innovations occur in the agricultural industry (see Figure 22 in the appendix). When looking at innovation within each industry, in agriculture, machinery, electronics and chemicals, the majority of firms introduced a product or service which was new to the market. In the light industry and service and public utilities, the division of radical versus incremental innovations was even (see Figure 8). The automotive industry, who's respondents account for 33% of the total light industry respondents, are thus mainly involved in incremental innovations whereas Thailand's second largest industry, electronics, are mainly engaged in radical innovations.

Figure 8. Percentile division of total innovation within each industry
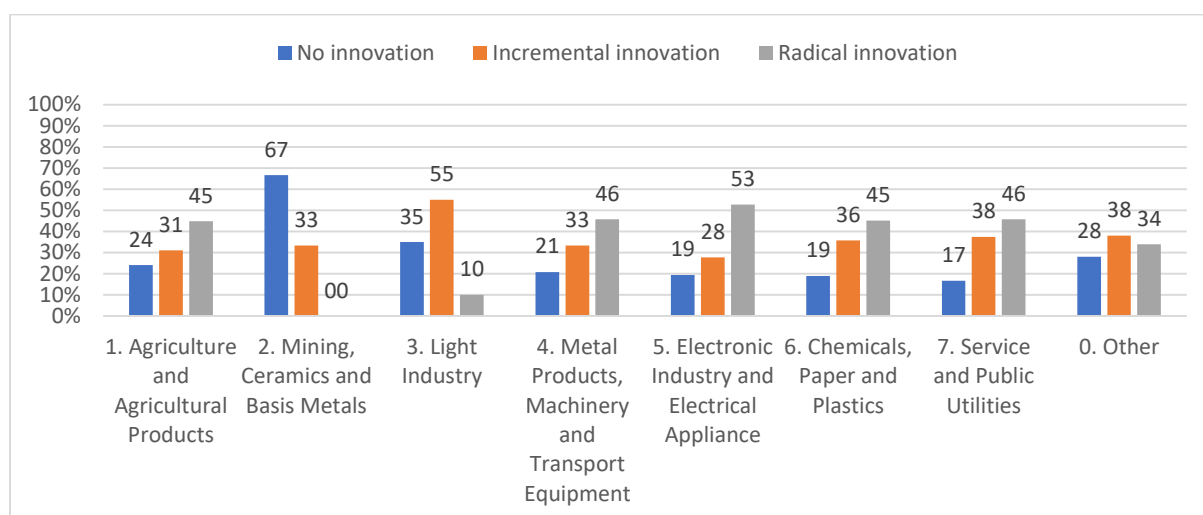
Looking at the network linkages of these industries, Figure 9 shows how each industry is linked to partners per scale. Local partners are those partners that are located in the same city or province as the respondent. Regional partners are those in the same region (North, South, Northeast, Central Region, or Bangkok). National are those partners in the other regions of Thailand and international are the partners located abroad. Firms in the machinery industry are most engaged in international linkages and least embedded in local networks. Firms in the electronic, mining, and light industry have the highest level of local collaboration.

Figure 9. Network Linkages per Industry
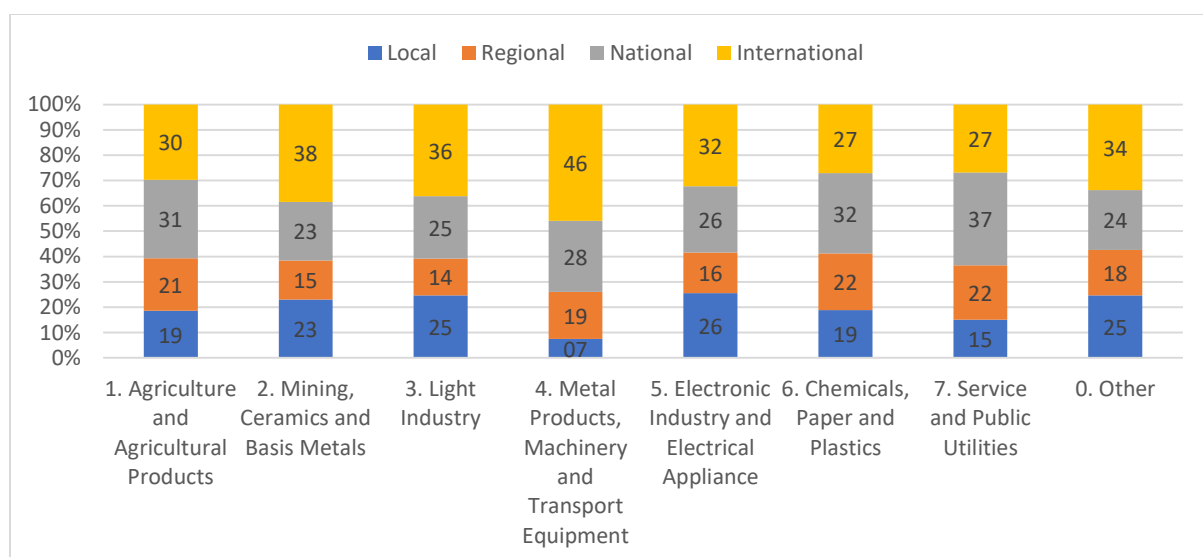
As indicated in Figure 8, these three industries differ widely from each other in innovation. From mainly no innovations in the mining industry, to incremental innovations in the light industry, and the highest number of radical innovations in the electronic industry. The variety in innovation performance in combination with a mutual dependency on local networks aligns with the general idea in the literature that every industry and sector requires different types of partnerships and that knowledge and

innovative ideas can be tapped from different spatial sources. As described in chapter 2.3, it suggests that distance in one dimension can be compensated by the presence of proximity in another. For the firms in the light industry, it can be stated that they indeed are more involved in incremental innovations rather than radical ones, and are well embedded in local networks. As shown in chapter 2.2, this aligns which the idea that typical outputs for engineering based industries, such as automotive and machinery, are indeed more incremental in nature. More information on these linkages and what they mean for innovation will be given in the next chapter.

Population

A summary of the description of the sample is provided in Table 2. The variables are compared with the population and national innovation surveys (World Bank, 2016ab; NSO, 2015; BOI, 2015). This was done by using a Chi-Square Goodness-of-fit test (see Table 7 till Table 12 in the appendix) (Field, 2013). All differences were significant, which means that the sample and population are significantly different from each other. Thus, the demographic division of the sample size was not generalizable to the Thai population and conclusions should be drawn with caution.

Table 2. Sample characteristics

Variable	Levels	Sample	Population
Product innovation	Product innovation	77.5%	8.2%
	No product innovation	22.5%	91.8%
Process innovation	Process innovation	74.6%	11.9%
	No process innovation	25.4%	88.1%
Firm size	SME (<250 employees)	62%	99.7%
	Large firm (>250 employees)	38%	0.3%
Region	North	18.3%	13.1%
	Northeast	4.2%	14.3%
	Central	28.2%	32.6%
	South	2.8%	12.6%
	Bangkok	46.5%	27.4%
Industry	Agriculture and Agricultural Products	20.4%	16%
	Mining, Ceramics and Basis Metals	2.1%	4%
	Light Industry	7.0%	16%
	Metal Products, Machinery and Transport Equipment	16.9%	29%
	Electronic Industry and Electrical Appliance	12.7%	15%
	Chemicals, Paper and Plastics	14.8%	16%
	Service and Public Utilities	8.5%	5%
	Other	17.6%	0%
Foreign ownership	Firms with at least 10% of foreign ownership	59.2%	2.1%
	Firms with 100% Thai ownership	39.4%	-

4.4 Conclusion

Thailand managed to develop its economy from a mainly rural and agricultural industry to an urbanized and export oriented country in as little as a few decades. However, as this chapter explained, being an export oriented country does not necessarily mean that there is a high degree of industrial sophistication. The country struggles to take the last step towards a more innovative and creative economic model. Although the Thailand 4.0 policy aims to achieve this, are there still many obstacles along the way. Many of the innovations they use originate from larger multinationals and the companies themselves are often only involved in Tier 2 or 3 activities such as assembly with a relatively low industrial sophistication. An educational system that seems to be unable to prepare Thai graduates for the increasingly competitive global labour market and a lack of skills in the vocational sector withholds Thailand from competing on global level. As Gurría (2017) states, not having the right people equipped with the right skills reduces Thailand's productive efficiency, hampers businesses' capacity to innovate, and thus its absorptive capacity to learn from others. These findings align with the statements made by different interviewees. They all argue that the level of education needs to be higher and especially the profession of engineer and technician should be promoted more in order to create a more skilled work-force.

Although Thailand's innovative performance lacks behind many other countries, seem the results from the questionnaire to show a completely different picture. The data shows that 77.5% of the firms developed a new product (74.6% process) or made improvements in the past three years. A large difference with the significantly lower results from a survey from the World Bank in 2016. Although data from 2017 or 2018 are not available (yet), is it unlikely that these figures are somewhere near the high innovative numbers in this thesis. One of the main reason why such differences exist between the population and the sample is the voluntary basis of the questionnaire. For instance, innovative companies are more likely to participate in a questionnaire about innovation than those who don't innovate. As shown by the Chi-Square Goodness-of-fit test is the sample size of this thesis thus not representable for the whole population. A similar conclusion can be drawn from the fact that in this thesis, 59.2% firms with at least 10% of foreign ownership responded, whereas these only occupy 2.1% in the World Bank (2016a) dataset. Since the respondents have been acquired through databases from the BOI, an institution with strong ties to foreign companies that entered the Thai market, is it not surprising that the majority of shares are indeed owned by foreign shareholders. For 43.7% of the respondents, at least 51% of the shares was owned by people or companies located outside of Thailand. Thus, in 56.3% of the companies that participated was the majority of shares owned by a Thai. It is therefore also not surprising that collaboration with international partners is most used in contrast to local, regional or national partners, as will be explained in more detail in the next chapter.

Chapter 5: Global Pipelines and Local Buzz

"When one looks at innovation in nature and in culture, environments that build walls around good ideas tend to be less innovative in the long run than more open-ended environments." … "This is not the wisdom of the crowd, but the wisdom of someone in the crowd. It's not that the network itself is smart; it's that the individuals get smarter because they're connected to the network."

Steven Johnson, author of the book 'Where good ideas come from'

In this chapter, the partnerships between the respondents and others are being analysed. It examines three of the four independent variables (type of partner, geographical proximity, and firm size) on innovation performance by testing the hypotheses drafted in chapter two. Paragraph *5.2*, *5.3* and *5.4* all start with explaining the hypotheses tested in that particular paragraph. At the end of these paragraphs the findings are being discussed and compared with the expectations that came forth from the literature and the results from the interviews. Each section concludes by examining the outcomes of the hypotheses and this chapter ends with an overall conclusion about the findings.

Prior to testing the hypotheses, the data from the questionnaire was prepared for analysis in SPSS. This included the creation of new variables, testing the distribution of the data, and examining the reliability and validity of the data. For an extensive explanation of the data preparation for this chapter, see *Appendix D: Data preparation Global Pipelines & Local Buzz*.

5.1 Vertical and Horizontal Linkages

In order to get a good understanding of the test results, it is important to get an idea of the existing linkage networks between the respondents and their partners. As demonstrated by Trippl et al (2009) and Fitjar and Rodríguez-Pose (2011), leads a greater diversity of partners to more innovation. In this train of thought, the partners chosen by the respondents in Q9 were counted, which resulted in a total of 1103 partners that were used by the respondents in the previous three years. This means, an average of 7.8 partners per respondent out of 28 possibilities. In line with the findings of the authors mentioned above, Thai innovative firms use more different partners (7.8 partners on average) than non-innovative firms (7.2 partners).

Figure 10 shows how the division is made between the partners on four levels: local, regional, national, and international. When comparing between the above mentioned categories, collaboration with international partners is most common. Overall, 52% collaborated at least with one partner on local level, with an average of 1.5 types of local partners per respondent; 59% collaborated with partners within the region, an average of 1.5 partner types; 79% collaborated with partners located elsewhere in Thailand (average 2.2); and 84% with partners abroad (average 2.6). More in-depth, innovative firms collaborated with 1.5 local, 1.5 regional, 2.1 national, and 2.7 international partners. Non-innovative firms collaborated with 1.4 local, 1.8 regional, 2.7 national, and 1.3 international partners. What stands

out is that innovative firms collaborated with more local, and especially, international partners whereas non-innovative firms used more regional and national partners.

Figure 10. Percentage distribution of partners
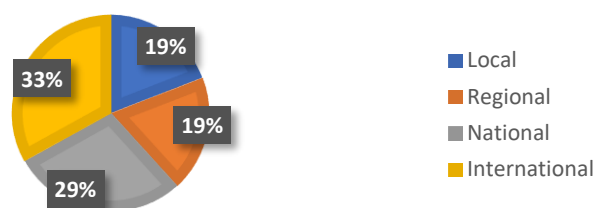
A next step is taking a closer look to the type of partners that are being used by the respondents. Figure 11 explains which type of partners are important on what level. The figure shows that suppliers and customers are the two most important partners, both within Thailand as well as abroad. Fitjar and Rodríguez-Pose (2011) also found that suppliers and customers were the most used partner type for innovation in their study of Norway and these are also the most used among all OECD countries in general (OECD, 2017b). Furthermore, competitors, other companies in the same conglomerate and consultants are less frequently used and those on the local and regional level are almost equally important. From all partners, research institutes and universities are the least frequently used from abroad but most on national level.

Taking a more in-depth look between innovative and non-innovative firms and their usage of DUI and STI-partners it becomes clear that non-innovative firms collaborated on average with slightly more DUI-partners (5.0) than innovative firms (4.9). However, the difference is larger for scientific partners. Here, non-innovative firms collaborated on average with 1.7 different STI-partners whereas innovative firms collaborated on average with 2.5.

Figure 11. Type of partners in firm networks in absolute numbers
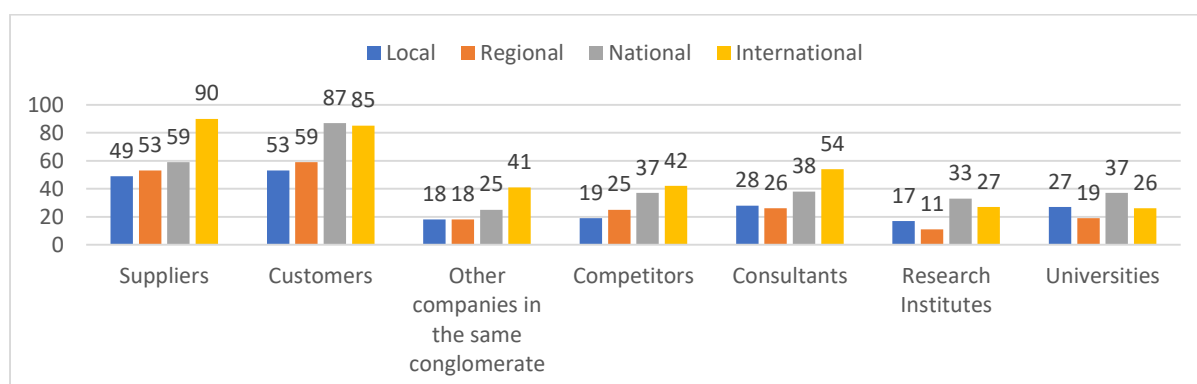
When combining local, regional and national partners as one nationwide category, the data shows that the respondents collaborate with 738 domestic and 365 international partners. On average, 5.2 partners domestically and 2.6 partners internationally. Meaning that even though international partners played an important role in the past three years, partners within Thailand are just as important. The next paragraph elaborates on the type of partners used and their relation to innovation.

5.2 Partner Types for Innovation

Now the question of interest is whether these cooperative relationships matter for companies' innovation activities and, if so, whether the geographical location of partners makes a difference. In this paragraph, a closer look will be taken to the link between the respondents' innovation performance and the type of partners they collaborated with in the past three years. The first two hypotheses drafted in earlier chapters will be tested:

- **H1a**: *Collaboration with DUI-partners is more important for incremental product and process innovations than radical product and process innovations.*
- **H1b**: *Collaboration with STI-partners is more important for radical product and process innovations than incremental product and process innovations.*

A total of 110 respondents indicated that they introduced a new product in the previous three years whereas 32 respondents did not. 106 said to have introduced a new process, against 36 who did not. Figure 12 and Figure 13 show the share of innovative companies and the different partners used. What stands out is that the majority of firms did radical product innovation and incremental process innovation. However, the figure also shows that there is no difference between collaborating with STI-partners or DUI-partners.

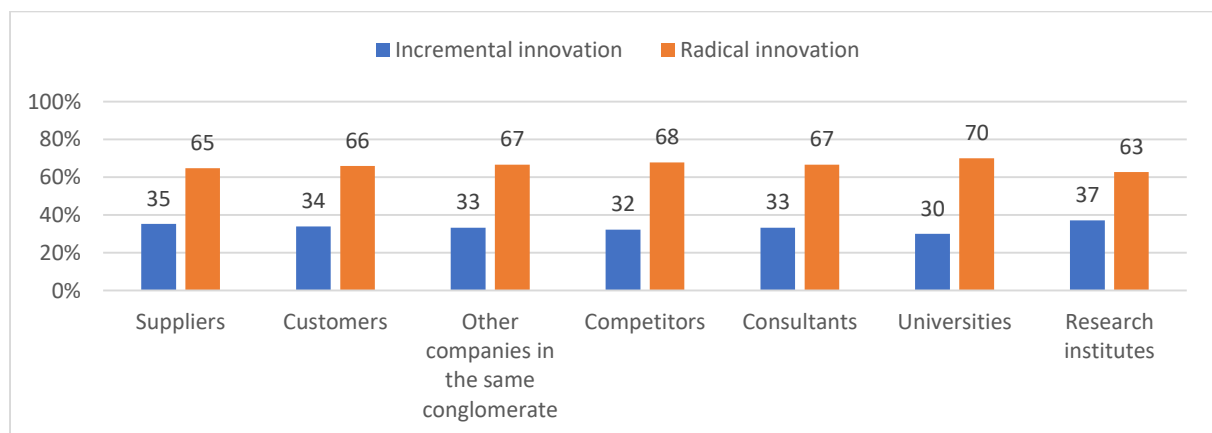*Figure 12. Product innovation and collaboration with different types of partners*

Figure 13. Process innovation and collaboration with different types of partners
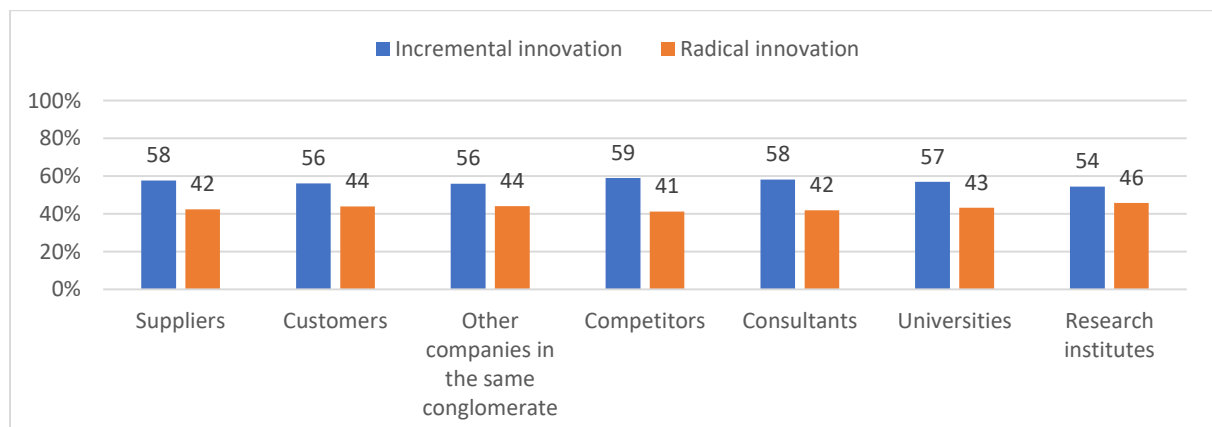
Table 3 shows the percentage of firms that collaborated with a particular partner and did innovation. On average, collaborating with research institutes was most successful for innovation (83%) whereas suppliers and competitors were the least successful (both 75%). However, as illustrated in the previous paragraph, there are large differences between the popularity of a particular partner per scale. For instance, 76% of the collaborations with competitors on regional level led to innovation, whereas they only account 12% of all partners on that level.

Table 3. Percentage of successful innovative partnerships per type of partner (both process and product)

Process	Local	Regional	National	International	*Average*
Suppliers	76%	69%	75%	81%*	*75%*
Customers	76%	75%	75%	78%	*76%*
Other companies in the same conglomerate	86%	78%*	78%	84%	*82%*
Competitors	74%	76%	73%	79%	*75%*
Consultants	80%*	88%*	76%	82%	*82%*
Universities	67%	87%	76%*	88%*	*79%*
Research institutes	79%	86%	79%	87%*	*83%*
Average	*77%*	*80%*	*76%*	*83%*	

* = significant linked to innovation, p <.05 (see below)

To see whether these partnerships are innovative because of coincidence or because there is significantly related to one another, a Pearson chi-square test ($\chi 2$) was conducted (Huizingh, 2010). For this, the dichotomous items of Q9 (see *Appendix A: Questionnaire*) were used in a 2x2 crosstab. An example is yes or no collaboration with international suppliers and yes or no product innovation. The output in SPSS showed a significant p-value (<0.05), indicating that usage of international suppliers has a significant effect on product innovation (see Table 14 and Table 15 in the appendix). The output also shows that '0 cells (0.0%) have expected count less than 5' which means we can continue with Pearson $\chi 2$, if this were not the case, Fisher-Freeman-Halton's Exact Test (in short, Fisher's Exact Test) should've been taken into account (Campbell, 2007; Freeman, 1951). A next step is looking at the phi coefficient which run from -1 to 1 and is used to measure the strength of association between two categorical variables (Cohen, 1988; Rea & Parker, 1992) (see Table 16 in the appendix for an association table for phi values). The output shows a significant phi value of -0.185, which indicates that there a negligible relationship between doing innovation and collaborating with international suppliers (see Table 17 in the appendix). The above described procedure has been conducted for all items of Q9 and all four innovation forms, resulting in the following significant outcomes (see grey cells in Table 3):

a) International suppliers * radical process innovation ($\chi 2$ = 3. 831, df = 1, p = .05, phi = .190);
b) Regional partners in the same conglomerate * radical process innovation ($\chi 2$ = 4.444, df = 1, p = .035, phi = .205);
c) Regional consultants * product innovation ($\chi 2$ = 4.017, df = 1, p = .045, phi = -.168);
d) International universities * product innovation ($\chi 2$ = 4.017, df = 1, p = .045, phi = -.168);
e) International research institutes * product innovation ($\chi 2$ = 6.773, df = 1, p = .009, phi = -.218);
f) Local consultants * radical process innovation ($\chi 2$ = 5.099, df = 1, p = .024, phi = -.219);
g) National universities * radical process innovation ($\chi 2$ = 4.189, df = 1, p = .041, phi = -.199).

However, as the phi values in the overview above already show, all results have a weak or negligible association with one another (see Table 18 to Table 37 in the appendix). In a second round of tests, a Mann-Whitney test, the non-parametric equivalent for the independent t-test, was used to see whether there is a significant relation between innovation and the number of partners used (Field, 2013; Lund, 2018). For DUI-partners, the output shows that, on average, product innovative firms collaborate significantly more with other companies in the same conglomerate (mean rank = 75.55, n = 110) than not-product innovative firms (mean rank = 57.59, n = 32), U = 1315, z = -2.38, p = .02, two tailed (see Table 38 and Table 39 in the appendix). **This means that collaborating with partners in the same conglomerate on different geographical scales positively influences product innovation**.

For STI-partners, it showed that there is a significant relation of 95% confidence interval between product innovation and research institutes. On average, product innovative firms collaborate significantly more with research institutes (mean rank = 74.40, n = 110) than not-product innovative firms (mean rank = 60.48, n = 32), U = 1407, z = -1.94, p = .05, two tailed (see Table 40 in the appendix). **Meaning that collaborating with research institutes on different geographical scales positively influences product innovation**.

5.2.1 Findings versus Expectations

As we saw in this paragraph, collaboration with customers is not significantly related to innovation on any scale. Contrarily to the results of Fitjar and Huber (2015), who found that international customers positively influence innovation. Although the SPSS output showed no significant relation between customers and innovation, argued the SME and MNE in the interviews that customers do play a role in the innovation process. However, this role is relatively small and does not stretch beyond listing to the preferences and wishes of the customer. As also indicated by Nonaka et al (2006), originates new knowledge from customers from complaints or other feedback, which must be shared with the firms' engineers through intense collaboration with the customers. Thinking along with your customers is an important part of innovation, but "*you should not let the customer do the design because it doesn't take into account your interests*" (SME, personal communication, 2018). Also for the MNE, customer demands are often a trigger to adapt existing products and processes and to innovate, although the actual innovations come from within the company (MNE, personal communication, 2018).

In contrast to Fitjar and Huber (2015), who found that collaboration with foreign competitors tends to be negatively related to innovation and radical product innovation, was no significant relation between competitors and innovation found in the case of Thailand. A reason can be found in the absence of a substantial amount of absorptive capacity, which is needed to use information that can be gained from competitors (Intarakumnerd, 2007). Additionally, collaborating with competitors on local level happens least frequent, suggesting that Thai firms are less likely to collaborate with a competitor in the same city or province. One reason may be the unintended knowledge spillovers that stem from geographical proximity. However, collaboration with competitors on a regional, national and international level happens somewhat equally frequent. Here, the case can be made that collaborating with inter-local competitors might be beneficial since they give firms access to scarce external expertise that can help

to resolve common technical issues, whereas they do not directly compete with firms over locally available resources, such as personnel.

The output in SPSS showed a significant relation between international suppliers and product and radical process innovation. A similar question was put forward to the interviewees, who responded that the main innovations come from the companies themselves and that suppliers rarely propose new inventions or innovations that could benefit the product or production process. "*Ironically, this is something we ourselves do by our customers quite frequently*" (MNE, personal communication, 2018). The example was risen by the SME that suppliers in many Western countries take the functional aspect of a product often as starting point whereas suppliers in Thailand take the technical aspect. When a product has particular specifications which, for instance, are relatively expensive, a Western supplier would suggest to make changes or to use different materials and is not afraid to put own ideas and improvements forward. Contrarily, in Thailand it is considered a service to deliver the exact specifications even though it would quickly imbalance the price/quality ratio. It requires trust between the company and the Thai supplier to suggest alternative options. Often, new suppliers feel a bit out of their comfort-zone while existing suppliers are more inclined to suggest adaptions and improvements. This is often depending on who is doing the procurement and negotiations. It often goes easier with Thai colleagues than with those from a different national background (SME, personal communication, 2018). The reason for the significant result between international suppliers and product and radical process innovation might be found in the idea that linkages with these suppliers are carefully chosen because of the expertise of that supplier in a specific field. Logically, the supplier abroad is able to offer something which cannot be found locally.

Additionally, it was found that collaborating with partners in the same conglomerate on different geographical scales positively influences incremental product innovation. As also indicated in chapter two, when companies belong to the same conglomerate this stimulates the mutual understanding among similar actors. Collaborating with various partners in the same conglomerate enables the accumulation of feedback from those partners to whom a firm is organizational and cognitive close (Boschma, 2005). In this case of Thailand, it hints to a certain degree of dependency on information coming from parent or associate companies. In terms of innovative output, Fitjar and Rodríguez-Pose (2013) draw a similar conclusion in their research on linkages in Norway and state that partnerships within the same conglomerate matter for incremental product innovation only. Contrarily, Fitjar and Huber (2015) found that collaboration with other units within multinational enterprises was never significantly associated with innovation and align their finding with that of Hervás-Oliver and Albors-Garrigós (2008), who suggest that this type of global pipeline should not be overrated regarding its role in innovation.

For STI-partners, the results showed that collaborating with research institutes on different geographical scales positively influences product innovation. An explanation for this is the concentration of academic institutes in Thailand, which is higher in the Bangkok area than in the provinces (STI, personal communication, 2018). As Figure 11 indicates, collaborating with universities is most popular on local

and national scale whereas they are least successful in bringing forth innovations. "*We're struggling with translating results from academics into the industry. In developed countries, the gap between the industry and university is quite small. In Thailand, the gap between industry and universities is quite large. A long standing problem in academic research in Thailand is that companies and private sector want commercially viable research. The universities rarely work together, which bring us to the valley of death [the phase between research and successful innovation]. Many projects are done for the sole purpose for professors to gain better status for university or academic status instead of commercial interesting products.*" (STI, personal communication, 2018). As Figure 11 indicated, are STI-partners most associated with innovation on an international level and the results from the χ2 test also proof that international universities and research institutes are indeed significantly related to product innovation whereas collaboration with those partners on local, regional or national level is not.

Overall, universities on international scale were least used by the respondents but brought forth the most innovations (see Figure 11 and Table 3). This positive association with collaboration with international scientific institutions raises the question why this type of collaboration does not happen more frequently. As shown by Figure 11, only 29.3% of the international partners are science, technology and innovation partners. This tells us something about the consciousness of choosing a university to collaborate with. Local universities are easy to reach and proximately close, however, some specialized universities are located somewhere else in the country, outside ones' region. Overall, approximately 40% of Thailand's 170 higher education institutions are located in the Bangkok area (Ministry of Education, 2016). Laursen, Reichstein and Salter (2011) found that companies in the UK 'appear to give preference to the research quality of the university partner over geographical closeness' and Fitjar and Huber (2015) also found that Norwegian firms that chose international STI-partners tend to be more innovative, although only a limited number of Norwegian firms seem to consider foreign universities as viable partners. This justifies to assume that not only geographical proximity plays a role in choosing STI-partners but also other dimensions of proximity. Especially since collaborating with STI-partners often involves codified and explicit knowledge, which travels rather easily over distances compared to tacit knowledge (Dicken, 2015). An important obstacle in collaboration between partners is trust (NIA, personal communication, 2018). Only 32% of people feel that they can trust most people while three quarters feel that they have to be very careful in dealing with others. Compared to 66% people who trust most in the Netherlands (Inglehart et al, 2014).

Institutional proximity, as in collaborating with actors that share a common language, habits, a law system securing ownership and intellectual property rights, provides a basis for economic co-ordination and interactive learning. Trust is an important element in this and tends to decrease over distance. Information is basically easier transmittable among actors with 'small cultural distance, common language and shared values' (Maskell & Malmberg, 1999). When Thai companies are looking for partners to innovate with, one of the main characteristics of a suitable partner is its trustworthiness. Trust is an important element in partnerships and is often easier built when these partners are geographically and institutional proximate to one another. "*Developing trust with international partners overseas is more difficult than with local partners. For instance, language can be a barrier. Also, working*

together with a similar culture, or one you know very well, make you feel more comfortable. Thailand works a lot with Chinese and Japanese firms. It is easier to work with them than with partners in the Middle-East." (NIA, personal communication, 2018).

However, too much social proximity may lead to an overload of trust which weakens the innovative capacity of firms and may lead to lock-in. Dr. Charoensukmongkol (personal communication, 2018), states that "*in Thailand, personal networks sometimes matter too much. We do business based on who knows who and the recommend each other*". The degree of social proximity is in these cases too high, which creates a relative homogenous environment where new ideas find it difficult to take hold and diffuse. The next paragraph discusses the usage of local, regional, national and international partners in further detail.

5.3 Global Pipelines for innovation

This second paragraph examines the link between the innovation performance of the respondents and the location of partners they collaborated with in the past three years. It does this by testing the following hypotheses:

- **H2a:** *Collaborating with international partners is more important for innovative firms than for non-innovative firms.*

- **H2b**: *Collaborating with international partners is more important for radically innovative firms than for incrementally innovative firms.*

As indicated in the first paragraph, innovative firms collaborated more with local and international partners whereas non-innovative firms used more regional and national partners. Figure 14 shows the share in percentages of innovative companies and the partners used on different scales. What stands out is that the majority of innovations are new to the market (radical) and there doesn't seem to be a large difference in percentages between the different scale levels and the type of product innovation. To illustrate, 49% of the firms that collaborated with local partners brought forth a radical product innovation, 27% of them brought forth incremental product innovations and 24% no product innovation at all.

Figure 14. Type of product innovation within each scale
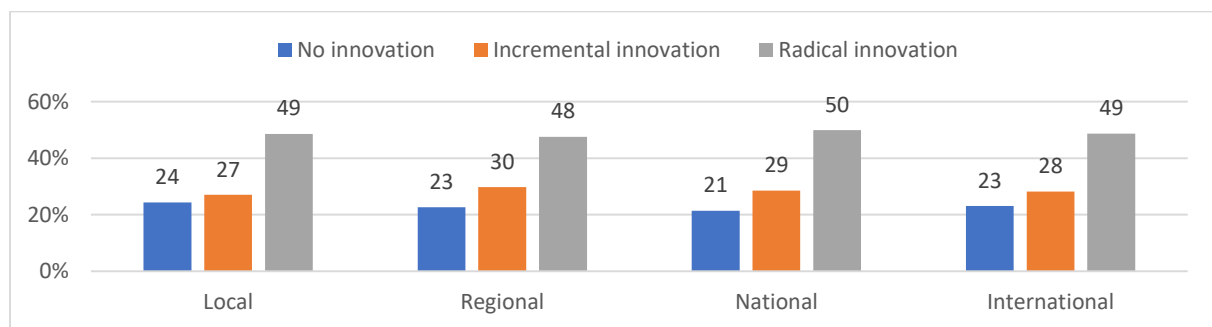
Figure 15 shows the share in percentages of innovative companies and the partners used on different scales. In contrast to product innovation is the majority of process innovations new to the company only (incremental). However, just as with product innovation, there doesn't seem to be a large difference in percentages between the different scales and the type of process innovation.

Figure 15. Type of process innovation within each scale
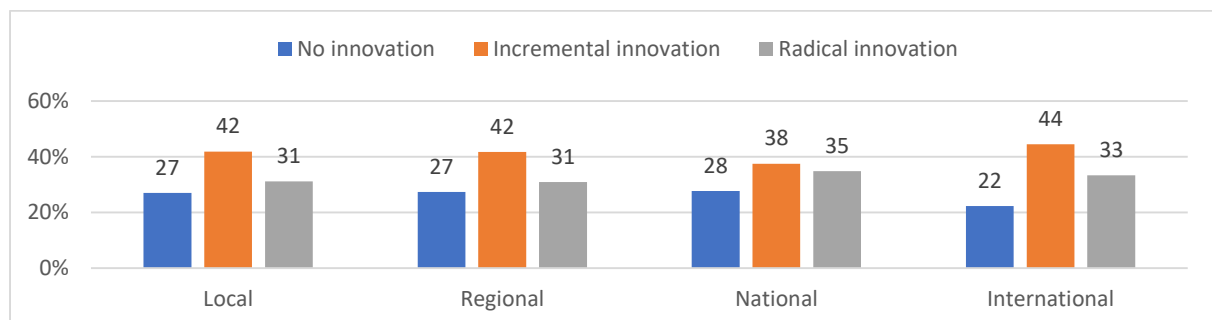
Furthermore, when looking at the same data but separated by innovation per scale in total we see that for both product innovation (Figure 16), as for process innovation (Figure 17), partnerships through global pipelines lead to more incremental and radical innovations than partnerships through local buzz. To illustrate, 60% of all radical product innovations were done through collaborating through global pipelines with national and/or international partners. The remaining 40% came forth from engaging in partnerships through local buzz. When testing the number of partners on local, regional, national and international level, the output of a Mann-Whitney test showed that, on average, product innovative firms collaborate significantly more with diverse partners on international scale (mean rank = 76.20, n = 110) than not-product innovative firms (mean rank = 55.34, n = 32), U = 1243, z = -2.56, p = .01, two tailed (see Table 43 and Table 44 in the appendix). **Meaning that collaborating with diverse international partners positively influences product innovation.**

Figure 16. Type of product innovation overall
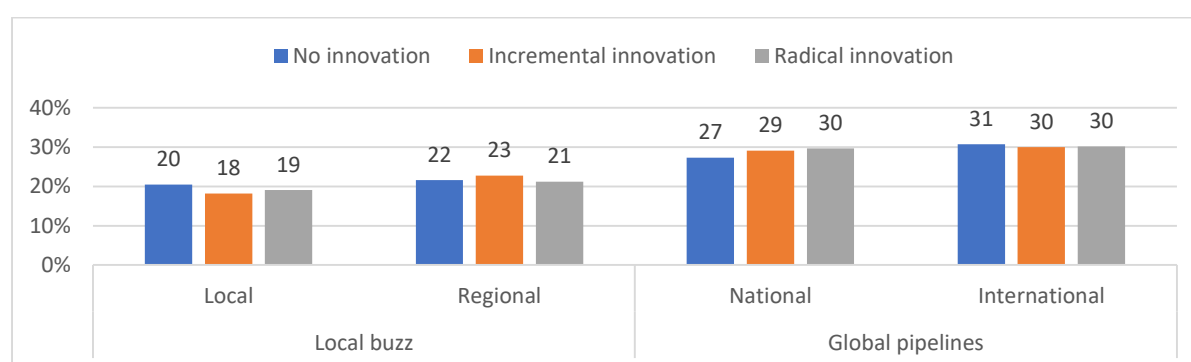
Additionally, A Mann-Whitney test shows that collaborating with diverse international partners has a significant relation with process innovation. On average, process innovative firms collaborate significantly more with diverse partners on international scale (mean rank = 75.58, n = 106) than not-product innovative firms (mean rank = 59.50, n = 36), U = 1476, z = -2.05, p = .04, two tailed (see Table 45 and Table 45 in the appendix). **This means that collaborating with diverse international partners positively influences process innovation.** For the other scales, the output in SPSS showed no significant effect on innovation and the number of local, regional and national partners.

Figure 17. Type of process innovation overall
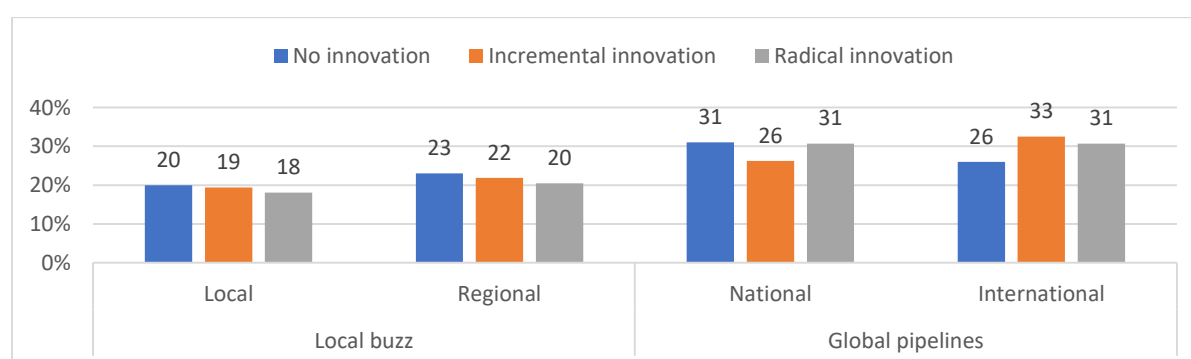
The respondents were also asked to indicate to what extent the location of personal contacts outside their firm had been useful for the work-related knowledge your gained in the past year. For this, a 5-point Likert scale was constructed (1 = not useful at all to 5 = very useful). The scales used by Fitjar and Huber (2015) were adapted to the case of Thailand and included: In my city/province, In my region, Elsewhere in Thailand, Elsewhere in Asia, Elsewhere in Europe, In the rest of the world. The output of the Mann-Whitney tests showed that product innovation was significantly positively linked to gaining work-related knowledge from personal contacts in Europe ($p = .008$) and the in the rest of the world ($p = .002$) (see Table 51 and Table 52 in the appendix). Somewhat surprisingly, the usefulness of personal contacts elsewhere in Asia was not significantly linked to innovation ($p = .55$). It is hard to allocate the exact reason for this but one may be found in the background of the respondents who might be generally more focused on Europe than on other Asian countries outside Thailand. For all the other scales no significant relation was found and thus, having personal contacts located close to home does thus not necessarily mean that they are more useful for innovation.

Additionally, a correlations matrix shows that the diversity of international partners is significantly positive related to whether the shares are owned by foreigners ($p = .000$, $r = .289$) whereas the association with having local partners is almost negatively significant ($p = .055$, $r = -.161$) (see Table 42 in the appendix). Spearman's rho (r) is the nonparametric equivalent of Pearson, which doesn't require the data to be normal distributed. A positive correlation value between .1 and .3 suggest a small strength of association, between .3 and .5 a medium strength of association and .5 to 1.0 a large strength (Pallant, 2010). However, foreign ownership of shares was not significantly associated with any form of innovation direct.

5.3.1   Findings versus Expectations

As we saw in this paragraph, collaborating with diverse international partners positively influences product innovation and process innovation. Additionally, product innovation was significantly positively linked to gaining work-related knowledge from personal contacts in Europe and the in the rest of the world. In contrast to most previous analyses, local (Porter, 1990) and national (Isaksen, 2009; Onsager, Isaksen, Fraas and Johnstad, 2007) interactions do thus not seem to promote firm-level innovation in Thailand. This was also concluded by Fitjar and Rodríguez-Pose (2011), who found that the most innovative firms are those with a greater diversity of international partners and local and national interaction seemed to be irrelevant for innovation (regional collaborations were not separately measured in their survey).

The fact that both personal and formal contacts abroad are significantly linked to innovation whereas those located closer to home are not, aligns with the notion that partners abroad are chosen for their cognitive replenishment to the already available knowledge within the firm. As Bathelt et al (2014) state, actors need to make well calculated decisions about which global pipelines to address and how much knowledge to request. Furthermore, the significant role of international linkages, in combination with no significant results for local partners, may indicate that the accumulation of knowledge only happens within companies and does not spillover to other partners.

The positive relation found between collaborating with international partners and foreign owned shares, and the negative relation between foreign owned shares and collaborating with local partners, indicates that Thai companies of whom the majority of shares are owned by foreigners are better embedded in international linkages than in their local network. As mentioned earlier by the STI, "*Japanese car manufacturers use Thai suppliers but also set up their own partners from Japan. In a sense, it is that they are operating in a closed system, which is an extension of their domestic system.*" (STI, personal communication, 2018).

5.4 SMEs and large firms

This third paragraph examines the differences between Thai SMEs and large firms and their collaboration with partners. Therefore, the following hypotheses have been tested:

- *H3a: SMEs are more linked to incremental innovations than radical innovations whereas large firms are more linked to radical innovations than incremental innovations*
- *H3b: Collaboration with DUI-partners for innovation is more important for SMEs than for large firms whereas collaboration with STI-partners for innovation is more important for large firms than for SMEs*
- *H3c: Collaboration with international partners for innovation is more important for large firms than for SMEs whereas collaboration with local partners for innovation is more important for SMEs than for large firms*

When splitting the data set between SMEs and large firms and testing them on innovation performance, the outcome shows that SMEs develop more incremental innovations whereas large firms develop more radical innovations (see Figure 18). Overall, SMEs are also slightly less innovative than large firms.

Figure 18. Difference in innovation performance between SMEs and large firms
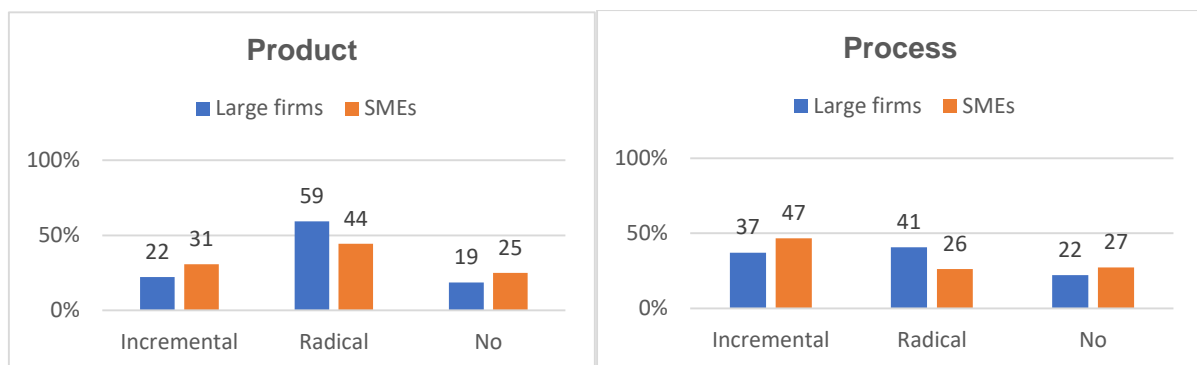
Figure 19 shows the difference between SMEs and large firms and the type of partners they used. Overall, large firms are using more STI-partners than SMEs whereas SMEs collaborate more with competitors. A Mann-Whitney U Test was used to test the associations between the two groups. For SMEs, an association between *companies in the conglomerate* and *product innovation* shows that, on average, the diversity of other companies in the same conglomerate for product innovative firms (mean rank = 47.64, n = 66) significantly exceeded those of non-product innovative firms (mean rank = 35.07, n = 22), U = 518.5, z = -2.18, p = .03, two tailed. **Meaning that for SMEs, collaborating with diverse partners in the same conglomerate on local, regional, national and international level, positively influences product innovation** (see Table 53 and Table 54 in the appendix).

Additionally, for SMEs, on average, the diversity of *universities* for *radical product innovative* firms (mean rank = 37.42, n = 39) significantly exceeded those of incremental product innovative firms (mean rank = 27.83, n = 27), U = 373.5, z = -2.16, p = .03, two tailed (see Table 55 and Table 56 in the appendix). **Meaning that for SMEs, collaborating with diverse universities on different geographical scales positively influences radical product innovation.** For large firm no significant relation between innovation and DUI or STI-partners was found.

Figure 19. Difference of types of partners between SMEs and large firms
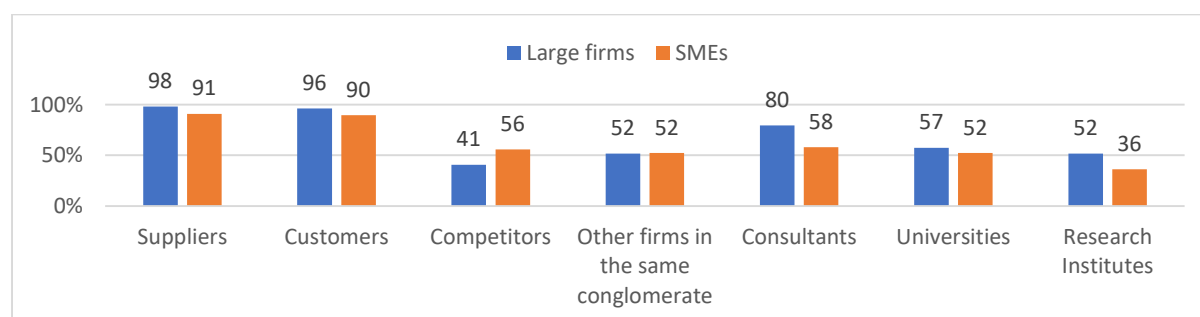
Figure 20 shows the difference between SMEs and large firms and their usage of partners on different spatial scales. Large firms do not collaborate with more international partners than SMEs whereas SMEs use slightly more local partners than large firms. However, the output of SPSS shows a significant association between *international partners* and *product innovation* for large firms. On average, the number of international partners for product innovative firms (mean rank = 29.49, n = 44) significantly exceeded those of non-product innovative firms (mean rank = 18.75, n = 10), U = 132.5, z = -1.98, p = .048, two tailed (see Table 57 and Table 58 in the appendix). **Meaning that for large firms, collaborating with more diverse international partners positively influences product innovation**. Furthermore, another association was found for large firms between *international partners* and *radical process innovation,* which shows that, on average, the number of international partners for radical process innovative firms (mean rank = 17.86, n = 22) is significantly lower than those of incremental process innovative firms (mean rank = 25.50, n = 20), U = 140, z = -2.05, p = .040, two tailed (see Table 59 and Table 60 in the appendix). **Meaning that for large firms, collaborating with international partners negatively influences radical process innovation and tends to stimulate incremental process innovation instead.** For SMEs, no significant relation was found.

Figure 20. Difference of geographical partners between SMEs and large firms
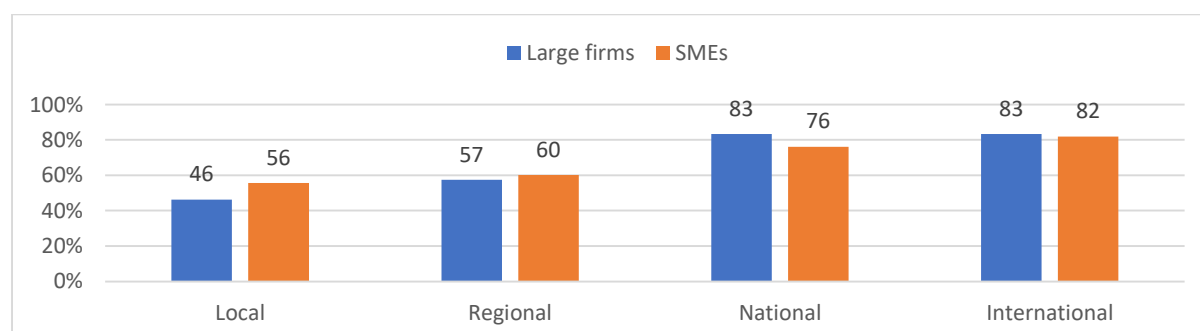
5.4.1 Findings versus Expectations

In the beginning of this paragraph it became clear that SMEs develop more incremental innovations whereas large firms develop more radical innovations. This is in line with the general tendency in the existing literature that SMEs often make small adaptions to existing products and services whereas larger firms and MNEs produce more radical innovations (Oke et al. 2007). As stated by the OECD (2017b), large firms are more embedded in partnerships with STI-partners than SMEs. This was also found in this research. Contrarily, SMEs have indicated to collaborate more with competitors than large firms. A reason for this might be that, as indicated earlier, SMEs in general have fewer resources and face more uncertainties while partnerships with competitors give access to scarce external expertise that can help to resolve common technical issues. Large firms, on the other hand, have more in-house resources to address these issues which allows them to prevent collaboration with competitors.

Furthermore, for SMEs, collaborating with diverse partners in the same conglomerate was positively linked to product innovation whereas collaborating with diverse universities was positively related to radical product innovation. For large firms, collaborating with more diverse international partners positively influences product innovation and tends to stimulate incremental process innovation. These findings suggest that SMEs are more dependent on different partners for innovation than large firms. Large firms on the other hand are better able to benefit from linkages with foreign partners than SMEs but seem to be beneficial only to incremental product and process innovations and are not necessarily linked to radical inventions. This is also in line with the statements made by the companies interviewed. The MNE does not collaborate much with Thai suppliers whereas the SME does this more frequent. This aligns with the literature, which states that SMEs are more embedded in local environments than large firms, who are more engaged in international networks. However, both companies state that the distance to a supplier is basically irrelevant for their partnership, as long as the required product or service can be delivered (SME, personal communication, 2018; MNE, personal communication, 2018). When asking when distance does matter, the MNE states that for collaborating with service centres proximity is often preferred. However, both also indicate that almost everything they need is located in and around Bangkok, the same area where both companies are located.

5.5 Conclusion

This chapter aimed to examine what type of partners are important for innovation in companies in Thailand and to what extent geographical proximity plays a role. Multiple hypotheses were tested to come to the conclusions made in this chapter, which in turn aim to answer sub-question a, b, and c. Below the outcomes of the hypotheses are explained (see Table 4 for an overview).

Overall, the results shown in paragraph 5.2 do not support H1a and H1b. Meaning that DUI-partners are not significantly more important for incremental innovations than radical innovations and that collaboration with STI-partners is not significantly more important for radical innovations than incremental innovations. Both type of partners are equally important for innovation. However, those companies that collaborate with other companies in the same conglomerate and research institutes on different geographical scales are significantly more successful in product innovation than those who collaborate with fewer of these partners. This indicates that collaboration with few of the same partners is not necessarily beneficial for the accumulation of new knowledge whereas this increases when firms collaborate with more of the same on different spatial levels.

The results of paragraph 5.3 do support H2a and thus, innovative firms are indeed more involved in international networks than non-innovative firms. For formal firm networks, international partners were significantly linked to product and process innovation and were believed to be more important as partners for innovation activities among those that did innovation than among those who did not. Additionally, personal contacts in Europe and the rest of the world were considered as important for gaining work-related knowledge in product innovation (although lesser so for process innovation). Furthermore, H2b cannot be supported. No significant relation was found between international partners and radical process or radical product innovation.

In paragraph 5.4, H3a was supported and Thai SMEs are indeed more linked to incremental innovation whereas large firms are more linked to radical innovations. Secondly, H3b was not supported. Although the usage of STI-partners was indeed more evident for large firms than for SMEs was there no difference in collaboration with DUI-partners between the two firm sizes. Also when looking at the output of SPSS, no clear division was visible between the two firm sizes and partner types. Thirdly, H3c was supported. Although no significant difference existed in collaborating with international partners between SMEs and large firms (see Figure 20) seem large firms better capable to transform the information acquired from these international partner into innovations. As stated, for large firms a significant positive relation was found between international partners and product innovation whereas they are negatively related to radical process innovation. Meaning that collaborating with international partners stimulates incremental process innovation rather than radical.

Table 4. Supported or Rejected Hypotheses and its sub-questions – Chapter 5

a) What type of partners are important to collaborate with for the innovation activities of Thai firms?	
H1a: Collaboration with DUI-partners is more important for incremental product and process innovations than radical product and process innovations.	**Rejected**
H1b: Collaboration with STI-partners is more important for radical product and process innovations than incremental product and process innovations.	**Rejected**
b) To what extent does geographical proximity of personal and formal partners influence the innovative performance of Thai firms?	
H2a: Collaborating with international partners is more important for innovative firms than for non-innovative firms.	*Supported*
H2b: Collaborating with international partners is more important for radically innovative firms than for incrementally innovative firms.	**Rejected**
c) How do network linkages for innovation in Thailand differ between SMEs and large firms?	
H3a: SMEs are more linked to incremental innovations than radical innovations whereas large firms are more linked to radical innovations than incremental innovations.	*Supported*
H3b: Collaboration with DUI-partners for innovation is more important for SMEs than for large firms whereas collaboration with STI-partners for innovation is more important for large firms than for SMEs.	**Rejected**
H3c: Collaboration with international partners for innovation is more important for large firms than for SMEs whereas collaboration with local partners for innovation is more important for SMEs than for large firms.	*Supported*

Chapter 6: Cultural Intelligence

"In Asia, the idea of being in harmony with each other is tacit. It's something we grew up with; it's been primed in us. Going into any engagement, we're trying to make the relationship work. There are no grounds for divorce. The relationship is the most important."

<div align="right">Soon Ang, Cultural Intelligence Pioneer, in CCL</div>

As was concluded in the previous chapter, inter-firm relationships that spring from formal and informal linkages between people offer access to sources of knowledge. Also, those linkages are most useful for innovation when firms collaborate with partners located abroad. Partnering with these firms and organizations abroad is not as 'automatic' as with partners who are located geographical more proximate. It requires more effort to understand the partner and to comprehend information transferred through these pipelines. Additionally, the previous chapter concluded that large firms are more embedded in international networks than SMEs and that they are better able to reap the benefits from the partnerships for innovation. Not completely surprisingly since they have the ability to access key resources easier. Therefore, this chapter tests whether metacognitive and motivational cultural intelligence influence a firm's capability to use international linkages and answers the final sub-question in the conclusion.

The Cultural Intelligence Scale (CQS), developed by Ang et al (2007) has been used to measure the level of cultural intelligence. The CQS is a frequently used measurement method in cultural intelligence literature. The CQS originally consists of 20 items that construct motivational, behavioural, metacognitive, and cognitive CQ. The two dimensions of CQ measured in this research are motivational and metacognitive (see chapter 2.6). In order to give an adequate answer to the final sub-question, two hypotheses were drafted from the theory:

- **H4a:** *Collaboration with international partners for innovation is more prevalent for firms with a high motivational CQ than firms with a low motivational CQ*
- **H4b:** *Firms with a high metacognitive CQ are more innovative than firms with a low metacognitive CQ*

To measure both dimensions, four items for metacognitive CQ (e.g. 'I consciously apply cross-cultural knowledge when interacting with people with different cultural backgrounds' and 'I adjust my cultural knowledge as I interact with people from a culture that is unfamiliar to me') and four items for motivational CQ (e.g. 'I enjoy interacting with people from other cultures' and 'I am confident that I can socialize with locals in a culture that is unfamiliar to me') were adopted (a total of 8 items). For all items see *Appendix A: Questionnaire*. These items are measured using a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree). In *Appendix F: Data Preparation Cultural Intelligence* the process taken prior to conducting the tests will be elaborated. This includes testing the reliability and validity of the constructs through a Cronbach's Alpha and Principal Component Analysis, and transforming the data from 7-likert to a 0 to 100 scale.

6.1 Motivational and Metacognitive CQ

Overall, the respondents had an average level motivational cultural intelligence of 83 and metacognitive of 80 (both out of 100). For motivational CQ the lowest rating was a score of 25 whereas the lowest score for metacognitive was 37.5 (see Table 72 in the appendix). In order to find out whether the level of the motivational and metacognitive CQ has a significant influence on the actual usage of local, regional, national and international scales, a Mann-Whitney test has been conducted. However, none of the output proved to be statistically significant (Table 73, Table 74, Table 75 and Table 76 in the appendix). **Meaning that motivational and metacognitive CQ is not significant related to using local, regional, national or international partners.**

Additionally, a Kruskal-Wallis H test has been conducted to see whether the level of motivational or metacognitive CQ influences the diversity of local, regional, national and international partners. Diversity in this case is the sum of all partner types on the respective level. The Kruskal-Wallis H test is the nonparametric equivalent of the one-way ANOVA test and can be used to determine if there are statistically significant differences between two or more groups of an independent variable on a continuous or ordinal dependent variable (Pallant, 2010). It extends the Mann–Whitney U test when there are only two groups. However, none of the output shows to be statistically significantly related for both variables (Table 77, Table 78, Table 79 and Table 80). **Meaning that motivational and metacognitive CQ is not significant related to the diversity of local, regional, national and international partners.**

A second Kruskal-Wallis H test has been done to test the usefulness of personal contacts on different spatial scales. The output in SPSS shows that cultural intelligence was significant related to the usefulness of personal contacts in the rest of the world (motivational, p = .015; metacognitive, p = .026) (see Table 81 and Table 83 in the appendix). **Meaning that firms that find personal contacts in the rest of the world useful have a higher motivational and metacognitive CQ than those who find them not useful.** Additionally, the same relation was found for personal contacts elsewhere in Asia (motivational, p = .002; metacognitive, p = .033) (see Table 82 and Table 84 the appendix). **Meaning that firms that find personal contacts elsewhere in Asia useful have a higher motivational and metacognitive CQ than those who find them not useful.** Just as with the usefulness of partners in Asia for innovation activities (see 5.3) are European partners not significantly linked to CQ. Again, the most likely reason behind this seems to be the Western background of many of the respondents. Meaning that CQ does not positively or negatively influence engaging in cultures that are already familiar to one's own.

For the second hypothesis, another two tests have been conducted. Firstly, the direct effect of both CQ dimensions has been tested on product and process innovations through a Mann-Whitney U test. Here, a significant relation with 90% confidence interval has been found between motivational and radical product innovation. The level of motivational is higher among those that introduced a radical innovative product in the last three years (mean rank = 59.35, n = 71) than those that introduced an incremental

product (mean rank = 48.49, n = 39) U = 1111, z = -1.73, p = .084, two tailed (see Table 85 and Table 86 in the appendix). **Meaning that firms that did radical product innovation have a higher motivational CQ than those that did incremental product innovation.**

Also for metacognitive CQ, the output showed a significant relation between the level of metacognitive CQ and product innovation. The level of metacognitive CQ is higher among those that did product innovation in the last three years (mean rank = 75.83, n = 106) than those did not do product innovation (mean rank = 56.63, n = 36) U = 1284, z = -2.35, p = .019, two tailed (see Table 87 and Table 88 in the appendix). **Meaning that firms that did product innovation have a higher metacognitive CQ than those that did no product innovation.**

The positive relation between CQ and usefulness of some partners abroad and between CQ and product innovation, raises the question of a moderating effect of CQ on the relation between collaborating with international partners and innovation performance. In order to test this, a linear regression analysis was conducted to test the presence of a moderating role of CQ on the four types of innovation. In order to do so, three additional variables have been created (Personal_Link_Cent, MOT_CQ_Cent, MOT_CQPersonal) (Aiken & West, 1991; Cling, 2008). However, when conducting a linear regression analysis with these analysis, no moderating role of motivational or metacognitive CQ come forward (see Table 89, Table 90, Table 91 and Table 92 in the appendix). **Meaning that motivational and metacognitive CQ has no moderating effect on innovation performance.**

However, knowing that large firms are more embedded in international network linkages than SMEs, raises the question whether this could be linked to a higher possession of cultural intelligence as well. In order to test this, a Mann-Whitney U test was conducted to see whether there was a significant difference between SMEs and large firms in their level of motivational and metacognitive CQ. The output showed that large firms, on average, had a significant higher level of metacognitive CQ (mean rank = 82.42, n = 54) than SMEs (mean rank = 64.80, n = 88) U = 1786.5, z = -2.51, p = .012, two tailed (see Table 93 and Table 94 in the appendix). **Meaning that large firms have a significant higher metacognitive CQ than SMEs.** For motivational CQ no significant difference was found.

6.1.1 Findings versus expectations

In short, the quantitative results show that there is a significant (<.05) relation between both motivational and metacognitive CQ and the usefulness of personal contacts in the rest of the world and elsewhere in Asia. Recall that motivational CQ reflects people's interest to learn from other cultures and to adapt to new cultural environments and that individuals with a high motivational CQ are able to develop more useful relations with people from different cultures and to 'translate' ideas into concepts that could be applied in domestic situations (Bogilović & Škerlavaj, 2015). Metacognitive CQ on the other hand is related to capabilities such as planning, monitoring and revising mental models of cultural norms for countries and groups of people, and is linked to positively influencing individual's creativity and creative thinking (Bogilović & Škerlavaj, 2015). Since the building of global pipelines is based on selecting specific partners that match the company's need outside the region does it imply some sort of cognitive

or organizational type of proximity (Fitjar & Rodríguez-Pose, 2013). The fact that both dimensions are related to finding people from other parts of the world useful for work-related knowledge indicates that they contribute to the capacity to understand and absorb information from them. Mr. Charoensukmongkol (personal communication, 2018) states that cultural intelligence is an important aspect for firms to undergo relations with partners abroad who's culture is different than your own. In the interviews with companies in Thailand, the role of the company's absorptive capacity is a strong determinant for the actual execution of (radically) new plans and ideas. Especially when the company exists of different nationalities, it is important that people understand not only each other but also those partners the company is working with. On the question whether cultural awareness is important, answer both companies positive. One states: "*Yes, this is very important but you should be aware that you're not adapting too much to the local culture. We prefer to keep our company culture intact as well and you need to be aware of the choices you make. Some personal cultural adaptions are really easy to make and it would be shocking for a Thai if you wouldn't do so.*" (SME, personal communication, 2018). Thus, people need to know what kind of adaptions are needed and relevant. Metacognitive CQ contributes to this since it entails "thinking about thinking, comprising the processes of monitoring and adjusting one's thoughts and strategies as one learns new skills" (Chua et al., 2012, p. 117).

Secondly, it is important to be aware of someone else's cultural background because it facilitates collaboration among different parties. When, for instance, both expect the other to take ownership over a certain problem, the risk exists that nothing happens. Cultural awareness therefore improves mutual understanding. As stated by the SME (personal communication, 2018): "*We have had some cases in which we made unnecessary costs because we didn't express our intentions well enough and the supplier didn't fully understand.*" A different example given by the MNE was a telephone call between a Thai colleague and someone from Europe. During this call the European partner got angry and frustrated and asked with clenched fists whether the task was done or not, upon which the Thai answered with a brief 'yes' and closed the laptop. Afterwards, "*I called the European colleague and asked whether he understood what happened, upon which he answered that he [the Thai colleague] is finally going to do what I asked him to do. No, I said. You got mad at him and you paid him no respect. In his view, you no longer exist.*". "*The sense of honour is here much stronger.*". When asking whether they received training to increase cross-cultural collaboration, he answered: "*We used to get training for this but they stopped offering these. I think this is not a wise choice since it is important to understand that cultures are different from each other and to prevent miscommunication like the example mentioned earlier.*" (MNE, personal communication, 2018). These findings support the idea that having knowledge of each other's culture is beneficial for collaboration. As found by Earley & Ang (2003), motivational and metacognitive CQ increase one's understanding of similarities and differences between culturally diverse colleagues from the East and the West (Earley & Ang, 2003). Had the European colleague known that he should have been more respectful and less direct, he probably would have gained much more from this collaboration than now was the case. These examples already suggest that the willingness to adapt to someone else's culture is an important drive to improve partnerships. As suggested by Bandura (2002) having a high motivational CQ enables one to obtain the relevant information and tools to develop effective coping strategies.

6.2 Conclusion

This chapter aimed to examine the role that cultural intelligence plays in engaging with international partners and innovation. H4a and H4b were tested, which in turn aim to answer sub-question d. Below the outcomes of the hypotheses are explained (see Table 5 for an overview).

The evidence from this chapter supports H4a and embraces the idea that collaboration with international partners for innovation is more prevalent for firms with a high cultural intelligence than firms with a low CQ. The results in SPSS showed a significant relation of CQ and to two forms of innovation: product and radical product. Therefore, H4b was supported and it can be stated that firms that did product innovation have a significant higher metacognitive CQ than those who did not introduce any new products. Also, those who conduct radical product innovation have a higher motivational CQ than those with incremental innovations.

Table 5. Supported or Rejected Hypotheses and its sub-question – Chapter 6

d) *How does cultural intelligence influence a company's engagement in international network ties for innovation?*	
H4a: Collaboration with international partners for innovation is more prevalent for firms with a high motivational CQ than firms with a low motivational CQ	*Supported*
H4b: Firms with a high metacognitive CQ are more innovative than firms with a low metacognitive CQ	*Supported*

Chapter 7: Conclusion, recommendations, limitations and critical reflection

"It isn't that they can't see the solution. It is that they can't see the problem."

G. K. Chesterton in 'The Point of a Pin', The Scandal of Father Brown (1935)

In this chapter, the outcomes of the research will be concluded. Additionally, a paragraph is dedicated to the recommendations that arise from this conclusion. This chapter ends with some possible further research directions and by giving a critical reflection on its limitations.

7.1 Conclusion

The goal of the thesis was to understand the importance of engaging in successful partnerships for innovation by examining to what extent network linkages and cultural intelligence contribute to the innovation performance of Thai firms. This research was conducted in the context of Thailand and the middle-income trap, which reflects its inability to change the industrial and export structure in order to meet the needs of international product markets where the emphasis lies on innovation and product differentiation (Agénor, 2016). The country's incomplete market, educational system, low level of R&D activities and spending, and its dichotomous private sector, were named as reasons that contribute to the current situation. In 2016, the Thai government responded by announcing its 'Thailand 4.0' strategy: an economic model based on creativity, innovation, new technology and high-quality services. However, as the quote in the beginning of this chapter already illustrates, the Thai government is right in its view to encourage innovation among its firms. Yet, it seems to overshoot its mark by trying to stimulate innovation by attracting foreign direct investment and physical infrastructure instead of investing in the much needed technical expertise and skilled workers. As Jitsuchon (2012) stated, "*It is completely true that we need innovations to create added value to flee the middle income trap, but we need to rethink whether Thailand 4.0 is a model that matches what we have now*".

Much of the current literature on knowledge exchange and innovation focuses on the importance of face-to-face interaction and frequent, repeated personal contacts. From a regional point of view, innovation is locally embedded and many of these theories are rooted in the idea that clustering and cooperation stimulates learning processes and the generation of a local knowledge base (Petruzzelli et al., 2018). The feeling that 'something is in the air' (Gertler, 2003) is embodied in the concept of 'local buzz', which emphasises the importance of co-location of people and firms within the same industry, place or region (Bathelt et al. 2004). Local buzz arises from both formal and planned, as well as, informal and unplanned forms of contact. It is beneficial to innovation processes because it generates opportunities for a variety of spontaneous and unanticipated situations where firms interact, which leads to knowledge spillovers (Nonaka et al., 2000). The main hotspot for this informal and unplanned exchange in Thailand remains since the 1980's Bangkok. Despite governmental fiscal incentives to encourage business relocation, most industries are still located in the Bangkok vicinity where they can benefit from a large consumer market and the availability of better infrastructure facilities and social

services (Poapongsakorn & Tangkitvanich, 2014). In order to avoid lock-in and decline, firms and clusters depend on new knowledge and networks, which is often acquired through strategic partnerships of interregional and international reach of 'global pipelines' (Owen-Smith & Powell, 2002). As this thesis showed, offers collaboration through these global pipelines Thai firms the potential to tap into new knowledge outside the country.

Various authors have argued that there is no reason why knowledge exchange should be limited territorially. In this train of thought, Boschma (2005) proposed a proximity framework which refers to the types of inter-organizational relationships that are expected to facilitate collaborative innovation. Besides geographical proximity, are cognitive, organizational, social, and institutional proximity emphasized as factors that support inter-organizational collaboration. Distance in one of the dimensions can be compensated with by the presence of proximity in another. This is also how the concept of local buzz and global pipelines work: interaction with partners who are not located nearby, which means a lack of geographical proximity, but strong cognitive, organisational and, most likely, social and institutional proximity, are global pipelines. Interaction at close quarters, when different agents in the production chain share the same location, which adds geographical proximity to all the other types of proximity, is characterized as local buzz.

Whereas this local buzz is often characterized as being frequent, broad, relatively unstructured and largely 'automatic', function global pipelines in a very different way. Global pipelines are channels of communication and interaction between locally based firms in a region or cluster and selected partners outside the region. Such strategic partnerships offer access to knowledge and assets not available locally, although their number and scope is limited by the cost and time involved in building them. Actors need to make well calculated decisions about what global pipelines to address and how much knowledge to request (Bathelt et al., 2004). The selection of partners abroad requires firms to invest time and resources in purposely selecting partners that fit the firm's capacity to cope with these proximity advantages and limitations. In this research it became evident that for Thai companies, trustworthiness is an important element in choosing who to collaborate with. Trust is often easier built when partners are geographically and institutional proximate to one another. As indicated earlier, developing trust with partners overseas was found more difficult than with local partners. As a result, many, Thai entrepreneurs tend to prefer engaging in partnerships with companies and managers they already know (NIA, personal communication, 2018). Furthermore, it was argued that for Thai firms, personal networks sometimes matter too much. Meaning that there lies too much emphasises on doing business with socially proximate partners (Charoensukmongkol, personal communication, 2018). This leads to frequent and repeated interactions with other socioeconomic actors in the same geographical space, which does not yield new impulses. Assuming that trust indeed decreases over social, institutional and geographical distance, and that this thesis showed that 33% of the total partners used were international, is at odd with these statements. It does however confirm the importance of carefully selecting partners through global pipelines. Merely 'being there' because 'something is in the air' is thus not enough and Thai firms need to engage in carefully chosen international linkages to tap into knowledge sources that complement the existing knowledge. For that reason, international partnerships

are significantly positive related to innovative performance, whereas local, regional or national partnerships are not. Trust can thus also be built across larger geographical, social and institutional distance, but this process takes time and requires resources.

As the previous sections examined the importance of global pipelines, argue Nadvi and Halder (2005) that a firm's network linkages need to be balanced between the local and the global. As Morrison et al (2013) stated, "*global pipelines are only beneficial for the accumulation of knowledge if the cluster is either characterized by a high-quality local buzz or is small and weakly endowed in terms of knowledge*". Although innovative firms relied more on international and local partners than non-innovative firms, showed this thesis that local collaboration was not significantly related to innovation. The absence of a significant relation between collaborating with local partners and innovation suggests that in the case of Thailand, the local buzz is weakly endowed in terms of knowledge. This however means that global pipelines can still be beneficial for innovation. Yet, the knowledge spillovers that occur from local interactions are barely novel in the sense that they lead to new insights or ideas.

This weakly endowed buzz is especially disadvantageous for Thai SMEs, who make up 99.7% of the firms in Thailand but only contribute 37.4% to the total GDP. They are more embedded in local networks than large firms, for whom local systems represent their primary source of knowledge, skills and networks. When these systems are weakly endowed in terms of knowledge, has this negative influence over the quality and novelty of knowledge spillovers. This may be one of the reasons why many Thai SMEs remain to be tier 2 and 3 suppliers who are usually limited in what they can produce and who have a relatively low industrial sophistication. Contrarily, finished goods assemblers and tier 1 suppliers, who often offer the most advanced processes, are mainly foreign firms (ADB, 2015). This system in which Thai suppliers remain in levels of relatively low industrial sophistication leads to a type of enclave industrialization in which the country possesses a few high-tech sectors, but not a high-tech economy. A reason for this weakly endowed local buzz comes from the rather low quality of the Thai educational system. Technical professions in engineering and IT are not very popular among the Thai youth and this increases the problem of translating academic results to industrial applications (Jitsuchon, personal communication, 2018; STI, personal communication, 2018). Overall, the Thai labour force lacks the skills and knowledge which is needed to turn Thailand from a country with a few high-tech sectors into a country with a high-tech economy.

As indicated earlier, Thai entrepreneurs tend to prefer engaging in partnerships with companies and partners they already know. This leads to frequent and repeated interactions with other socioeconomic actors in the same geographical space and may not yield new impulses. Addressing new partners through global pipelines would enable them to tap into new sources of knowledge. However, this process of identifying and connecting to the appropriate knowledge partners is not self-evident for all firms. Generally, SMEs have less resources available than large firms to engage in successful international partnerships. Large firms, on the other hand, are better able to reap the benefits from international network ties, since they have better access to key resources and employ larger R&D staff. Therefore, this thesis showed that collaboration with international partners was for large firms

significantly linked to product and process innovation. In order to benefit from international collaboration, firms need to possess absorptive capacity, which refers to routines and processes through which firms acquire, assimilate, transform, and exploit knowledge (Cohen & Levinthal, 1990). As Nooteboom (2000, p. 153) already argued: "*Information is useless if it is not new, but it is also useless if it is so new that it cannot be understood*".

In this train of thought, Earley and Ang (2003) developed the construct of cultural intelligence (CQ), which reflects "*an individual's capability to function and manage effectively in culturally diverse settings*". This thesis found that firms with a high possession of motivational and metacognitive cultural intelligence are better able to engage in international partnerships and are better able to reap the benefits coming from these international linkages, with innovation as result. Motivational and metacognitive cultural intelligence increase the individual's understanding of similarities and differences between culturally diverse colleagues from the East and the West (Earley & Ang, 2003).

The key to creativity is with whom and how people interact and a high cultural intelligence contributes to the ability to function and manage effectively in culturally diverse settings. As became evident from examples given by the interviewees, are these important principles for cross-cultural collaboration and knowledge exchange. The output showed that both dimensions have a positive effect on the usage of personal contacts in Asia and the rest of the world. Motivational CQ reflects people's interest to learn from other cultures and to adapt to new cultural environments. The results showed that collaboration with international partners for innovation is significantly more prevalent for firms with a high motivational CQ than firms with a low motivational CQ. Additionally, the literature showed that metacognitive CQ is positively related to an individual's creativity and creative thinking (Bogilović & Škerlavaj, 2015). This thesis showed that firms that did product innovation have indeed a significant higher metacognitive CQ than those who did not introduce any new products. Also, firms who developed radical new product innovations have a significant higher motivational CQ than those who developed incremental innovations. In a broader sense, these findings contribute to the idea that is a helpful trait for managers and employees to possess in cross-cultural collaborations. Also, the idea that large firms are better capable of engaging in international network linkages can be explained by their higher level of metacognitive CQ. Large firms have better access to resources, which allows them to utilize capabilities as planning, monitoring and revising mental models of cultural norms for countries and groups of people.

7.2 Recommendations and further research directions

With the past chapters and paragraphs in mind proposes this paragraph several recommendations for policy makers and managers in firms.

7.2.1   Policy Recommendations

A first policy recommendation concerns the availability of data regarding innovation. The creation of a database with data on the innovation performance of Thai firms and their linkages would be beneficial for semi-governmental organizations, like the STI and NIA, who are tasked with innovation stimulation and promotion. The annual or biannual collection of data on innovation could contribute to the drafting process of policies that aim to stimulate innovation and enable organizations to pinpoint existing bottlenecks and shortcomings. Advisable is to use a mixed method research approach where quantitative data has been complemented with qualitative data, which gives a much richer insight in the ways how clusters or firms use partners and innovate.

A second recommendation has to do with the creation of clusters and local buzz. In recent years, policy initiatives to develop spatial clusters of similar economic activities were popular tools to encourage and promote knowledge creation across firms in such clusters. However, the results from this thesis raise the question whether such initiatives alone are sufficient. There is no reason to doubt the importance of local networking, which retains the need to be addressed in local development policies. However, an important argument is that local buzz largely takes care of itself. When economic actors are placed within a region, buzz will ultimately take place in some shape; it is especially the development of global pipelines that requires institutional and infrastructural support. Obviously, this thesis does not suggest that clusters should be exclusively outward looking, since without internal cohesiveness such cluster would not exist. However, many policies for interactive learning and knowledge creation in clusters tend to focus solely on local networking and overlook the importance of trans-local and external partners for novel knowledge. This thesis therefore recommends that policy makers should consider stimulating pipeline development rather than making extensive efforts in generating and promoting local buzz through various forms of social engineering.

Thirdly, this thesis made clear that a country's educational system is the fundamental start for local buzz. When this is weakly endowed in terms of knowledge, a critical look at this system is required. By developing skills required for high value-added sectors the Thai will be prepared for the increasingly competitive global labour market. Skills such as those needed for information technology, communication, and leadership are beneficial for the development of local buzz as well as global pipelines. But also problem-solving and independent, or, out-of-the-box, thinking were skills mentioned by the interviewees. Campaigns to promote technical professions and targeting to close the skill shortages gap in the vocational sector are needed to help the country escape the middle-income trap.

Fourthly, with only 56% of Thailand's population having access to the internet, an enormous potential in human capital remains untapped. By creating a stable digital infrastructure and helping the remaining

Thai to access the internet would enable firms to interacts in today's globalized world easier and quicker. The internet could be a first step for many Thai SMEs to engage in global pipelines and to look for resources, knowledge, information from other places.

7.2.2 Managerial Recommendations

The conclusion also leads to some managerial recommendations. Firstly, its recommended that both SMEs and large firms should invest sufficient resources in finding suitable partners that extend their current knowledge. These partners can be found either within their own city or province, region, elsewhere in Thailand, or even abroad. Firms are more likely to innovate when they purposely look for partners which provide knowledge that complement their current knowledge and which can be understood and transformed into new ideas. Contrarily to what is stated in much of the agglomeration literature, one way to achieve this is by searching for specific partners who may not only be at a considerable cognitive distance from the firms involved, but also at a considerable geographical distance. By engaging in partnerships through global pipelines, partners may find assets or knowledge which are not available locally.

A second recommendation for firms is that they should strive to ensure that their (innovation) managers possess a high level of cultural intelligence. Metacognitive CQ is positively associated with product innovation and motivational CQ is positively associated with radical product innovation. Additionally, managers with a high motivational and metacognitive CQ are significantly better able to engage in international partnerships with people located in Asia and elsewhere in the world. Thus, CQ assessment should be a relevant component of the recruitment and selection process for (innovation) managers. To achieve this, hiring managers should familiarize themselves with the concept of CQ and include CQ assessments as part of an overall evaluation process of candidates for innovation manager positions. Prior research by Ang et al (2007) found that of the Big Five personality dimensions (openness to experience, conscientiousness, extraversion, agreeableness and neuroticism), conscientiousness and openness to experience are significantly related to metacognitive CQ, and motivational CQ is predicted by extraversion and openness to experience. Additionally, unlike inherent aspects of personality, CQ can also be learned, developed, and enhanced.

7.2.3 Future research directions

Although this research provides a few answers regarding the role of pipelines and buzz, different types of partners, and cultural intelligence in Thailand, does it also result in several possible directions for further research. These directions not only rise from the conclusion and limitations in this chapter but also ascend from discussions and conclusions made in the chapters four, five and six.

Firstly, the global pipelines and local buzz literature would benefit from more varied research in different national and cultural contexts. As became clear in chapter *2.4 Local buzz and Global pipelines*, the concept is popular in many European countries with empirical evidence from Italy, Norway and the Netherlands, whereas research of pipelines and buzz in other continents is not yet available. In this thesis, much of the findings were compared to these in other countries (mainly Norway) but by

broadening the existing literature to Asian, American or African contexts, a better understanding of network linkages for innovation can be created. Additionally, all of the pipeline and buzz literature focuses on high-income, developed countries, whereas an extensive examination of this in developing economies would contribute to an understanding of innovation networks in middle- or low-income countries; a gap which this thesis partly fills.

Secondly, contrarily to what was found in the literature was collaboration with DUI- and STI-partners not significantly more important for incremental or radical innovations. Also, this thesis did not found that collaborating with international partners is more important for radically innovative firms than for incrementally innovative firms. These rejected hypotheses could be tested in a different setting to see whether they lead to different results when different factors are at play.

Thirdly, the literature of cultural intelligence is still in its infancy and many fields of expertise have not yet been investigated. Relevant research directions for human geography can be found in the field of migration studies, cultural geography, and identity and border studies. As an example, Le, Jiang and Nielsen (2016) examined the role that cognitive CQ plays on life satisfaction and career engagement of migrant workers and Young, Haffejee, Corsun (2017) examined the relation between ethnocentrism and cultural intelligence. Furthermore, the examination of cultural intelligence remains relevant in an increasingly globalizing world where many high-tech cluster attract highly talented people from all across the world. Cultural intelligence could be used in examining a firm's or cluster's network linkages in highly internationalized environments.

7.3 Limitations

The fact that this research was conducted in the context of Thailand might matter for the results in several ways. Firstly, Thailand is a large upper-middle income country with a population of 68.8 million people (World Bank, 2016). The country is getting increasingly urbanized and the Bangkok urban area accounts for nearly 80% of the total urban area in Thailand. As a result, many of the country's companies are located in the Bangkok vicinity where also 40% of Thailand's 170 higher education institutions are located. The quality of the educational system in Thailand is already for many years underperforming compared to other countries in the region. Results from the PISA tests in science, mathematics and reading are stable but show that its students are performing below the world's average since 2006 or even declining (PISA, 2015). Furthermore, the Thai economy is highly reliable on its exports, which account for more than two-thirds of its GDP (World Bank, 2016). Its two major export categories are automotive (cars and delivery trucks) and electronics (computers, integrated circuits), which are dominated by foreign finished goods assemblers and tier 1 suppliers. Finally, levels of trust are relatively low; only 32% of people feel that they can trust most people while three quarters feel that they have to be very careful in dealing with others (Inglehart et al, 2014). This low trust level expresses might stem from the fact that the country is currently governed by a military junta who came to power in 2014 after a coup d'état. Although all of these contextual conditions should be taken into account when interpreting the results, these characteristics are not necessarily unique to Thailand alone and are some elements common across upper-middle income countries.

A second point I want to reflect on is linked to external validity of the sample used in this research. The fact that the questionnaire was distributed via an e-mail while only 52.9% of firms uses e-mail to interact with clients and suppliers, already suggests that those firms are excluded in this research. Also, the samples used in for the quantitative data were all firms with a strong international orientation. This may lead to some extend of bias and the findings of the quantitative outcomes should be taken with this in mind.

Thirdly, although the information retrieved from the interviewees gave a valuable insight, was the number of interviews with representatives from Thai business rather low. Speaking with more managers, and those with a Thai nationality, would have given additional information and might have given different perspectives on the usage of partners. However, finding suitable interviewees that were willing to participate was more difficult than expected beforehand.

Fourthly, as mentioned in chapter 3.4, people tend to overestimate themselves when they have to reflect on their characteristic straits. The question remains whether managers have a high CQ because they have a good relationship with foreign partners or whether they have a good relationship with foreign partners because they have a high CQ. When asking this to Mr. Charoensukmongkol (personal communication, 2018), he agrees that these conclusions are difficult to track. Also, he agrees with the complexity of measuring the phenomenon through questionnaires and doesn't believe it is the best way, but "*it is the only way done so far in academics.*"

Chapter 8: Bibliography

"If I have seen further it is by standing on the shoulders of Giants."

Isaac Newton in a letter to Robert Hooke (1676)

Aarstad, J., Kvitastein, O.A. and Jakobsen, S. (2016). "Local buzz, global pipelines, or simply too much buzz? A critical study". *Geoforum* 75 (2016) 129–133. http://dx.doi.org/10.1016/j.geoforum.2016.07.009

ADB, Asian Development Bank (2015). "Thailand Industrialization and Economic Catch-up". https://www.adb.org/sites/default/files/publication/178077/tha-industrialization-econ-catch.pdf

Agénor, P.R. (2016). "Caught in The Middle? The Economics of Middle-Income Traps". *Journal of Economic Surveys* Vol. 31, No. 3, pp. 771–791. DOI: 10.1111/joes.12175

Aiken, L. S., West, S. G., & Reno, R. R. (1991). Multiple regression: Testing and interpreting interactions. *Sage.*

Amara, N., & Landry, R. (2005). Sources of information as determinants of novelty of innovation in manufacturing firms: evidence from the 1999 statistics Canada innovation survey. *Technovation*, *25*(3), 245-259.

Amin, A., & Cohendet, P. (2004). *Architectures of knowledge: Firms, capabilities, and communities*. Oxford University Press on Demand.

Ang, S., van Dyne, L., Koh, C., Yee Ng, K., Templer, K.J., Tay, C., and Chandrasekar N.A. (2007). 'Cultural Intelligence: Its Measurement and Effects on Cultural Judgment and Decision Making, Cultural Adaptation and Task Performance'. *Management and Organization Review* 3:3 335–371, doi: 10.1111/j.1740-8784.2007.00082. Blackwell Publishing Ltd.

AseanUp.com (2018). *Thailand automotive industry overview [market analysis].* Last update: January 24, 2018, accessed on 02-10-2018. https://aseanup.com/thailand-automotive-industry-overview/

Asheim B., Coenen L., Vang J. (2007). Face-to-face, buzz, and knowledge bases: socio-spatial implications for learning, innovation, and innovation policy'. *Environment and Planning C: Government and Policy* 25 655 - 670

Asheim, B. T., & Gertler, M. S. (2005). The geography of innovation: regional innovation systems. *The Oxford handbook of innovation.*

Audretsch, D. B., & Feldman, M. P. (1996). R&D spillovers and the geography of innovation and production. *The American economic review*, 86(3), 630-640.

Azagra-Caro, J. M., Pardo, R., & Rama, R. (2014). Not searching, but finding: how innovation shapes perceptions about universities and public research organisations. *The Journal of Technology Transfer*, *39*(3), 454-471.

Baarda, D.B. (2009). Dit is onderzoek! Handleiding voor kwantitatief en kwalitatief onderzoek. Eerste druk. Groningen: *Noordhoff Uitgevers BV*

Baarda, D.B., M.P.M. de Goede en J. Teunissen (2009). "Basisboek Kwalitatief Onderzoek – Handleiding voor het opzetten en uitvoeren van kwalitatief onderzoek". Groningen: *Noordhoff Uitgevers BV*

Bahlmann, M. D., Huysman, M. H., Elfring, T., & Groenewegen, P. (2009). *Global pipelines or global buzz? A micro-level approach towards the knowledge-based view of clusters.* (Research Memorandum; No. 2009-2). Amsterdam: Faculteit der Economische Wetenschappen en Bedrijfskunde.

Baker, C. and Phongpaichit, P. (2014). *A history of Thailand – third edition.* Cambridge University Press. ISBN 978-1-107-42021-2

Balland, P. A. (2012). Proximity and the evolution of collaboration networks: evidence from research and development projects within the global navigation satellite system (GNSS) industry. *Regional Studies*, *46*(6), 741-756.

Bandura, A. (2002). 'Social cognitive theory in cultural context'. *Applied psychology*, 51, 26-290. Doi: 10.1111/1464-0597.00092

Bangkok Post (2017). *Thailand 4.0: Are we ready?* Published on 02-02-2017, accessed on 02-10-2018. https://www.bangkokpost.com/business/news/1173133/thailand-4-0-are-we-ready-

Bathelt, H., Malmberg, A. and Maskell, P. (2004). "Clusters and knowledge: local buzz, global pipelines and the process of knowledge creation". *Progress in Human Geography* 28,1 (2004) pp. 31–56

Bathelt, H., Schuldt, N. (2010) International trade fairs and global buzz, part I: ecology of global buzz. *European Planning Studies*, 18: 1957–1974.

Baumgartner, H., & Weijters, B. (2017). Measurement Models for Marketing Constructs. In B. Wieringa & R. van der Lans (Eds.), *Springer Handbook of Marketing Decision Models* (Vol. 254, pp. 259–295).

Beerepoot, N. (2004). 'Learning in small enterprise clusters: the role of skilled workers in the diffusion of knowledge in the Philippines', *Int. J. Technology and Globalisation, Vol. 1*, No. 1, pp.78–91.

Belderbos, R., Carree, M., & Lokshin, B. (2004). Cooperative R&D and firm performance. *Research policy*, *33*(10), 1477-1492.

Belderbos, R., Carree, M., Lokshin, B., Sastre, J. F. (2004). Inter-temporal patterns of R&D Collaboration and Innovative Performance. Maastricht University, RM/15/004

Benneworth, P., & Hospers, G. J. (2007). The new economic geography of old industrial regions: Universities as global—Local pipelines. *Environment and Planning C: Government and Policy*, 25(6), 779-802.

Bogilovic, S., & Skerlavaj, M. (2016). Metacognitive and Motivational Cultural Intelligence: Superpowers for Creativity in A Culturally Diverse Environment. *Economic and Business Review for Central and South-Eastern Europe*, *18*(1), 55.

BOI, Board of Investment Thailand (2015). BOI promoted companies directory 2014-2015. *Investor Club Association*. ISBN 978-616-92074-0-5

Boschma, R. (2005). Proximity and innovation: a critical assessment. *Regional studies*, *39*(1), 61-74.

Bradburn, N. M., Sudman, S., & Wansink, B. (2004). Asking questions: The definitive guide to questionnaire design for market research, political polls, and social and health questionnaires. San Francisco, CA: *Jossey-Bass.*

Breschi, S., & Lissoni, F. (2001). Knowledge spillovers and local innovation systems: a critical survey. *Industrial and corporate change*, *10*(4), 975-1005.

Breschi, S., & Lissoni, F. (2009). Mobility of skilled workers and co-invention networks: an anatomy of localized knowledge flows. *Journal of economic geography*, *9*(4), 439-468.

Breschi, S., & Malerba, F. (2001). The geography of innovation and economic clustering: some introductory notes. *Industrial and corporate change*, *10*(4), 817-833.

Bresnahan, T., Gambardella, A., & Saxenian, A. (2001). 'Old economy'inputs for 'new economy'outcomes: Cluster formation in the new Silicon Valleys. *Industrial and corporate change*, *10*(4), 835-860.

Brown, J. D. (2009). Choosing the right type of rotation in PCA and EFA. *JALT Testing & Evaluation SIG Newsletter*, 13(3), 20-25.

Bryman, A. (2012). "Social Research Methods – 4th Edition". *Oxford University Press*, ISBN 978–0–19–958805–3.

Burt, R.S., 1992. *Structural Holes: The Social Structure of Competition*. Harvard University Press, Cambridge, MA.

Caloghirou, Y., Kastelli, I., Tsakanikas, A. (2004). Internal capabilities and external knowledge sources: complements or substitutes for innovative performance? *Technovation*, Vol.24, 29-39.

Campbell, I. (2007). Chi-squared and Fisher-Irwin tests of two-by-two tables with small sample recommendations. *Stat Med.* 26:3661-3675.

Cantwell, J., & Santangelo, G. D. (2003). The new geography of corporate research in information and communications technology (ICT). In *Change, Transformation and Development* (pp. 343-377). Physica, Heidelberg.

Cardenas, K. (2016). The middle income trap and export-oriented industrialization in Calabarzon. *EMIT Working Paper Series no.* 2016eur1

Carifio, J., & Perla, R. (2008). Resolving the 50-year debate around using and misusing Likert scales. *Medical Education*, 42, 1150–1152.

Cerny, Barbara A. & Kaiser, Henry F. (1977) A Study of a Measure of Sampling Adequacy for Factor-Analytic Correlation Matrices, Multivariate Behavioral Research, 12:1, 43-47, DOI: 10.1207/s15327906mbr1201_3

Charoensukmongkol, P. (2014). 'Cultural Intelligence and Export Performance of Small and Medium Enterprises in Thailand: Mediating Roles of Organizational Capabilities'. Inter*national Small Business Journal,* 1-18. DOI: 10.1177/0266242614539364

Charoensukmongkol, P. (2015). 'Cultural intelligence of entrepreneurs and international network ties – the case of small and medium manufacturing firms in Thailand'. *Management Research Review Vol. 38*, No. 4, 2015, pp. 421-436. DOI: 10.1108/MRR-09-2013-0214.

Charoensukmongkol, P. (2018, August 20). Ph.D. Assistant Professor at ICO NIDA. *Personal Communication.*

Chen, G., Kirkman, B. L., Kim, K., Farh, C. I., & Tangirala, S. (2010). When does cross-cultural motivation enhance expatriate effectiveness? A multilevel investigation of the moderating roles of subsidiary support and cultural distance. *Academy of Management Journal*, *53*(5), 1110-1130.

Chen, M.L. and Lin, C.P. (2013). "Assesing the effects of cultural intelligence on team knowledge sharing from a socio-cognitive perspective". *Human Resource Management, 52(5),* 675-695.

Chua, R. Y., Morris, M. W., & Mor, S. (2012). Collaborating across cultures: Cultural metacognition and affect-based trust in creative collaboration. *Organizational behavior and human decision processes*, *118*(2), 116-131.

CIA, The World Factbook (2010). People and Society, Language. Accessed on September 1st, 2018, though https://www.cia.gov/library/publications/the-world-factbook/geos/th.html

Cling, A.D. (2008). The epistemic regress problem. *Philos Stud* (2008) 140:401-421, DOI 10.1007/sl 1098-007-9152-6

Cloke, P. (2005) 'Self-Other', in P. Cloke, P. Crang and M. Goodwin (eds) *Introducing Human Geographies* (2nd edn). London: Arnold. pp. 61–77.

Coe, N. M., Hess, M., Yeung, H. W. C., Dicken, P., & Henderson, J. (2004). 'Globalizing' regional development: a global production networks perspective. *Transactions of the Institute of British geographers*, *29*(4), 468-484.

Cohen P., Cohen J., Aiken, L.S., &. West, S. G. (1999). The Problem of Units and the Circumstance for POMP, *Multivariate Behavioral Research, 34:3*, 315-346, DOI: 10.1207/S15327906MBR3403_2

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Cohen, W. M., & Levinthal, D. A. (2000). Absorptive capacity: A new perspective on learning and innovation. In *Strategic Learning in a Knowledge economy* (pp. 39-67).

Cooke, P. (2001). Regional innovation systems, clusters, and the knowledge economy. *Industrial and corporate change*, *10*(4), 945-974.

Costigan, C. L., & Cox, M. J. (2001). Fathers' participation in family research: Is there a self-selection bias? *Journal of Family Psychology*, 15(4), 706-720. DOI: 10.1037/0893-3200.15.4.706

Creswell, J.W. (2007). "*Qualitative Inquiry & Research Design – Choosing Among Five Approaches*" Second Edition. Sage Publications, ISBN 978-1-4129-1607-3.

Creswell, J.W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4nd ed.). Thousand Oaks, CA: Sage.

Davidov, E., Meuleman, B., Cieciuch, J., Schmidt, P., & Billiet, J. (2014). Measurement equivalence in cross-national research. *Sociology*, 40, 55–75.

Davids, M., & Frenken, K. (2018). Proximity, knowledge base and the innovation process: towards an integrated framework. *Regional Studies*, *52*(1), 23-34.

De Schrijver, A. (2012). Sample survey on sensitive topics: Investigating respondents' understanding and trust in alternative versions of the randomized response technique. *Journal of Research Practice*, 8(1), Article M1. Retrieved from http://jrp.icaap.org/index.php/jrp/article/view/277/250

de Winter, J. C. F. and D. Dodou (2012). Five-Point Likert Items: t test versus Mann-Whitney-Wilcoxon. *Practical Assessment, Research & Evaluation*, 15(11). Available online: http://pareonline.net/getvn.asp?v=15&n=11.

Desatova, P. (2018) Thailand 4.0 and the Internal Focus of Nation Branding, *Asian Studies Review*, 42:4, 682-700, DOI: 10.1080/10357823.2018.1512555

Dicken, P. (2005). 'Tangled webs: transnational production networks and regional integration', SPACES, 2005-04, (*Spatial Aspects Concerning Economic Structures*, journal published by Department of Economic Geography, Philipps-University of Marburg).

Dicken, P. (2015). '*Global Shift: Mapping the Changing Contours of the World Economy'*. 7th edition. Edition. London: Sage

Dicken, P., & Lloyd, P. E. (1990). *Location in space: Theoretical perspectives in economic geography*. Prentice Hall.

Druckner, P. (1998). From capitalism to knowledge society. In D. Neef (Eds.), *The knowledge Economy.* Boston: Butterworth-Heinemann.

Duranton, G., & Puga, D. (2004). Micro-foundations of urban agglomeration economies. In *Handbook of regional and urban economics* (Vol. 4, pp. 2063-2117). Elsevier.

Earley, P.C., & Ang, S. (2003) 'Cultural intelligence: Individual interactions across cultures. Palo Alto, CA: *Stanford University Press.*

Elenkov, D. S., & Manev, I. M. (2009). Senior expatriate leadership's effects on innovation and the role of cultural intelligence. *Journal of World Business*, *44*(4), 357-369.

Escribano, A., Fosfuri, A., Tribó, J. (2009). 'Managing external knowledge flows: The moderating role of absorptive capacity'.

European Commission, 2018. "What is an SME?" Accessed on July 2nd, 2018, through http://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition_en

Fagerberg, J. and Shrolec, M. (2008). 'National innovation systems, capabilities and economic development'. *Research policy*, 37(9), 1417-1435.

Fehr, Ryan and Eric Kuo (2008), "The Impact of Cultural Intelligence in Multicultural Social Networks," paper presented at the 23d Annual Conference of the Society for Industrial and Organizational Psychology, San Francisco (April).

Ferrarini, B. 2011. Mapping Vertical Trade. ADB Economics Working Paper Series No. 263. Manila: ADB

Field, A. (2013). *Discovering Statistics Using IBM SPSS Statistics*, 4th edition. SAGE. ISBN 978-1-4462-4917-8

Fitjar, R. D., & Huber, F. (2015). Global pipelines for innovation: insights from the case of Norway. *Journal of Economic Geography*, *15*(3), 561-583.

Fitjar, R. D., & Rodríguez-Pose, A. (2011). When local interaction does not suffice: sources of firm innovation in urban Norway. *Environment and Planning* A, 43(6), 1248-1267.

Fitjar, R.D. and Rodríguez-Pose, A. (2013): Firm Collaboration and Modes of Innovation in Norway. *Research Policy 42* (1): 128-138.

Flyvbjerg, B. (2006). "*Five Misunderstandings About Case-Study Research*," Qualitative Inquiry, vol. 12, no. 2, April 2006, pp. 219-245. DOI: 10.1177/1077800405284363

Franke, N., & Shah, S. (2003). How communities support innovative activities: an exploration of assistance and sharing among end-users. *Research policy*, *32*(1), 157-178.

Freeman GH, Halton TR. (1951). 'Note on exact treatment of contingency, goodness-of-fit and other problems of significance'. *Biometrika*. 1951; 38: 141-149

George, D., & Mallery, P. (2003). *SPSS for Windows step by step: A simple guide and reference*. 11.0 update. Boston: Allyn & Bacon.

Gertler, M. (1995). "'Being there': proximity, organization, and culture in the development and adoption of advanced manufacturing technologies". *Economic Geography* 71, 1–26.

Gertler, M. (2003). *"Tacit Knowledge and the Economic Geography of Context or The Undefinable Tacitness of Being (There)".* Presented at the Nelson and Winter DRUID Summer Conference, Aalborg.

Gertler, M.S., & Wolfe, D. A. (2005). Spaces of knowledge flows: Clusters in a global context. Clusters and regional development: *Critical reflections and explorations*, 218-235.

Gill, I. S., & Kharas, H. (Eds.). (2007). An East Asian renaissance: ideas for economic growth. *The World Bank.*

Gill, S.I., and Kharas, H. (2015). "The Middle-Income Trap Turns Ten". Policy Research Working Paper 7403. World Bank Group, August 2015.

Giuliani, E., & Bell, M. (2005). The micro-determinants of meso-level learning and innovation: evidence from a Chilean wine cluster. *Research policy*, *34*(1), 47-68.

Given, Lisa (2008). "*The SAGE Encyclopedia of Qualitative Research Methods – Volume 1 & 2".* Sage Publications.

Gnyawali, D. R., & Park, B. J. R. (2011). Co-opetition between giants: Collaboration with competitors for technological innovation. *Research Policy*, *40*(5), 650-663.

Golgeci, I., & Y. Ponomarov, S. (2013). Does firm innovativeness enable effective responses to supply chain disruptions? An empirical study. *Supply Chain Management: An International Journal*, *18*(6), 604-617.

Gölgeci, I., Swiatowiec-Szczepanska J. & Raczkowski, K. (2017) How does cultural intelligence influence the relationships between potential and realised absorptive capacity and innovativeness? Evidence from Poland. *Technology Analysis & Strategic Management*, 29:8, 857-871, DOI: 10.1080/09537325.2016.1245858

Granovetter, M., 1973. The strength of weak ties. *Am. J. Sociol.* 78 (6), 1360–1380.

Griffith, D. A., & Hoppner, J. J. (2013). Global marketing managers: Improving global marketing strategy through soft skill development. *International Marketing Review*, *30*(1), 21-41.

Griliches, Z. (1992). "The search for R&D spillovers". *Scandinavian Journal of economics*, 94, 29-47.

Gulati, R., Nohria, N., & Zaheer, A. (2000). Strategic networks. *Strategic management journal*, 21(3), 203-215.

Gurría, A. (2017), OECD, Organization for Economic Co-operation and Development. 'Globalisation, Inequality and Thailand 4.0'. http://www.oecd.org/about/secretary-general/globalisation-inequality-and-thailand-4-0.htm

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate Data Analysis.* Edinburgh Gate: Person Education Limited.

Harrell, M.C. and Bradley, M.A. (2009) Data Collection Methods: Semi-Structured Interview and Focus Groups. RAND National Defense Research Institute, Santa Monica.

Hervás-Oliver, J.-L., Albors-Garrigós, J. (2008) Local knowledge domains and the role of MNE affiliates in bridging and complementing a cluster's knowledge. *Entrepreneurship & Regional Development*, 20: 581–598.

Hobday, M. (2005). Firm-level innovation models: perspectives on research in developed and developing countries. *Technology analysis & strategic management*, *17*(2), 121-146.

Hoonaard, van den, W, C. (1997) *Working with sensitizing concepts, Analytical Field Research*. California: Sage Publications.
Howells, J. (2002). Tacit knowledge, innovation and economic geography. *Urban studies*, *39*(5-6), 871-884.

Howells, J. (2005) "Innovation and regional economic development: A matter of perspective?". *Research Policy 34* 1220–1234. DOI:10.1016/j.respol.2005.03.014

Huber, F. (2013) Knowledge-sourcing of R&D workers in different job positions: contextualizing external personal knowledge networks. *Research Policy*, 42: 167–179.

Huizingh, E. (2010). *Inleiding SPSS 18.0 – Voor IBM SPSS statistics en data collection author*. Tiende editie. Sdu Uitgevers, Den Haag.

Imai, L., & Gelfand, M. J. (2010). The culturally intelligent negotiator: The impact of cultural intelligence (CQ) on negotiation sequences and outcomes. *Organizational Behavior and Human Decision Processes*, *112*(2), 83-98.

Inglehart, R., C. Haerpfer, A. Moreno, C. Welzel, K. Kizilova, J. Diez-Medrano, M. Lagos, P. Norris, E. Ponarin & B. Puranen et al. (eds.). 2014. *World Values Survey: Round Six* - Country-Pooled Datafile Version: www.worldvaluessurvey.org/WVSDocumentationWV6.jsp. Madrid: JD Systems Institute.

Intarakumnerd, P. (2007) Measuring Innovation in Catching-up Economies: An Experience from Thailand. *Paper presented at Centre of Advanced Study Workshop 2007/2008*. Norway.

International Monetary Fund (IMF) (2018). Thailand: Gross domestic product, current prices. *https://www.imf.org/*

Isaksen A (2009). "Innovation dynamics of global competitive regional clusters: the case of the Norwegian Centres of Enterprise" *Regional Studies* 43 1155 – 1166

Jacobs, Jane. 1969. *The Economy of Cities*. New York: Random House.

Jaffe, A.B. (1986). "Technological opportunity and spillovers of R&D: evidence from firms' patents, profits and market value". *American Economic Review*, December, 76 (5), 984-1001.

Jamieson, S. (2004). 'Likert scales: how to (ab)use them'. Blackwell Publishing Ltd *MEDICAL EDUCATION* 2004; 38: 1212–1218

Jarasooriya, S. (2017). "*growth slowdowns, middle-income trap, and demographic profile in South Asia*". ADBI working paper series, no. 736, May 2017. Tokyo: Asian Development Bank Institute.

Jensen, M.B., Johnson, B., Lorenz, E. and Lundvall, B.A. (2007). "Forms of knowledge and modes of innovation". The learning economy and the economics of hope, 155. *Research Policy* 36 (2007) 680–693. DOI: 10.1016/j.respol.2007.01.006

Jeppesen, L. B., & Molin, M. J. (2003). Consumers as co-developers: Learning and innovation outside the firm. *Technology Analysis & Strategic Management*, *15*(3), 363-383.

Jitsuchon S. (2012). Thailand in a middle-income trap. *TDRI Quarterly Review* 27: 13–20.

Jitsuchon S. (2018, August 24). Research Director at the Thailand Development Research Institutes (TDRI). *Personal Communication*.

Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of mixed methods research*, 1(2), 112-133.

Jones, C., & Pimdee, P. (2017). "Innovative ideas: Thailand 4.0 and the Fourth Industrial Revolution"*. Asian International Journal of Social Sciences*, 17(1), 4 – 32. Retrieved from http://aijss.org/index.php/aijss20170101/

Kaiser, H. 1974. An index of factor simplicity. *Psychometrika* 39: 31–36.

Kaufmann, A., & Tödtling, F. (2001). Science–industry interaction in the process of innovation: the importance of boundary-crossing between systems. *Research policy*, *30*(5), 791-804.

Keskin, S. (2011). 'Inter-cluster pipelines: the driving force of knowledge creation and economic development. *International journal of social sciences and humanity studies*, Vol. 3, No. 1, 2011.

Kitchin, R. and Tate, N. (2013). *Conducting research in human geography: theory, methodology and practice*. Routledge, New York, USA.

Krackhardt, D., 1992. The strength of strong ties: the importance of philos in organizations. In: Nohria, N., Eccles, R.G. (Eds.), *Networks and Organization. Harvard Business School Press*, Boston, MA, pp. 216–239.

Kruger, J., & Dunning, D. (1999). Unskilled and unaware of it: How difficulties in recognizing one's own incompetence lead to inflated self-assessments. *Journal of Personality and Social Psychology*, 77, 1121-1134.

Lagendijk, A & Oinas, P. (2005). Towards understanding proximity, distance and diversity in economic interaction and local development. Proximity, distance and diversity, issues on economic interaction and local development, 307-332.

Laursen, K., Reichstein, T., Salter, A. (2011) Exploring the effect of geographical proximity and university quality on university-industry collaboration in the United Kingdom. *Regional Studies*, 45: 507–523.

Lawson, C., & Lorenz, E. (1999). Collective learning, tacit knowledge and regional innovative capacity. *Regional studies*, *33*(4), 305-317.

Le, H., Jiang, Z., & Nielsen, I. (2016). Cognitive cultural intelligence and life satisfaction of migrant workers: The roles of career engagement and social injustice. *Social Indicators Research*, 139(1), 237-257.

Leung, R. C. (2013) Networks as sponges: international collaboration for developing nanomedicine in China. *Research Policy*, 42: 211–219.

Lorenzen, M., Mudambi, R. (2013) Clusters, connectivity and catch-up: Bollywood and Bangalore in the global economy. *Journal of Economic Geography*, 13: 501–534.

Lund Research Ltd. (2018). Mann-Whitney U Test using SPSS Statistics. Accessed on 09-10-2018, https://statistics.laerd.com/spss-tutorials/mann-whitney-u-test-using-spss-statistics.php

Lundvall, B.A. (1992). "*User-producer relationships. In national systems of innovation: towards a theory of innovation and interactive learning*". 47-71, London: Pinter.

Magnusson, P., Westjohn, S. A., Semenov, A. V., Randrianasolo, A. A., & Zdravkovic, S. (2013). The role of cultural intelligence in marketing adaptation and export performance. *Journal of Marketing Research*, *21*(4), 44-61.

Malinen, P., & Simula, H. (2005). A conceptual platform for developing local and regional innovation environment. In *The 6th CINet Conference, Brighton, UK* (pp. 38-42).

Malmberg, A. & Power, D. (2005) (How) do (firms in) clusters create knowledge? *Industry and Innovation, 12(4)*, pp. 409–431.

Malmberg, A., Solvell, O. and Zander, I., 1996: Spatial clustering, local accumulation of knowledge and firm competitiveness. *Geogr. Ann. 78* B (2). 85-97. Scandinavian University.

Mare, A.L., Promphaking, B. and Rigg, J. (2015). "Returning Home: The Middle-Income Trap and Gendered Norms in Thailand". *Journal of International Development 27*, 285–306. DOI: 10.1002/jid.3064.

Mariotti, I. (2005). Firm relocation and regional policy. A focus on Italy, the Netherlands and the United Kingdom s.n.

Maskell, P. and Malmberg, A. (1999). "Localised Learning and Industrial Competitiveness". Cambridge *Journal of Economics*, Vol. 23, Issue 2, p. 167-185 1999.

McCann, P. (2007). "Sketching out a model of innovation, face-to-face interaction and economic geography". *Spatial Economic Analysis*, 2(2), 117-134

McDermott, C.M., and Prajogo, D.I. (2012) "Service innovation and performance in SMEs", *International Journal of Operations & Production Management, Vol. 32* Issue: 2, pp.216-237, https://doi.org/10.1108/01443571211208632

Mills, A. J., Durepos, G., and Wiebe, E. [Eds.] (2010) *Encyclopedia of Case Study Research, Volumes I and II.* Thousand Oaks, CA: Sage, DOI: http://dx.doi.org/10.4135/9781412957397.n175

Ministry of Education (2016). 2016 Educational Statistics. Office of the Permanent Secretary, Ministry Of Education. ISBN 978-616-395-895-2. http://www.en.moe.go.th/enMoe2017/index.php/educational-statistics/educational-statistics-2016

Miotti, L., & Sachwald, F. (2003). Co-operative R&D: why and with whom?: An integrated framework of analysis. *Research policy*, *32*(8), 1481-1499.

MNE (2018, August 29). Anonymous Innovation Manager at MNE in Thailand. *Personal Communication*.

Moodysson, J. (2008) Principles and practices of knowledge creation: on the organization of 'buzz' and 'pipelines' in life science communities. *Economic Geography*, 84: 449–469.

Morrison, A., Rabellotti, R. and Zirulia, L. (2013). "When do global pipelines enhance the diffusion of knowledge in clusters?". Vol. 89 No 1, 89(1):77-96 Clark University.

Nadvi, K., & Halder, G. (2005). Local clusters in global value chains: exploring dynamic linkages between Germany and Pakistan. *Entrepreneurship & Regional Development*, *17*(5), 339-363.

Nash, D.J. (2000) 'Doing independent overseas fieldwork 1: practicalities and pitfalls', *Journal of Geography in Higher Education*, 24(1): 139–149.

NIA representative, (2018, August 9). Manager at the National Innovation Agency (NIA). *Personal Communication*.

Nonaka, I., & Toyama, R. (2005). The theory of the knowledge-creating firm: subjectivity, objectivity and synthesis. *Industrial and corporate change*, *14*(3), 419-436.

Nonaka, I., Toyama, R., & Nagata, A. (2000). A firm as a knowledge-creating entity: a new perspective on the theory of the firm. *Industrial and corporate change*, *9*(1), 1-20.

Nonaka, I., von Krogh, G., Voelpel, S. (2006). Organizational Knowledge Creation Theory: Evolutionary Paths and Future Advances. *Organization Studies, Vol 27*, Issue 8, 2006. https://doi.org/10.1177/0170840606066312

Nooteboom, B. (2000). *Learning and Innovation in organizations and economies*. Oxford University Press, Oxford.

NSO, National Statistical Office Thailand. Ministry of information and communication technology (2015). The labor force survey 2015, Q1. http://web.nso.go.th/en/survey/lfs/data_lfs/2015_lf_Q1_FullReport.pdf

OEC, The Observatory of Economic Complexity, (2018). Country profile Thailand. https://atlas.media.mit.edu/en/profile/country/tha/

OECD, (2005). 'Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data, 3rd Edition'. ISBN 978-92-64-01308-3

OECD, (2017a). Enhancing the Contributions of SMEs in a Global and Digitalised Economy. Meeting of the OECD Council at Ministerial Level, Paris, 7-8 June 2017.

OECD, (2017b). OECD Science, Technology and Industry Scoreboard 2017: The digital transformation, OECD Publishing, Paris. http://dx.doi.org/10.1787/9789264268821-en

Oerlemans, L. A. G., & Meeus, M. T. H. (2005). Do Organizational and Spatial Proximity Impact on Firm Performance? February 2005 *Regional Studies 39*(1):89-104 DOI: 10.1080/0034340052000320896

Oinas, P. (2002). Competition and collaboration in interconnected places: towards a research agenda. Geografiska Annaler: Series B, *Human Geography*, *84*(2), 65-76.

Oke, A., Burke, G., & Myers, A. (2007). Innovation types and performance in growing UK SMEs. *International Journal of Operations & Production Management*, *27*(7), 735-753.

Onsager K, Isaksen A, Fraas M, Johnstad T (2007). "Technology cities in Norway: innovating in glocal networks". *European Planning Studies* 15 549 – 566

Owen-Smith, J. and Powell, W.W. 2002: *Knowledge networks in the Boston biotechnology community*. Paper presented at the Conference on 'Science as an Institution and the Institutions of Science' in Siena.

Pallant, Julie. (2010). SPSS survival manual: a step by step guide to data analysis using SPSS. Maidenhead: *Open University Press*/McGraw-Hill,

Perry-Smith, J.E. and Shalley, C.F. (2003). "The social side of creativity: A static and dynamic social network perspective". *Academy of Management Review*, 28 (1), 89-106.

Peter, J. P. (1981). Construct validity: A review of basic issues and marketing practices. *Journal of Marketing Research*, 18(2), 133-145.

Petruzzelli, A.M., Albino, V. and Carbonara, N. (2018). "External knowledge sources and proximity". *Journal of Knowledge Management, Vol. 13* No. 5 2009, pp. 301-318, Emerald Group Publishing Limited, ISSN 1367-3270. DOI 10.1108/13673270910988123

PISA, OECD, (2015). Pisa results per country. http://www.compareyourcountry.org/pisa/country/tha?lg=en

Poapongsakorn, N. and Tangkitvanich, S. (2014). Industrial restructuring in Thailand: a critical assessment. Nomura Foundation.

Polanyi, M. (1966). The logic of tacit inference. *Philosophy, 41*(155), 1-18.

Porter, M, (1990). The Competitive Advantage of Nations (Macmillan, London)

Porter, M. E. (1998). *Clusters and the new economics of competition* (Vol. 76, No. 6, pp. 77-90). Boston: Harvard Business Review.

Putnam, R.D., 2000. *Bowling Alone: The Collapse and Revival of American Community*. Simon & Schuster Paperbacks, New York, NY.

Ramsey, J. R., Nassif Leonel, J., Zoccal Gomes, G., & Rafael Reis Monteiro, P. (2011). Cultural intelligence's influence on international business travelers' stress. *Cross Cultural Management: An International Journal*, *18*(1), 21-37.

Rattanakhamfu, S. (2017). What should be the real development targets for the EEC? *TDRI Insight*. Accessed on 10-10-2018 via https://tdri.or.th/en/2017/10/eec-requires-joined-thinking-benefit-everyone/.

Rea, L. M., & Parker, R. A. (1992). *Designing and conducting survey research*. San Francisco: Jossey-Boss.

Robinson, O.C. (2014). Sampling in Interview-Based Qualitative Research: A Theoretical and Practical Guide, Qualitative Research in Psychology, 11:1, 25-41, DOI: 10.1080/14780887.2013.801543

Rujirawanich, P., Addison R., and Smallman, C. (2011) 'The effect of cultural factors on innovation in a Thai SME'. *Management Research Review Vol. 34*, no. 12, 2011.

Sachdev, S. (2018). The digital economy and Thailand 4.0: Is the country ready? *Digital Tranformation*. Grant Thorton. Accessed on 1-10-2018 via https://www.grantthornton.co.th/insights/articles/the-digital-economy-and-thailand-4.0-is-the-country-ready/

Sajarattanochote, S. and Poon, J.P.H. (2009) 'Multinationals, Geographical Spillovers, and Regional Development in Thailand'. *Regional Studies*, Vol. 43, 3, pp 479-494. April 2009.

Schmutzler, J. and Lorenz. E. (2018) 'Tolerance, agglomeration, and enterprise innovation performance: a multilevel analysis of Latin American regions'. *Industrial and Corporate Change, 2018. Vol. 27*, No. 2, 243-268, doi: 10.1093/icc/dtx034.

Simonton, DK 1999, 'Significant samples: the psychological study of eminent individuals', *Psychological Methods, vol. 4,* pp. 425–51.

SME (2018, August 22). Anonymous CEO at SME in Thailand. *Personal Communication*.

Smith, K. (2000). Innovation as a systemic phenomenon: Rethinking the role of policy. *Enterprise & Innovation Management Studies, 1,* 73-103.

Smith, T. W. (2004). Developing and evaluating cross-national survey instruments. In R. M. Groves, G. Kalton, J. N. K. Rao, N. Schwarz, & C. Skinner (Eds.), *Methods for testing and evaluating survey questionnaires* (pp. 431–452).

Statista (2018a). "Thailand: Distribution of employment by economic sector from 2007 to 2017". Accessed on 02-10-2018 via https://www.statista.com/statistics/332341/employment-by-economic-sector-in-thailand/

Statista (2018b). "Thailand: Share of economic sectors in the gross domestic product (GDP) from 2007 to 2017". Accessed on 02-10-2018 via https://www.statista.com/statistics/331893/share-of-economic-sectors-in-the-gdp-in-thailand/

Sternberg, R., & Arndt, O. (2001). The firm or the region: what determines the innovation behavior of European firms? *Economic Geography*, *77*(4), 364-382.

STI representative, (2018, August 17). National Science Technology and Innovation Policy Office (STI). *Personal Communication*.

Storper, M., & Venables, A. J. (2004). Buzz: face-to-face contact and the urban economy. *Journal of economic geography,* 4(4), 351-370.

Tabachnik, B. G., & Fidell. S. L. (2007). Using multivariate statistics. Boston: Pearson Education.

Tether, B. S. (2002). Who co-operates for innovation, and why: an empirical analysis. *Research policy*, 31(6), 947-967.

Tidd, J., Bessant, J., & Pavitt, K. (2005). *Managing innovation integrating technological, market and organizational change*. John Wiley and Sons Ltd.

Tödtling, F., Lehner, P., & Trippl, M. (2006) Innovation in knowledge intensive industries: The nature and geography of knowledge links, *European Planning Studies*, 14:8, 1035-1058, DOI: 10.1080/09654310600852365

TopUniversities.com (2018). Study in Thailand. https://www.topuniversities.com/where-to-study/asia/thailand/guide

Trippl, M., Tödtling, F., Lengauer, L. (2009). Knowledge sourcing beyond buzz and pipelines: evidence from the Vienna software cluster. Economic Geography, 85: 443–462.

Uzzi, B. (1996) The sources and consequences of embeddedness for the economic performance of organizations: the network effect. *American Sociological Review*, 61: 674–698.

Van Dyne, L., Ang, S., & Koh, C. (2008). Development and validation of the CQS. *Handbook of cultural intelligence*, 16-40.

Verschuren, P., Doorwaard, H., (2010). Het ontwerpen van een onderzoek. Den Haag: Boom lemma uitgevers.

Warr P. (2011). A nation caught in the middle-income trap. East Asia Forum 3(4): 4–6.

Wisdom, J. and Creswell, J.W. (2013). *Mixed Methods: Integrating Quantitative and Qualitative Data Collection and Analysis While Studying Patient-Centered Medical Home Models.* Rockville, MD: Agency for Healthcare Research and Quality. AHRQ Publication No. 13-0028-EF.

World Bank (2015). *Urbanization in Thailand is dominated by the Bangkok urban area.* Published on January 26, 2015, accessed on 01-10-2018 via http://www.worldbank.org/en/news/feature/2015/01/26/urbanization-in-thailand-is-dominated-by-the-bangkok-urban-area

World Bank, (2016a). "Enterprise Surveys – Thailand". Accessed on 23-09-2018 via http://www.enterprisesurveys.org/data/exploreeconomies/2016/thailand#innovation-and-technology

World Bank, (2016b). 'Thailand Economic Monitor - June 2016: Aging Society and Economy'. Publication. http://www.worldbank.org/en/country/thailand/publication/thailand-economic-monitor-june-2016-aging-society-and-economy

World Bank, (2016c). 'Total population Thailand'.

World Bank, (2017a). "The World Bank in Thailand ". Last updated: Sept. 2017, accessed on 10 Jan. 2018.

World Bank, (2017b). "Research and development expenditure (% of GDP)".

Wu, P. C., & Ang, S. H. (2011). The impact of expatriate supporting practices and cultural intelligence on cross-cultural adjustment and performance of expatriates in Singapore. *The International Journal of Human Resource Management*, *22*(13), 2683-2702.

Ye, L. and Robertson, P.E. (2016). "On the existence of a middle-income trap". *Economic Record*, VOL. 92, NO. 297, JUNE, 2016, 173–189.

Yin, R. K. (2003). *Case study research: Design and method* (3rd ed.). Thousand Oaks, CA: Sage.

Young, C. A., Haffejee, B., & Corsun, D. L. (2017). The relationship between ethnocentrism and cultural intelligence. *International Journal of Intercultural Relations*, 58, 31-41.

Appendix A: Questionnaire

Local, regional and international network ties for innovation

Dear Sir, Dear Madam,

I am a student from the Radboud University in the Netherlands and I am doing a research for my master thesis.

This research is on company innovation in Thailand and the role that local, regional and international network ties play in acquiring knowledge.
To gain insight, I have set up a questionnaire that consists of **18 questions**.

May I ask **10 minutes** of your time by filling out the questionnaire? Your participation will be highly appreciated and would be of great value to the research and my graduation.

The questionnaire is fully anonymous which means that the given answers cannot be traced back to the person who filled in the questionnaire.

Many thanks for your participation.

Best regards,

Kevin van Lierop

E: innovationinthailand@gmail.com / lieropkevinvan@hotmail.nl
L: https://www.linkedin.com/in/kevinvlierop/

The first questions are related to **product or service innovation**. Think for instance of the usage of new materials, new intermediate products, new functional parts, radically new technology or the introduction of new functions and new products.

Q1. Apart from sales of new products from suppliers: Has your company introduced any **products or services** into the market during the past three years that were new to the company or significantly improved compared to your existing products?

○ Yes

○ No (please continue at Q4)

Q2. Were these **products/services** developed mainly by your company, others, or did you cooperate with others in developing them?

○ Mainly by our company

○ Mainly by our company in cooperation with other companies or organizations

○ Mainly by other companies or organizations

Q3. Were any of these **product/service** innovations new to the market?

○ Yes, they were new to the market

○ No, they were only new to our company

The following three questions are related to **method and process innovation**. Think for instance of the introduction of new production techniques, new organizational features, new technologies or new professional software.

Q4. Has your company introduced any **methods or processes** for production or delivery of products during the last three years that were new to the company or significantly improved compared to the company's existing methods?

○ Yes

○ No (please continue at Q7)

Q5. Were these **methods/processes** developed mainly by your company, others, or did you cooperate with others in developing them?

○ Mainly by our company

○ Mainly by our company in cooperation with other companies or organizations

○ Mainly by other companies or organizations

Q6. Were any of these **methods/processes** new to the industry?

○ Yes, they were new to the industry

○ No, they were only new to our company

The following four questions are related to cooperation and collaboration between your firm and others. *In this section, several questions will refer to the location of firms or other partners in your region. In this case, 'region' refers to the regional division of Thailand as in the North, South, Northeast, Central Region, and Bangkok.*

Q7. How important is it for your company to collaborate with the following types of partners in **innovation activities**? (*Innovation activities are all those scientific, technological, organizational, financial and commercial steps which actually, or are intended to, lead to the implementation of technologically new or improved products or processes. Some may be innovative in their own right; others are not novel but are necessary for implementation*).

	Not important at all	Not very important	Neutral	Somewhat important	Very important
Innovative companies	○	○	○	○	○
Competitors	○	○	○	○	○
Suppliers	○	○	○	○	○
Customers	○	○	○	○	○
Research institutes	○	○	○	○	○
Universities	○	○	○	○	○

Q8. How important is it for your company to collaborate with the following types of partners in innovation activities?

	Not important at all	Not very important	Neutral	Somewhat important	Very important
Partners in my city/province	○	○	○	○	○
Partners in the region	○	○	○	○	○
Partners elsewhere Thailand	○	○	○	○	○
Partners in the Netherlands	○	○	○	○	○
Partners elsewhere abroad	○	○	○	○	○

Q9. Has your company cooperated with any of the following in the last three years? **Multiple** answers are possible

	In my city/province	In the region	Elsewhere in Thailand	In the Netherlands	Elsewhere abroad	Not used
Suppliers	☐	☐	☐	☐	☐	☐
Customers	☐	☐	☐	☐	☐	☐
Competitors	☐	☐	☐	☐	☐	☐
Other companies in the same conglomerate	☐	☐	☐	☐	☐	☐
Consultants	☐	☐	☐	☐	☐	☐
Universities	☐	☐	☐	☐	☐	☐
Research institutes	☐	☐	☐	☐	☐	☐

Q10. How important have the following **sources of information** been to the innovation activities in your company during the last three years?

	Not important at all	Not very important	Neutral	Somewhat important	Very important	Not used
Sources within the company	○	○	○	○	○	○
Suppliers	○	○	○	○	○	○
Customers	○	○	○	○	○	○
Competitors or other companies in the industry	○	○	○	○	○	○
Consultancies	○	○	○	○	○	○
Universities	○	○	○	○	○	○
Research institutes	○	○	○	○	○	○
Conferences, seminars, workshops, exhibitions, etc.	○	○	○	○	○	○
Foreign institutes (e.g. embassies, chambers of commerce)	○	○	○	○	○	○
Informal networks	○	○	○	○	○	○

The following three questions are related to the usage of sources and personal contacts for knowledge gathering.

Q11. How important are the following sources of knowledge for the **work-related knowledge** you gained in the past year?

	Not important at all	Not very important	Neutral	Somewhat important	Very important
Colleagues within your firm at this site	○	○	○	○	○
Other colleagues within your firm, but at sites located somewhere else	○	○	○	○	○
Personal contacts from other firms or research institutions	○	○	○	○	○
Chatting with strangers (e.g. in trade fairs, seminars, conferences, workshops)	○	○	○	○	○

Q12. Indicate to what extent the location of **personal contacts** outside your firm have been useful for the work-related knowledge your gained in the past year.

	Not useful at all	Not very useful	Neutral	Somewhat useful	Very useful
In my city/province	○	○	○	○	○
In my region	○	○	○	○	○
Elsewhere in Thailand	○	○	○	○	○
Elsewhere in Asia	○	○	○	○	○
In the Netherlands	○	○	○	○	○
Elsewhere in Europe	○	○	○	○	○
In the rest of the world	○	○	○	○	○

Q13. To what extent do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
I enjoy interacting with people from other cultures.	○	○	○	○	○	○	○
I am confident that I can socialize with locals in a culture that is unfamiliar to me.	○	○	○	○	○	○	○
I am sure I can deal with the stresses of adjusting to a culture that is new to me.	○	○	○	○	○	○	○
I enjoy living in cultures that are unfamiliar to me.	○	○	○	○	○	○	○
I consciously apply cross-cultural knowledge when interacting with people with different cultural backgrounds.	○	○	○	○	○	○	○
I adjust my cultural knowledge as I interact with people from a culture that is unfamiliar to me.	○	○	○	○	○	○	○
I am conscious of the cultural knowledge I apply to cross-cultural interactions.	○	○	○	○	○	○	○
I check the accuracy of my cultural knowledge as I interact with people from different cultures.	○	○	○	○	○	○	○

The final five questions are related to general information about your company.

Q14. How many employees does your company have?

○ 1-10

○ 10-50

○ 50-250

○ 250-1000

○ 1000+

Q15. In which region (North, South, Northeast, Central Region, Bangkok) is your company located?

○ North

○ South

○ Northeast

○ Central Region

○ Bangkok

Q16. About what share of the company is owned by people or companies located in Thailand or elsewhere? Fill in the numbers in **percentages**. Note: the total should make up 100%

In Thailand: : _____
Elsewhere in the ASEAN region: : _____
Elsewhere in Asia: : _____
In the Netherlands:: _____
Elsewhere in Europe: : _____
In the rest of the world: : _____
Total : _____

Q17. What is your highest completed level of education?

○ No completed education

○ Primary/lower secondary school

○ Upper secondary school

○ Higher education, undergraduate level (1-4 years)

○ Higher education, postgraduate level (5 years or more)

Q18. In which industry is your company active?

- ○ Agriculture & food production
- ○ Automotive & auto parts
- ○ Aviation
- ○ Biotechnology
- ○ Chemicals
- ○ Construction & engineering
- ○ Electrical, Electronics & Allied
- ○ Energy (renewable)
- ○ Food Processing
- ○ Footwear, textile, garments & leather based products
- ○ Furniture
- ○ High tech systems & materials
- ○ Horticulture
- ○ Logistics & transportation
- ○ Medical machinery & instruments
- ○ Metals & mining
- ○ Petrochemical & petroleum refining
- ○ Pharmaceuticals
- ○ Plastics & rubber based products
- ○ Robotics and automation
- ○ Software & digital
- ○ Tourism
- ○ Printing & Paper Packaging
- ○ Water management
- ○ Wood Processing
- ○ Other

Appendix B: Interview guide

Introduction
Dear Khun (Mr./Mrs.) …
Many thanks for giving me the opportunity to speak with you for an hour and allowing me to ask some questions about the activities of the (organization).

Research objective and Introduction research.
I am a student from the Netherlands where I study Economic Geography. Currently I am in the last phase of my master's where I am writing my master thesis in Bangkok on innovation in companies in Thailand. Especially, on how companies use local, regional and international partners (e.g. universities, customers, suppliers) in their innovation activities.

The link to economic geography is that innovation is often localized and locally embedded and requires face-to-face interaction and frequent, repeated personal contacts that enable knowledge exchange. In the literature there is a distinction being made being "local buzz", which are local and regional interactions and "global pipelines" which are strategic partnerships of interregional and international reach. These 'pipelines' connect the local environment to the rest of the world and the knowledge that enters the region through global pipelines is likely to spill over to other partners connected through the buzz.

Request for recording the interview
For my thesis I gather quantitative data through an online questionnaire which I am distributing among companies in Thailand and expert interviews like this. Therefore, I would like for your permission to record this interview to make it possible to analyse the different interviews conducted.

Themes:
- Thailand (Thai middle-income trap, Thailand 4.0, Education, R&D spending, Private sector)
- Formal networks (Firm linkages, Type of Partners, Knowledge spillovers, Global Pipelines)
- Informal Networks (Personal linkages, Local buzz)
- Proximity (Cognitive proximity, Organizational proximity, Social proximity, Institutional proximity)
- Cultural intelligence (Culture)

The above mentioned information and introduction was the same for all interviews.

Appendix C: Respondents Questionnaire

This chapter is part of *Chapter 4: Thailand, a country profile*.

Figure 21. Regional Division of Thailand: The North, South, Northeast, and Central Region (Bangkok has been encircled) (Image: Wikipedia, 2012)

Table 6. In which industry is your company active?

Industry	Frequency	Percentage	BOI Sector
Other	25	17.6	0
Agriculture & food production	20	14.1	1
Horticulture	3	2.1	1
Food Processing	6	4.2	1
Metals & mining	3	2.1	2
Footwear, textile, garments & leather based products	5	3.5	3
Furniture	2	1.4	3
Medical machinery & instruments	3	2.1	3
Automotive & auto parts	8	5.6	4
Aviation	4	2.8	4
High tech systems & materials	1	0.7	4
Robotics and automation	1	0.7	4
Construction & engineering	10	7.0	4
Electrical, Electronics & Allied	10	7.0	5
Software & digital	8	5.6	5
Pharmaceuticals	1	0.7	6
Chemicals	11	7.7	6
Plastics & rubber based products	4	2.8	6
Petrochemical & petroleum refining	3	2.1	6
Printing & Paper Packaging	2	1.4	6
Logistics & transportation	5	3.5	7
Energy (renewable)	4	2.8	7
Tourism	3	2.1	7
Total	**142**	**100%**	

Figure 22. Percentile division of total innovation per industry
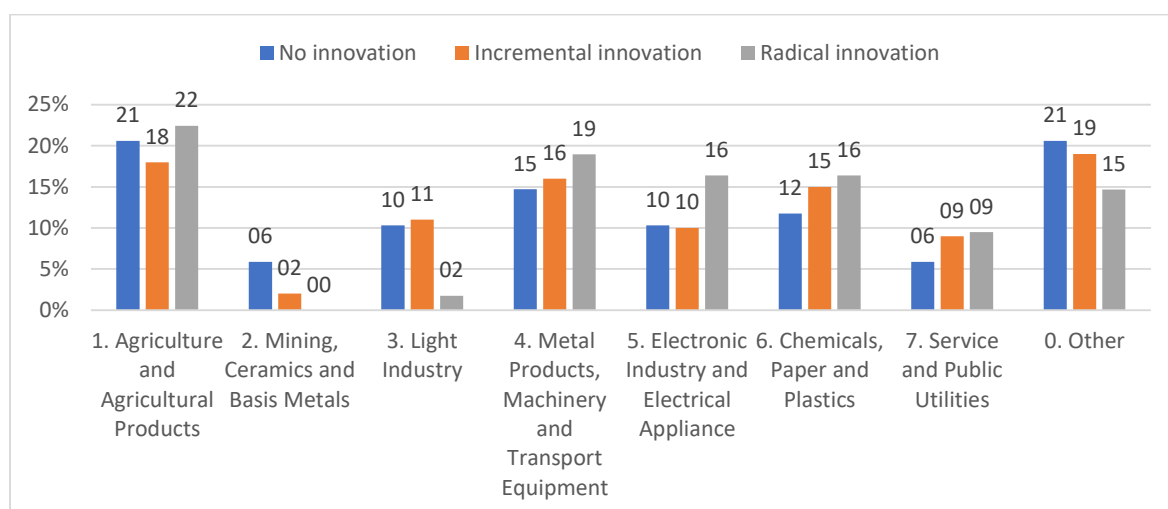
Figure 23. Type of partners in firm networks in percentages
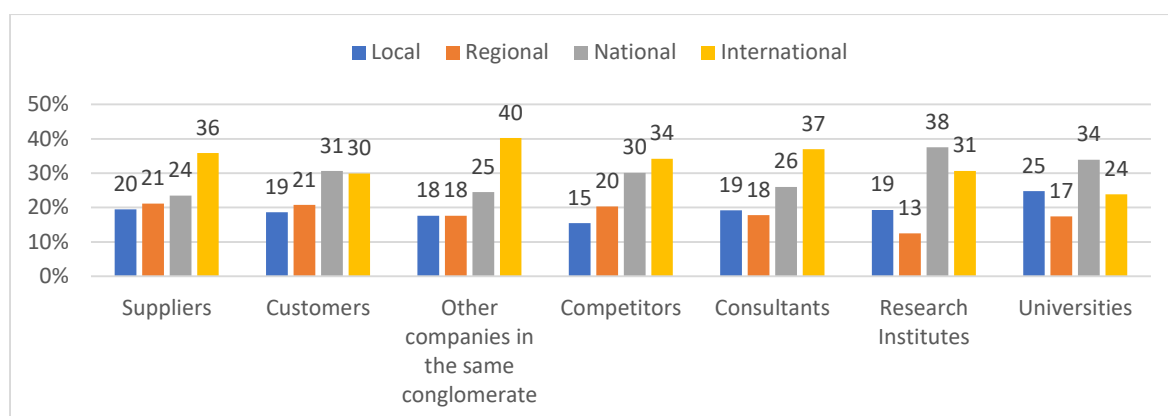
Table 7. Chi-Square goodness-of-fit test – Industry

Industry

	Observed N	Expected N	Residual
Agriculture and Agricultural Products	3	22.7	-19.7
Mining, Ceramics and Basis Metals	10	5.9	4.1
Light Industry	12	22.7	-10.7
Metal Products, Machinery and Transport Equipment	18	40.4	-22.4
Electronic Industry and Electrical Appliance	21	20.7	.3
Chemicals, Paper and Plastics	24	22.7	1.3
Service and Public Utilities	25	6.9	18.1
Other	29	.1	28.9
Total	142		

Table 8. Chi-Square goodness-of-fit test statistics – Industry

	Industry
Chi-Square	8561.387[a]
df	7
Asymp. Sig.	.000

a. 1 cells (12.5%) have expected frequencies less than 5. The minimum expected cell frequency is .1.

Table 9. Chi-Square goodness-of-fit test – Region

	Observed N	Expected N	Residual
North	4	18.6	-14.6
Northeast	6	20.3	-14.3
Central	26	46.3	-20.3
South	40	17.9	22.1
Bangkok	66	38.9	27.1
Total	142		

Table 10. Chi-Square goodness-of-fit test statistics – Region

	Region
Chi-Square	76.599[a]
df	4
Asymp. Sig.	.000

a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 17.9.

Table 11. Chi-Square goodness-of-fit test – Firm size

	Observed N	Expected N	Residual
SMEs	54	141.6	-87.6
Large firms	88	.4	87.6
Total	142		

Table 12. Chi-Square goodness-of-fit test statistics – Firm size

	Firm Size
Chi-Square	17887.900[a]
df	1
Asymp. Sig.	.000

a. 1 cells (50.0%) have expected frequencies less than 5. The minimum expected cell frequency is .4.

Appendix D: Data preparation Global Pipelines & Local Buzz

This appendix is part of *Chapter 5: Global Pipelines and Local Buzz*. In order to uncover the network linkages of the respondents, they were asked whether they had cooperated with any of these types of partners during the preceding 3 years: suppliers, customers, competitors, other companies in the same conglomerate, consultants, universities and research institutes (see Q9 in the questionnaire). For each type of partner, managers were also asked whether the firm had collaborated with a partner of this type located within the same city/province, same region, elsewhere in Thailand, and/or elsewhere abroad. In order to increase interpretability, the responses in Q9 can be divided according to location and type. For location, all items with partners 'in my city/province', 'in the region', 'elsewhere in Thailand', were counted separately and transformed in local partners, regional partners, and national partners. For the Items 'in the Netherlands' and 'elsewhere abroad' a new variable was created in which both items were combined to 'international partners'. When a respondent indicated to have used a partner elsewhere abroad this was counted as one, regardless of any partner in the Netherlands. When a respondent used a partner in the Netherlands but none elsewhere abroad, this was counted as one as well.

A second division was done according to the type of partner. Again, the items suppliers, customers, competitors, other companies in the same conglomerate, consultants, universities and research institutes were counted and summed in a separate variable. Additionally, a separate variable for STI, DUI and DUI-partners within the supply-chain was created. This led to the creation of the following variables:

- Diversity_Local
- Diversity_Regional
- Diversity_National
- Diversity_International
- Count_Suppliers
- Count_Customers
- Count_Competitors
- Count_Other_companies_in_the_ same_conglomerate
- Count_Consultants
- Count_Universities
- Count_Research_institutes
- Partners_STI
- Partners_DUI
- Partners_DUI_within_supply_chain

In calculating the new variables, some items were counted twice for each construct. For instance, suppliers in my city/province belong to both the category 'local partners' as well as 'suppliers'. The variable Diversity_Local is thus a sum of all local partners a respondent collaborated with in the past three years. The variable Count_Competitors is a sum of all competitors a respondent collaborated with in the past three years, on all four geographical scale levels. Additionally, in order to measure diversification, all items were counted in a separate variable: Count_Diversification. These variables are measured on a continuous scale since respondents can have 0 to 28 different types of partners in four geographical dimensions. These newly created variables tell us something about the usage of different types of partners on different spatial levels. Summed scores generally have a more normal distribution than single items, which makes them usable for with parametric techniques such as the independent

sample t-test (Carifio & Perla, 2008; de Winter & Dodou, 2012). However, the independent t-test requires data to be normally distributed. In SPSS a Shapiro-Wilk test has been conducted to test the normality of the distribution of all newly created variables from Q9. As Table 13 shows, are all scales highly significant (.000), which means that the data is skewed and significantly deviates from a normal distribution. This makes the variables not suitable for parametric tests and is a non-parametric test more suitable (Field, 2013). Therefore, instead of an independent sample t-test, a Mann-Whitney U Test has been conducted to compare differences between an independent variable (companies that did or did not do innovation in the past three years), and a dependent variable (number of partners). The Mann-Whitney U Test is the non-parametric equivalent for the independent t-test and can be used to compare the distributions in two conditions and these conditions contain different entities (Field, 2013).

Many of the other questions in the questionnaire were Likert scales. In the literature, a heated debate exists on how to perceive these Likert scales: interval or ordinal. Common practice is to perceive this measurement as ordinal although some authors state that Likert-type categories constitute interval-level measurement (Jamieson, 2004). However, since treating ordinal scales as interval is still somewhat controversial are Likert-scales perceived as ordinal data in this research.

Table 13. Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Local partners	.266	142	.000	.788	142	.000
Regional partners	.216	142	.000	.822	142	.000
National partners	.155	142	.000	.916	142	.000
International partners	.134	142	.000	.937	142	.000
Total suppliers	.285	142	.000	.838	142	.000
Total customers	.244	142	.000	.874	142	.000
Total competitors	.287	142	.000	.769	142	.000
Total other companies in the same conglomerate	.277	142	.000	.759	142	.000
Total consultants	.269	142	.000	.820	142	.000
Total universities	.262	142	.000	.768	142	.000
Total research institutes	.333	142	.000	.701	142	.000
Diversification partners	.123	142	.000	.940	142	.000
STI	.188	142	.000	.851	142	.000
DUI	.158	142	.000	.937	142	.000
DUI within supply-chain	.202	142	.000	.930	142	.000

a. Lilliefors Significance Correction

Appendix E: Output SPSS Global Pipelines & Local Buzz

This chapter belongs to *Chapter 5: Global Pipelines and Local Buzz*.

*Table 14. Chi-Square Tests - Product innovation * Suppliers international*

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.849[a]	1	.028		
Continuity Correction[b]	3.974	1	.046		
Likelihood Ratio	4.715	1	.030		
Fisher's Exact Test				.037	.024
Linear-by-Linear Association	4.815	1	.028		
N of Valid Cases	142				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.72.

b. Computed only for a 2x2 table

*Table 15. Crosstab - Product innovation * Suppliers international*

			Product/service innovation		
			Yes	No	Total
Suppliers - International	No	Count	35	17	52
		% within Suppliers - International	67.3%	32.7%	100.0%
		% within Product/service innovation	31.8%	53.1%	36.6%
	Yes	Count	75	15	90
		% within Suppliers - International	83.3%	16.7%	100.0%
		% within Product/service innovation	68.2%	46.9%	63.4%
Total		Count	110	32	142
		% within Suppliers - International	77.5%	22.5%	100.0%
		% within Product/service innovation	100.0%	100.0%	100.0%

Table 16. Value of Phi and Cramer's V (Rea & Parker, 1992)

.00 and under (-).10	Negligible association
(-).10 and under (-).20	Weak association
(-).20 and under (-).40	Moderate association
(-).40 and under (-).60	Relatively strong association
(-).60 and under (-).80	Strong association
(-).80 and (-)1.00	Very strong association

*Table 17. Symmetric Measures - Product innovation * Suppliers international*

		Value	Asymptotic Standardized Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	-.185			.028
	Cramer's V	.185			.028
Interval by Interval	Pearson's R	-.185	.086	-2.225	.028[c]
Ordinal by Ordinal	Spearman Correlation	-.185	.086	-2.225	.028[c]
N of Valid Cases		142			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

*Table 18. Chi-Square Tests - international suppliers * radical process innovation*

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.831[a]	1	.050		
Continuity Correction[b]	3.062	1	.080		
Likelihood Ratio	3.816	1	.051		
Fisher's Exact Test				.063	.040
Linear-by-Linear Association	3.795	1	.051		
N of Valid Cases	106				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 15.28.

b. Computed only for a 2x2 table

*Table 19. Crosstab - international suppliers * radical process innovation*

			Radical method/process innovation		
			Radical	Incremental	Total
Suppliers - International	No	Count	20	16	36
		% within Suppliers - International	55.6%	44.4%	100.0%
		% within Radical innovation	44.4%	26.2%	34.0%
	Yes	Count	25	45	70
		% within Suppliers - International	35.7%	64.3%	100.0%
		% within Radical innovation	55.6%	73.8%	66.0%
Total		Count	45	61	106
		% within Suppliers - International	42.5%	57.5%	100.0%
		% within Radical innovation	100.0%	100.0%	100.0%

*Table 20. Symmetric Measures - international suppliers * radical process innovation*

		Value	Asymptotic Standardized Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.190			.050
	Cramer's V	.190			.050
Interval by Interval	Pearson's R	.190	.097	1.975	.051[c]
Ordinal by Ordinal	Spearman Correlation	.190	.097	1.975	.051[c]
N of Valid Cases		106			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

*Table 21. Chi-Square Test - Regional Same conglomerate * Radical process innovation*

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.444[a]	1	.035		
Continuity Correction[b]	3.271	1	.071		
Likelihood Ratio	4.962	1	.026		
Fisher's Exact Test				.040	.031
Linear-by-Linear Association	4.402	1	.036		
N of Valid Cases	106				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.52.

b. Computed only for a 2x2 table

*Table 22. Crosstab - Regional Same conglomerate * Radical process innovation*

			Radical method/process innovation		
			Radical	Incremental	Total
Other companies in the same conglomerate - Region	No	Count	43	50	93
		% within Others same conglomerate - Region	46.2%	53.8%	100.0%
		% within Radical method/process innovation	95.6%	82.0%	87.7%
	Yes	Count	2	11	13
		% within Others same conglomerate - Region	15.4%	84.6%	100.0%
		% within Radical method/process innovation	4.4%	18.0%	12.3%
Total		Count	45	61	106
		% within Others same conglomerate - Region	42.5%	57.5%	100.0%
		% within Radical method/process innovation	100.0%	100.0%	100.0%

*Table 23. Symmetric Measures - Regional Same conglomerate * Radical process innovation*

		Value	Asymptotic Standardized Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.205			.035
	Cramer's V	.205			.035
Interval by Interval	Pearson's R	.205	.078	2.133	.035[c]
Ordinal by Ordinal	Spearman Correlation	.205	.078	2.133	.035[c]
N of Valid Cases		106			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

*Table 24. Crosstab - Regional consultants * product innovation*

			Product/service innovation		Total
			Yes	No	
Consultants - Region	No	Count	86	30	116
		% within Consultants - Region	74.1%	25.9%	100.0%
		% within Product/service innovation	78.2%	93.8%	81.7%
	Yes	Count	24	2	26
		% within Consultants - Region	92.3%	7.7%	100.0%
		% within Product/service innovation	21.8%	6.3%	18.3%
Total		Count	110	32	142
		% within Consultants - Region	77.5%	22.5%	100.0%
		% within Product/service innovation	100.0%	100.0%	100.0%

*Table 25. Chi-Square Tests - Regional consultants * product innovation*

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.017[a]	1	.045		
Continuity Correction[b]	3.043	1	.081		
Likelihood Ratio	4.827	1	.028		
Fisher's Exact Test				.066	.033
Linear-by-Linear Association	3.988	1	.046		
N of Valid Cases	142				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.86.

b. Computed only for a 2x2 table

*Table 26. Chi-Square Tests - Local consultants * Radical process innovation*

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.099[a]	1	.024		
Continuity Correction[b]	4.064	1	.044		
Likelihood Ratio	5.063	1	.024		
Fisher's Exact Test				.030	.022
Linear-by-Linear Association	5.051	1	.025		
N of Valid Cases	106				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.34.

b. Computed only for a 2x2 table

*Table 27. Crosstab - Local consultants * Radical process innovation*

			Radical method/process innovation		
			Radical	Incremental	Total
Consultants - City/province	No	Count	31	53	84
		% within Consultants - City/province	36.9%	63.1%	100.0%
		% within Radical method/process innovation	68.9%	86.9%	79.2%
	Yes	Count	14	8	22
		% within Consultants - City/province	63.6%	36.4%	100.0%
		% within Radical method/process innovation	31.1%	13.1%	20.8%
Total		Count	45	61	106
		% within Consultants - City/province	42.5%	57.5%	100.0%
		% within Radical method/process innovation	100.0%	100.0%	100.0%

*Table 28. Symmetric Measures - Local consultants * Radical process innovation*

		Value	Asymptotic Standardized Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	-.219			.024
	Cramer's V	.219			.024
Interval by Interval	Pearson's R	-.219	.096	-2.293	.024[c]
Ordinal by Ordinal	Spearman Correlation	-.219	.096	-2.293	.024[c]
N of Valid Cases		106			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

*Table 29. Chi-Square Tests - National universities * Radical proces innovation*

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.189[a]	1	.041		
Continuity Correction[b]	3.316	1	.069		
Likelihood Ratio	4.157	1	.041		
Fisher's Exact Test				.046	.035
Linear-by-Linear Association	4.149	1	.042		
N of Valid Cases	106				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.46.

b. Computed only for a 2x2 table

*Table 30. Crosstab - National universities * Radical process innovation*

			Radical method/process innovation		Total
			Radical	Incremental	
Universities - Elsewhere in Thailand	No	Count	29	50	79
		% within Universities - Elsewhere in Thailand	36.7%	63.3%	100.0%
		% within Radical method/process innovation	64.4%	82.0%	74.5%
	Yes	Count	16	11	27
		% within Universities - Elsewhere in Thailand	59.3%	40.7%	100.0%
		% within Radical method/process innovation	35.6%	18.0%	25.5%
Total		Count	45	61	106
		% within Universities - Elsewhere in Thailand	42.5%	57.5%	100.0%
		% within Radical method/process innovation	100.0%	100.0%	100.0%

*Table 31. Symmetric Measures - National universities * Radical process innovation*

		Value	Asymptotic Standardized Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	-.199			.041
	Cramer's V	.199			.041
Interval by Interval	Pearson's R	-.199	.097	-2.068	.041[c]
Ordinal by Ordinal	Spearman Correlation	-.199	.097	-2.068	.041[c]
N of Valid Cases		106			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

*Table 32. Chi-Square Tests - International universities * Product innovation*

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.017[a]	1	.045		
Continuity Correction[b]	3.043	1	.081		
Likelihood Ratio	4.827	1	.028		
Fisher's Exact Test				.066	.033
Linear-by-Linear Association	3.988	1	.046		
N of Valid Cases	142				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.86.

b. Computed only for a 2x2 table

*Table 33. Crosstab - International universities * Product innovation*

			Product/service innovation		
			Yes	No	Total
Universities - International	No	Count	86	30	116
		% within Universities - International	74.1%	25.9%	100.0%
		% within Product/service innovation	78.2%	93.8%	81.7%
	Yes	Count	24	2	26
		% within Universities - International	92.3%	7.7%	100.0%
		% within Product/service innovation	21.8%	6.3%	18.3%
Total		Count	110	32	142
		% within Universities - International	77.5%	22.5%	100.0%
		% within Product/service innovation	100.0%	100.0%	100.0%

*Table 34. Symmetric Measures - International universities * Product innovation*

		Value	Asymptotic Standardized Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	-.168			.045
	Cramer's V	.168			.045
Interval by Interval	Pearson's R	-.168	.060	-2.019	.045[c]
Ordinal by Ordinal	Spearman Correlation	-.168	.060	-2.019	.045[c]
N of Valid Cases		142			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

*Table 35. Chi-Square Tests - International research institutes * product innovation*

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.773[a]	1	.009		
Continuity Correction[b]	5.506	1	.019		
Likelihood Ratio	8.938	1	.003		
Fisher's Exact Test				.009	.005
Linear-by-Linear Association	6.725	1	.010		
N of Valid Cases	142				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.08.

b. Computed only for a 2x2 table

*Table 36. Crosstabs - International research institutes * product innovation*

			Product/service innovation		
			Yes	No	Total
Research institutes - International	No	Count	84	31	115
		% within Research institutes - International	73.0%	27.0%	100.0%
		% within Product/service innovation	76.4%	96.9%	81.0%
	Yes	Count	26	1	27
		% within Research institutes - International	96.3%	3.7%	100.0%
		% within Product/service innovation	23.6%	3.1%	19.0%
Total		Count	110	32	142
		% within Research institutes - International	77.5%	22.5%	100.0%
		% within Product/service innovation	100.0%	100.0%	100.0%

*Table 37. Symmetric Measures - International research institutes * product innovation*

		Value	Asymptotic Standardized Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	-.218			.009
	Cramer's V	.218			.009
Interval by Interval	Pearson's R	-.218	.049	-2.648	.009[c]
Ordinal by Ordinal	Spearman Correlation	-.218	.049	-2.648	.009[c]
N of Valid Cases		142			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

*Table 38. Mann-Whitney U Test Statistics - Other companies in the same conglomerate * Product innovation*

	Total other companies in the same conglomerate
Mann-Whitney U	1315.000
Wilcoxon W	1843.000
Z	-2.379
Asymp. Sig. (2-tailed)	.017

a. Grouping Variable: Product/service innovation

*Table 39. Mann-Whitney U Test Ranks - Other companies in the same conglomerate * Product innovation*

	Product/service innovation	N	Mean Rank	Sum of Ranks
Total other companies in the same conglomerate	Yes	110	75.55	8310.00
	No	32	57.59	1843.00
	Total	142		

*Table 40. Mann-Whitney U Statistics – STI-partners * product innovation*

	STI-partners	Total consultants	Total universities	Total research institutes
Mann-Whitney U	1417.000	1501.500	1610.500	1407.500
Wilcoxon W	1945.000	2029.500	2138.500	1935.500
Z	-1.704	-1.344	-.793	-1.946
Asymp. Sig. (2-tailed)	.088	.179	.428	.052

a. Grouping Variable: Product/service innovation

*Table 41. Mann-Whitney U Ranks – STI-partners * product innovation*

	Product/service innovation	N	Mean Rank	Sum of Ranks
STI-partners	Yes	110	74.62	8208.00
	No	32	60.78	1945.00
	Total	142		
Total consultants	Yes	110	73.85	8123.50
	No	32	63.42	2029.50
	Total	142		
Total universities	Yes	110	72.86	8014.50
	No	32	66.83	2138.50
	Total	142		
Total research institutes	Yes	110	74.70	8217.50
	No	32	60.48	1935.50
	Total	142		

*Table 42. Correlation Shares owned abroad * Diversity of partners*

			Shares owned abroad	Diversity of Local partners	Diversity of International partners
Spearman's rho	Shares owned abroad	Correlation Coefficient	1.000	-.161	.289**
		Sig. (2-tailed)	.	.055	.000
		N	142	142	142

**. Correlation is significant at the 0.01 level (2-tailed).

*Table 43. Ranks - Diversity International partners * product innovation*

	Product/service innovation	N	Mean Rank	Sum of Ranks
Diversity of International partners	Yes	110	76.20	8382.00
	No	32	55.34	1771.00
	Total	142		

*Table 44. Test Statistics - Diversity International partners * product innovation*

	Diversity of International partners
Mann-Whitney U	1243.000
Wilcoxon W	1771.000
Z	-2.558
Asymp. Sig. (2-tailed)	.011

a. Grouping Variable: Product/service innovation

Table 45. Ranks – Diversity of international partners and process innovation

	Method/process innovation	N	Mean Rank	Sum of Ranks
Diversity of International partners	Yes	106	75.58	8011.00
	No	36	59.50	2142.00
	Total	142		

Table 46. Test Statistics – Diversity of international partners and process innovation

	Diversity of International partners
Mann-Whitney U	1476.000
Wilcoxon W	2142.000
Z	-2.053
Asymp. Sig. (2-tailed)	.040

a. Grouping Variable: Method/process innovation

Table 47. Mann-Whitney Ranks - Partners abroad * Product innovation

	Product/service innovation	N	Mean Rank	Sum of Ranks
Partners abroad	Yes	110	76.73	8440.00
	No	32	53.53	1713.00
	Total	142		

Table 48. Mann-Whitney Test Statistics - Partners abroad * Product innovation

	Partners abroad
Mann-Whitney U	1185.000
Wilcoxon W	1713.000
Z	-2.943
Asymp. Sig. (2-tailed)	.003

a. Grouping Variable: Product/service innovation

Table 49. Mann-Whitney Ranks - Partners abroad * Process innovation

	Method/process innovation	N	Mean Rank	Sum of Ranks
Partners abroad	Yes	106	76.40	8098.00
	No	36	57.08	2055.00
	Total	142		

Table 50. Mann-Whitney Test Statistics - Partners abroad * Process innovation

	Partners abroad
Mann-Whitney U	1389.000
Wilcoxon W	2055.000
Z	-2.552
Asymp. Sig. (2-tailed)	.011

a. Grouping Variable: Method/process innovation

Table 51. Mann-Whitney Test Statistics – Personal contacts * Product innovation

	In my city/province	In my region	Elsewhere in Thailand	Elsewhere in Asia	Elsewhere in Europe	In the rest of the world
Mann-Whitney U	1737.500	1607.000	1690.000	1645.000	1236.000	1170.500
Wilcoxon W	7842.500	2135.000	7795.000	7750.000	1764.000	1698.500
Z	-.114	-.775	-.359	-.598	-2.653	-3.031
Asymp. Sig. (2-tailed)	.909	.438	.719	.550	.008	.002

a. Grouping Variable: Product/service innovation

*Table 52. Mann-Whitney Ranks – Personal contacts * Product innovation*

	Product/service innovation	N	Mean Rank	Sum of Ranks
In my city/province	Yes	110	71.30	7842.50
	No	32	72.20	2310.50
	Total	142		
In my region	Yes	110	72.89	8018.00
	No	32	66.72	2135.00
	Total	142		
Elsewhere in Thailand	Yes	110	70.86	7795.00
	No	32	73.69	2358.00
	Total	142		
Elsewhere in Asia	Yes	110	70.45	7750.00
	No	32	75.09	2403.00
	Total	142		
Elsewhere in Europe	Yes	110	76.26	8389.00
	No	32	55.13	1764.00
	Total	142		
In the rest of the world	Yes	110	76.86	8454.50
	No	32	53.08	1698.50
	Total	142		

*Table 53. Mann – Whitney Ranks - SME - Companies in the conglomerate * Product innovation*

	Product/service innovation	N	Mean Rank	Sum of Ranks
Total other companies in the same conglomerate	Yes	66	47.64	3144.50
	No	22	35.07	771.50
	Total	88		

*Table 54. Mann – Whitney Test Statistics - SME - Companies in the conglomerate * Product innovation*

	Total other companies in the same conglomerate
Mann-Whitney U	518.500
Wilcoxon W	771.500
Z	-2.175
Asymp. Sig. (2-tailed)	.030

*Table 55. Mann-Whitney Ranks - SME - Universities * Radical product innovation*

	Radical product/service innovation	N	Mean Rank	Sum of Ranks
Total universities	New to market	39	37.42	1459.50
	New to company	27	27.83	751.50
	Total	66		

*Table 56. Mann-Whitney Test Statistics - SME - Universities * Radical product innovation*

	Total universities
Mann-Whitney U	373.500
Wilcoxon W	751.500
Z	-2.161
Asymp. Sig. (2-tailed)	.031

*Table 57. Mann-Whitney U Ranks - Large firm - International partners * product innovation*

	Product/service innovation	N	Mean Rank	Sum of Ranks
International partners	Yes	44	29.49	1297.50
	No	10	18.75	187.50
	Total	54		

*Table 58. Mann-Whitney U Test Statistics - Large firm - International partners * product innovation*

	International partners
Mann-Whitney U	132.500
Wilcoxon W	187.500
Z	-1.979
Asymp. Sig. (2-tailed)	.048

*Table 59. Mann-Whitney U Ranks - Large firm - International partners * Radical process innovation*

	Radical method/process innovation	N	Mean Rank	Sum of Ranks
International partners	Radical process innovation	22	17.86	393.00
	Incremental process innovation	20	25.50	510.00
	Total	42		

*Table 60. Mann-Whitney U Test Statistics - Large firm - International partners * Radical process innovation*

	International partners
Mann-Whitney U	140.000
Wilcoxon W	393.000
Z	-2.052
Asymp. Sig. (2-tailed)	.040

*Table 61. Mann-Whitney U Ranks - Large firm - International partners * product innovation*

	Product/service innovation	N	Mean Rank	Sum of Ranks
International partners	Yes	44	29.49	1297.50
	No	10	18.75	187.50
	Total	54		

*Table 62. Mann-Whitney U Test Statistics - Large firm - International partners * product innovation*

	International partners
Mann-Whitney U	132.500
Wilcoxon W	187.500
Z	-1.979
Asymp. Sig. (2-tailed)	.048

*Table 63. Mann-Whitney U Ranks - Large firm - International partners * Radical process innovation*

	Radical method/process innovation	N	Mean Rank	Sum of Ranks
International partners	Radical process innovation	22	17.86	393.00
	Incremental process innovation	20	25.50	510.00
	Total	42		

*Table 64. Mann-Whitney U Test Statistics - Large firm - International partners * Radical process innovation*

	International partners
Mann-Whitney U	140.000
Wilcoxon W	393.000
Z	-2.052
Asymp. Sig. (2-tailed)	.040

Appendix F: Data Preparation Cultural Intelligence

This appendix is part of Chapter 6: Cultural Intelligence. To measure both dimensions, four items for metacognitive CQ (e.g. I am conscious of the cultural knowledge I use when interacting with people with different cultural backgrounds) and four items for motivational CQ (e.g. I enjoy interacting with people from different cultures) were adopted (a total of 8 items). These items are measured using a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree).

<u>**Reliability**</u>

To test the reliability of these constructs, SPSS is being used to calculate the Cronbach's alpha. Cronbach's alpha can range between 0 and 1 and the closer the outcome to 1, the more reliable the statements in the construct are. A Cronbach's alpha below 0.5 is unacceptable. A Cronbach's alpha between 0.5 and 0.6 is poor, between 0.6 and 0.7 is questionable, and between 0.7 and 1 is acceptable, good, or even excellent (George & Mallery 2003; Peter, 1981). The construct motivational CQ has a Cronbach's alpha of 0.857, an indication of a good internal consistency (see Table 66). The Item-Total Statistics table does not indicate an improvement of the Cronbach's alpha if any Item were to be deleted. The second construct, metacognitive CQ, has a Cronbach's alpha of 0.859. Again, the construct is reliable and deleting any other measurement does not improve the reliability (see

Table 68). This aligns with other researches on CQ where internal consistency and reliability of the scales were confirmed (e.g. Ang et al., 2007; Charoensukmongkol, 2015).

Table 65. Cronbach's Alpha - Motivational CQ

Reliability Statistics

Cronbach's Alpha	N of Items
.857	4

Table 66. Item-Total Statistics Motivational CQ

	Cronbach's Alpha if Item Deleted
I enjoy interacting with people from other cultures.	.817
I am confident that I can socialize with locals in a culture that is unfamiliar to me.	.791
I am sure I can deal with the stresses of adjusting to a culture that is new to me.	.827
I enjoy living in cultures that are unfamiliar to me.	.836

Table 67. Cronbach's Alpha – Metacognitive CQ

Reliability Statistics

Cronbach's Alpha	N of Items
.859	4

Table 68. Item-Total Statistics Metacognitive CQ

	Cronbach's Alpha if Item Deleted
I consciously apply cross-cultural knowledge when interacting with people with different cultural backgrounds.	.825
I adjust my cultural knowledge as I interact with people from a culture that is unfamiliar to me.	.803
I am conscious of the cultural knowledge I apply to cross-cultural interactions.	.797
I check the accuracy of my cultural knowledge as I interact with people from different cultures.	.859

Validity

The validity of the construct is tested on convergent validity and discriminant validity. Convergent validity estimates the correlation between two measures of the same construct, and discriminant validity estimates whether similar constructs are distinctive enough from each other (Hair et al., 2010; Peter, 1981). Validity is checked according to a Principal Component Analysis (PCA). In order to check whether the data is suited for PCA a Kaiser-Meyer-Olkin (KMO) Test has been included in the output. The KMO values run between 0 and 1 and the minimum acceptable value of the KMO is 0.5. The output shows a KMO of 0.878 which means that the value is 'meritorious' and thus suitable for a PCA (Cerny, Barbara & Kaiser, 1977; Kaiser, 1974). Additionally, the Bartlett's Test of Sphericity in the table shows a significant strong (below 0.05) relationship between variables, which means that a PCA for the data is possible (see Table 69). In a Principal Component Analysis two different rotation methods can be chosen: oblique or orthogonal. In order to find the correct rotation method, Tabachnick and Fiddell (2007, p. 646) argue that "*the best way to decide between orthogonal and oblique rotation is to request oblique rotation (e.g. direct oblimin or promax)*". First, a Promax Rotation is chosen which resulted in a correlation of 0.585. Tabachnik & Fidell (2007) argue that a correlation around and above 0.32 means that an oblique rotation is most suitable unless there are compelling reasons for orthogonal rotation (see also Brown, 2009). Therefore, there is no need to run a second test with Validax Rotation (see Table 70). The pattern matrix, shows a clear distinction between the two components. The four items representing motivational CQ are divided from the four items that represent metacognitive CQ (see Table 71) and show a high item loading which indicates that convergent validity and discriminant validity are achieved. In the next sections is shown how the two components have been constructed. These newly created variables are: CQ_MOT and CQ_MC.

Table 69. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.878
Bartlett's Test of Sphericity	Approx. Chi-Square	630.747
	df	28
	Sig.	.000

Table 70. Component correlation matrix in Promax Rotation

Component	1	2
1	1.000	.585
2	.585	1.000

Extraction Method: Principal Component Analysis.

Rotation Method: Promax with Kaiser Normalization.

Table 71. Pattern matrix

	Component	
	1	2
I check the accuracy of my cultural knowledge as I interact with people from different cultures.	.924	-.178
I am conscious of the cultural knowledge I apply to cross-cultural interactions.	.872	.011
I adjust my cultural knowledge as I interact with people from a culture that is unfamiliar to me.	.816	.060
I consciously apply cross-cultural knowledge when interacting with people with different cultural backgrounds.	.699	.169
I enjoy interacting with people from other cultures.	-.223	1.013
I am confident that I can socialize with locals in a culture that is unfamiliar to me.	.004	.884
I enjoy living in cultures that are unfamiliar to me.	.213	.670
I am sure I can deal with the stresses of adjusting to a culture that is new to me.	.277	.625

Extraction Method: Principal Component Analysis. Rotation Method: Promax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Scores Represented as the Percent of Maximum Possible

In order to increase interpretability, the 7-point Likert variables have been transformed to a scale which runs from 0 to 100. This is done through the following equation to calculate Scores Represented as the Percent of Maximum Possible, or, POMP (Cohen, Cohen, Aiken & West, 1999):

$$POMP = [(observed - minimum) / (maximum - minimum)] \times 100$$

In this equation, observed = the observed score for a single case, minimum = the minimum possible score on the scale, and maximum = the maximum possible score on the scale. For example, when a respondent answered 'very important' (7) on every Likert-scale, the CQ_MOT or CQ_MC score he would get is 100. After the ordinal data was transformed to scale data (see Table 72 for the descriptive statistics) the distribution of the data was tested through the Shapiro-Wilk test. The output was significant, which means that the data is not normally distributed and nonparametric tests are best suitable for testing the data (de Winter & Dodou, 2012).

Appendix G: Output SPSS Cultural Intelligence

Table 72. Descriptive Statistics Motivational and Metacognitive Scale

		Level of Motivational CQ (0 to 100)	Level of Metacognitive CQ (0 to 100)
N	Valid	142	142
	Missing	0	0
Mean		83.0986	80.2230
Median		83.3333	83.3333
Mode		83.33	83.33
Std. Deviation		13.13661	13.06765
Range		75.00	62.50
Minimum		25.00	37.50
Maximum		100.00	100.00

Table 73. Motivational and Metacognitive CQ and local partners

Test Statistics[a]

	Level of Motivational CQ (0 to 100)	Level of Metacognitive CQ (0 to 100)
Mann-Whitney U	2294.500	2322.000
Wilcoxon W	4640.500	5097.000
Z	-.913	-.801
Asymp. Sig. (2-tailed)	.361	.423

a. Grouping Variable: Use of local partners

Table 74. Motivational and Metacognitive CQ and regional partners

Test Statistics[a]

	Level of Motivational CQ (0 to 100)	Level of Metacognitive CQ (0 to 100)
Mann-Whitney U	2271.000	2362.000
Wilcoxon W	3982.000	5932.000
Z	-.691	-.311
Asymp. Sig. (2-tailed)	.489	.756

a. Grouping Variable: Use of regional partners

Table 75. Motivational and Metacognitive CQ and national partners

Test Statistics[a]

	Level of Motivational CQ (0 to 100)	Level of Metacognitive CQ (0 to 100)
Mann-Whitney U	1511.000	1675.000
Wilcoxon W	1976.000	2140.000
Z	-.852	-.025
Asymp. Sig. (2-tailed)	.394	.980

a. Grouping Variable: Use of national partners

Table 76. Motivational and Metacognitive CQ and international partners

Test Statistics^a

	Level of Motivational CQ (0 to 100)	Level of Metacognitive CQ (0 to 100)
Mann-Whitney U	1363.000	1393.500
Wilcoxon W	8266.000	1718.500
Z	-.538	-.374
Asymp. Sig. (2-tailed)	.591	.709

a. Grouping Variable: Use of partners abroad

Table 77. Motivational and Metacognitive CQ and the diversity of local partners

Test Statistics^{a,b}

	Level of Motivational CQ (0 to 100)	Level of Metacognitive CQ (0 to 100)
Chi-Square	5.671	3.536
df	7	7
Asymp. Sig.	.579	.831

a. Kruskal Wallis Test

b. Grouping Variable: Diversity of Local partners

Table 78. Motivational and Metacognitive CQ and the diversity of regional partners

Test Statistics^{a,b}

	Level of Motivational CQ (0 to 100)	Level of Metacognitive CQ (0 to 100)
Chi-Square	7.026	3.753
df	7	7
Asymp. Sig.	.426	.808

a. Kruskal Wallis Test

b. Grouping Variable: Diversity of Regional partners

Table 79. Motivational and Metacognitive CQ and the diversity of national partners

Test Statistics^{a,b}

	Level of Motivational CQ (0 to 100)	Level of Metacognitive CQ (0 to 100)
Chi-Square	8.901	10.465
df	7	7
Asymp. Sig.	.260	.164

a. Kruskal Wallis Test

b. Grouping Variable: Diversity of National partners

Table 80. Motivational and Metacognitive CQ and the diversity of international partners

Test Statistics[a,b]

	Level of Motivational CQ (0 to 100)	Level of Metacognitive CQ (0 to 100)
Chi-Square	2.496	10.115
df	6	6
Asymp. Sig.	.869	.120

a. Kruskal Wallis Test

Table 81. CQ and the usefulness of personal contacts in the rest of the world - Ranks

	In the rest of the world	N	Mean Rank
Level of Motivational CQ (0 to 100)	Not useful at all	6	69.42
	Not very useful	17	43.97
	Neutral	30	73.42
	Somewhat useful	61	72.00
	Very useful	28	85.52
	Total	142	
Level of Metacognitive CQ (0 to 100)	Not useful at all	6	58.92
	Not very useful	17	54.29
	Neutral	30	67.65
	Somewhat useful	61	70.02
	Very useful	28	91.98
	Total	142	

Table 82. CQ and the usefulness of personal contacts elsewhere in Asia - Ranks

Ranks

	Elsewhere in Asia	N	Mean Rank
Level of Motivational CQ (0 to 100)	Not useful at all	7	65.93
	Not very useful	4	22.13
	Neutral	27	71.63
	Somewhat useful	63	63.43
	Very useful	41	89.59
	Total	142	
Level of Metacognitive CQ (0 to 100)	Not useful at all	7	61.71
	Not very useful	4	32.75
	Neutral	27	65.48
	Somewhat useful	63	68.03
	Very useful	41	86.24
	Total	142	

Table 83. CQ and the usefulness of personal contacts in the rest of the world - Test statistics

	Level of Motivational CQ (0 to 100)	Level of Metacognitive CQ (0 to 100)
Chi-Square	11.160	11.065
df	4	4
Asymp. Sig.	.015	.026

a. Kruskal Wallis Test

b. Grouping Variable: In the rest of the world

Table 84. CQ and the usefulness of personal contacts elsewhere in Asia – Test Statistics

Test Statistics[a,b]

	Level of Motivational CQ (0 to 100)	Level of Metacognitive CQ (0 to 100)
Chi-Square	16.546	10.472
df	4	4
Asymp. Sig.	.002	.033

a. Kruskal Wallis Test

b. Grouping Variable: Elsewhere in Asia

Table 85. Mann-Whitney U Ranks - Radical product innovation and motivational CQ

	Radical product/service innovation	N	Mean Rank	Sum of Ranks
Level of Motivational CQ (0 to 100)	New to market	71	59.35	4214.00
	New to company	39	48.49	1891.00
	Total	110		

Table 86. Mann-Whitney U Test Statistics - Radical product innovation and motivational CQ

	Level of Motivational CQ (0 to 100)
Mann-Whitney U	1111.000
Wilcoxon W	1891.000
Z	-1.726
Asymp. Sig. (2-tailed)	.084

a. Grouping Variable: Radical product/service innovation

Table 87. Mann-Whitney U Ranks - Product innovation and metacognitive CQ

	Product/service innovation	N	Mean Rank	Sum of Ranks
Level of Metacognitive CQ (0 to 100)	Yes	110	75.83	8341.00
	No	32	56.63	1812.00
	Total	142		

Table 88. Mann-Whitney U Test Statistics - Product innovation and metacognitive CQ

	Level of Metacognitive CQ (0 to 100)
Mann-Whitney U	1284.000
Wilcoxon W	1812.000
Z	-2.350
Asymp. Sig. (2-tailed)	.019

a. Grouping Variable: Product/service innovation

Table 89. Moderating effect motivational CQ on personal global links and product innovation

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.232	.035		35.270	.000
	Personal_Link_Cent	-.109	.033	-.278	-3.309	.001
	MOT_CQ_Cent	.000	.003	.015	.177	.859
	MOT_CQPersonal	-.002	.002	-.074	-.876	.382

a. Dependent Variable: Product/service innovation

Table 90. Moderating effect motivational CQ on personal global links and radical product innovation

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.365	.048		28.264	.000
	Personal_Link_Cent	-.012	.050	-.024	-.234	.815
	MOT_CQ_Cent	-.003	.004	-.084	-.842	.402
	MC_CQPersonal	-.003	.004	-.067	-.692	.491

a. Dependent Variable: Radical product/service innovation

Table 91. Moderating effect motivational CQ on personal global links and process innovation

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.254	.038		33.207	.000
	Personal_Link_Cent	-.058	.035	-.140	-1.620	.107
	MOT_CQ_Cent	.000	.003	-.010	-.111	.912
	MC_CQPersonal	.000	.003	-.004	-.044	.965

a. Dependent Variable: Method/process innovation

Table 92. Moderating effect motivational CQ on personal global links and radical process innovation

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.581	.051		31.310	.000
	Personal_Link_Cent	.035	.050	.071	.690	.492
	MOT_CQ_Cent	-.002	.004	-.045	-.436	.664
	MC_CQPersonal	-.003	.004	-.064	-.645	.521

a. Dependent Variable: Radical method/process innovation

*Table 93. Mann-Whitney U Test Ranks – Metacognitive and Motivational CQ * SME or Large firm*

	SME or Large firm	N	Mean Rank	Sum of Ranks
Level of Motivational CQ (0 to 100)	SME	88	70.51	6204.50
	Large firm	54	73.12	3948.50
Level of Metacognitive CQ (0 to 100)	SME	88	64.80	5702.50
	Large firm	54	82.42	4450.50

*Table 94. Mann-Whitney U Test Statistics – Metacognitive and Motivational CQ * SME or Large firm*

	Level of Motivational CQ (0 to 100)	Level of Metacognitive CQ (0 to 100)
Mann-Whitney U	2288.500	1786.500
Wilcoxon W	6204.500	5702.500
Z	-.371	-2.505
Asymp. Sig. (2-tailed)	.711	.012

a. Grouping Variable: SME or Large firm