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Complexity in the ‘Extended’ Business Network

A Study of Business, Social, and Political
Relationships in Smart City Solutions

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Abstract

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In this thesis an 'extended' business network is investigated. The designation 'extended' refers to the inclusion of socio-political actors in the firm's business network. Building on a business network perspective, the thesis' purpose is to understand how interactions between business, social, and political actors influence the development of smart city solutions. Based on the findings from the four articles included in the thesis, a complexity lens for further understanding of interaction with socio-political actors is presented. It argues that reaching success in the relationship entails finding a balance between economic and social needs.

Through the analysis of two smart city projects developed in Brazil, this study investigates the influence of socio-political actors on firms' cooperative and competitive behavior as well as their decisions relating to resource allocation. The findings illustrate that decisions to cooperate or compete are associated with centrality. The firm's willingness to be a central actor, i.e., a project leader, places traditional buyer-supplier partners in competition. In addition to this, resource allocation is closely linked to customization. In cities demanding a high level of customization of the smart city solution, companies will be encouraged to allocate resources to exploitation, while in cities requiring a low level of customization, exploration will be chosen instead. But knowledge about how to allocate resources is closely linked to the centrality issue, since a central actor may enjoy better access to a large pool of resources and information. Consequently, the final outcome in relational terms can lead to win-lose rather than a win-win situation if rivalry for centrality between business partners intensifies over time.

The study of such complex interaction contributes to the industrial marketing and business network literature by providing a practical perspective and showing how socio-political actors can be a source of competitive advantages for companies. In addition, this thesis suggests that managers need to cope with the complexity inherent in such type of relationships, primarily due the fact that interaction with socio-political actors has important competitive implications for firms. Ultimately, the thesis offers a framework for investigating complexity in actors' interactions and resource heterogeneity that complements our understanding of intraorganizational relationships, opening opportunities for a new perspective and better comprehension of the influence of socio-political actors in firms' business networks.

Keywords: complexity, extended business network, centrality, smart city solutions, cooperation-competition, exploration-exploitation.

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*In loving memory of my father
Plinio Leite*

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... amigos para sempre, obrigada C.M.



List of Papers

This thesis is based on the following papers, which are referred to in the text by their Roman numerals.

- I. Leite, E., Bengtson, A. (2018). A Business Network View on Value Creation and Capture in Public-Private Cooperation. Accepted in *Industrial Marketing Management*, forthcoming.

Previous versions of this article have been accepted as a book chapter in:
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Leite, E., Latifi, M., (2016).The Role of NGOs in Business Networks: Partnership in Innovation. Book Chapter in *Extending the Business Network Approach – New Territories, New Technologies, New Terms*, Palgrave Macmillan Book series, pp.83-97.
- II. Leite, E., Pahlberg, C., Åberg, S. (2018).The Cooperation-Competition Interplay in the ICT Industry. Accepted in *Journal of Business and Industrial Marketing*, forthcoming, 33(4).
- III. Leite, E., Pahlberg, C., Hadjikhani, A. (2017), Business and Socio-Political Interaction in International Service Projects. Submitted to *Management International Review*, (R&R) review and resubmit.
- IV. Leite, E., (2018), Innovation Networks - Why do they emerge and how are they configured? Submitted to *Industrial Marketing Management*.

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Abbreviations

B2B: Business to Business

BRICS: Brazil, Russia, India, China, South Africa

BRT: Bus Rapid Transit

CSR: Corporate Social Responsibility

FDI: Foreign Direct Investment

GPS: Global Positioning System

ICT: Information and Communication Technology

IoT: Internet of Things

IBGE: Brazilian Institute of Geography and Statistics

ICI: Institute of Intelligent Cities

IMP: Industrial Marketing Purchasing

IT: Information Technologies

MNE: Multinational Enterprise

NGO: Non-governmental Organization

OCC: Operational Control Center

R&D: Research and Development

SIM: Subscriber Identity Module

URBS: Urbanization of Curitiba

UN: United Nation

UNFCCC: United Nation Framework for Climate Change Convention

WHO: World Health Organization

1. Introduction

We live in an urban world. People move to cities for many reasons, including job opportunities and family ties. The current world population of 7.6 billion is expected to reach 8.6 billion in 2030, and 60 percent of the world's population is expected to be living in cities in the same period (UN, 2017). With more people living in urban areas, streets may become congested, pollution levels rise and public health may decline (UN, 2014). As cities have expanded, so has the demand for government ability to provide better infrastructure and public services. The 'smart city' concept may form a response to these urban challenges.

A city is defined as 'smart' when the government participates in the efficient allocation of resources aligned with economic growth (Caragliu, Del Bo & Nijkamp, 2011). The term has also been used to refer to the integration of public and private services using technological innovation, which typically involves ICT (information and communications technology). Although 'smart city' lacks a formal definition, its goal 'is to better allocate public resources, increase the quality of services offered to citizens while reducing the operational costs of the public administration' (Zanella Bui, Castellani & Vangelista, 2014) and therefore public authorities are the potential buyers of such technologies. This objective for making cities smart can be pursued by the development of IoT (Internet of Things) based services, which integrate several technologies and communication infrastructures via the internet. Such technologies facilitate remote monitoring, the management and optimization of traditional public services such as transport and parking, public street lighting, education and health, surveillance and maintenance of public areas, etc. (Atzori, Iera, & Morabito, 2010). Furthermore, these technological solutions can also combine data from several connected devices and, therefore, help public authorities to improve their decision-making.

From a business point of view, incorporating digital technologies to address some of the city's sustainability challenges is a way of creating business opportunities. However, the development and implementation of technologies applied to cities require companies to interact with a range of actors outside their traditional business network. In this study the focus is on companies that are perceived to be embedded in relationships containing both business and nonbusiness actors. That is, an 'extended' business network is investigated. The word 'extended' refers to the inclusion of actors beyond the traditional business network of customers, suppliers, and competitors.

Research has shown that nonbusiness actors (e.g. nongovernmental organizations, political actors, etc.) are important, mainly because they can help firms to gain support, build legitimacy, and therefore influence firms' corporate behavior (see for example Ghauri, Hadjikhani & Elg, 2012; Hadjikhani, Lee & Ghauri, 2008; Hadjikhani, Lee & Park, 2016; Salmi & Heikkilä, 2015). This view is in line with research which recognizes that nonbusiness actors have a supplementary value for the companies' business activities and that they may therefore affect the firm's focal business relationship (Hadjikhani et al., 2008). In such relationships, companies and socio-political actors may benefit from each other if they perceive possibilities for achieving mutual goals. In this study, 'social' refers to nongovernmental organizations (NGOs) while 'political' refers to public officials and politicians.

The actors may be directly or indirectly interdependent (Ljung, 2014). In other words, on the one hand companies are best equipped to develop technologies that have a societal impact, while on the other hand local government and nonprofit organizations are the actors possessing the knowledge about the cities' context and the expertise to identify the needs of that society. In addition, while firms need support and acceptance for their new IoT technologies, socio-political actors rely on the technological expertise provided by firms that may increase a society's wellbeing. In a city context, government, NGOs, and companies will try to indicate that they are conforming to society's needs. Therefore, there is a necessity for companies to establish a close interaction, by working together with social and political actors in projects to develop solutions for smart cities. Interaction is thus an important dimension for the development of smart cities, since it constitutes a basic requirement for cooperation and the creation of mutual benefits. It is through interaction that actors access and combine resources (Håkansson & Snehota, 1995). However, working together in such partnerships is not a trivial task and, as Le Ber and Branzei (2010; p.145) affirm, cross-sector cooperation does not follow a linear progression path. On the contrary, it is commonly marked by constant adjustments and interrupted by temporary successes and failures. Thus, the complexity in an 'extended' business network seems to be higher than in the traditional business network due to differences in the nature of the exchange.

The stem of the word 'complexity' is 'complex', which has Latin roots. According to the Oxford Dictionary, its meaning combines 'com', which means 'together', and 'plex', meaning 'woven'. Complexity is thus generally used to describe something with several parts where those parts interact with each other in numerous ways (Baccarini, 1996). A business network is complex, as stated by Halinen and Törnroos (2005), because its structure consists of various actors and several different links, and those links can be directly and indirectly connected between them. In the case of the 'extended' business network, the additional complexity is related to differences in the nature

of the exchange in comparison to the traditional business network. Such differences include the economic and non-economic nature of the exchange, greater differences among actors (business and nonbusiness) and their respective resources (technological and non-technological).

Investigating the role of actors in the development of technologies for smart cities involves both an actor and a resource dimension. Within the marketing field, resource interdependence explains actors' motivation for relationship and product development. But Ghauri et al., (2012) claim that not all relationships will be stable and that project development may be characterized by temporary projects network. This is in line with Dalsace (2004), who affirms that in the current business environment, relationships are far from stable but are based on discontinuity and complexity. Smart city projects are complex, since the solution involves several organizational actors and temporary with a start and an end period, although this doesn't necessarily mean that the relationships between actors terminate when the project ends. IMP research highlights the complexity that exists in the resource combination process, which involves more than just assembling existing assets to entail the integration of one actor's resources into another actor's resources (Baraldi & Bocconcelli, 2001; Cantú, Corsaro & Snehota, 2012). Therefore, complexity resides at the intersection of the actors and the resource dimension. Thus, resource combination is collectively enacted. In a smart city context, added complexity is observed because such a process involves both business and nonbusiness actors.

From a business viewpoint, cities can mainly be seen as an innovation environment if they can be used as live labs for internet technology experimentation and services application (Eurocities, 2010). An interesting aspect is that the goals of companies in developing technologies applied to cities concern the opportunities for growth, and socio-political actors may support and/or impede this process. Therefore, more knowledge is necessary to understand the influence of socio-political actors, for instance on market creation and expansion for this type of new technology. Cooperation with socio-political actors may facilitate and/or hinder firms' competitive behaviors in various ways, for example by contributing ideas for improvements of the solution/service, assisting companies with the testing of prototypes, cooperating in pilot projects by allowing companies to use some sites in the city for technological experimentation, etc. Last but not least, interaction with socio-political actors may influence what kind of solution can be achieved in respect to exploration of new resource combinations and exploitation of known solutions. In times of sustainability and pressure for more socially oriented behavior from companies in general, understanding the impact of such relationships can be relevant for firms aiming to develop strategies to better interact with political and social organizations (Ghauri & Buckley, 2004; Hadjikhani et al., 2008, 2016; Ring et al., 1990).

1.1 Research Gap

While business networks are intrinsically linked to the examination of traditional business-to-business relationships, in practice firms also maintain relationships with organizations other than business firms (Anderson, Håkansson & Johanson, 1994; Möller & Halinen, 1999; Håkansson & Waluszewski, 2007; Waluszewski, 2011). Examples include government, universities, civil society, media, etc. The management of socio-political relationships has been acknowledged as important, and, for example, these relationships help firms to enhance legitimacy (Hadjikhani et al., 2008; 2016; Jansson, Saqib, & Sharma, 1995), access new market information (Hadjikhani & Ghauri, 2001), or improve a company's network position. This is particularly relevant for firms that operate globally and therefore meet with very different business networks (Jansson, Johanson & Ramström, 2007).

Several studies have analyzed firms' relationships with nonbusiness actors (e.g., Boddewyn, 1988; Ghauri et al., 2012; Hadjikhani & Ghauri, 2001; Ritvala & Salmi, 2011; Ritvala, Salmi & Andersson, 2014). Prior research also suggests that the management of social and political environments is the key marketing strategy that influences competition, market image, and success in entry and expansion into foreign markets (Ghauri et al., 2012; Marquina & Morales, 2012; Polonsky & Jevons, 2009). When studying the behavior of international firms in socio-political environments in the European Union, Hadjikhani and Ghauri (2001) demonstrated that the more political knowledge and commitment a firm has, the more influence it gains and the more specific support it can receive from socio-political actors. Hadjikhani and Ghauri depict political actors as supporting firms' activities or taking coercive action against them. Bengtson, Pahlberg and Pourmand (2009) also indicated the importance of proactive behavior of small firms in influencing political decisions at different levels when such decisions affect their business. These studies showed that gaining political knowledge allows firms to influence rather than just complying with political norms and decisions.

Other studies have also shown that managing relationships with socio-political actors might be valuable for firms aiming to gain preferential treatment, access insider information, reduce uncertainty, and enhance reputation in foreign markets (see, for example, Ghauri et al., 2012; Hadjikhani et al., 2008; Li, Poppo & Zhou, 2008). In investigating interaction between public officials and companies in Russia, Salmi and Heikkilä (2015) found that firms still need to nurture relationships with public officials even when they have an established position in the foreign market. The authors affirm that interaction is needed in order to create mutual understanding between public and private organizations which have different goals and organizational practices.

Recent calls (see, for example, Ritvala et al., 2014; Thilenius, Pahlberg & Havila, 2016) continue to highlight the importance of extending the boundaries of the business network as a means to explore new theoretical and empirical territories (Hadjikhani & Thilenius, 2016). Welch and Wilkinson (2004) suggest, for instance, that researchers need to look beyond the non-economic role of political actors, since their influence may be greater than this and they might be in control of important economic resources. While most of the earlier studies recognize that firms also need to manage interactions with socio-political actors, they have paid much attention to firms' interactions with political actors. Notably, there is a dearth of studies including a triadic perspective (firms-social and political) on the interaction. With this view in mind, and inspired by empirical observations of inter-organizational interaction, this study contributes to this ongoing debate by extending firms' business networks. The intention is to include actors beyond the traditional business network and analyze the complexities and tensions that arise in such triadic interactions.

While some previous studies share my interest in the interaction between firms and socio-political actors, according to Salmi and Heikkilä (2015), these studies lack a practical perspective. In their study, the authors discuss the complex interaction between MNEs (multinational enterprises) and public officials in Russia. Their focus is on firms' daily routines such as contact with public officials through email exchange, copies of product certificates, or certification processes. They conclude that interactions with public officials are part of the firms' business environment even when MNEs have an ongoing operation in the local market. In line with Salmi and Heikkilä, this thesis also takes a practical perspective. But rather than analyzing daily routines, the focus is on firms working together with socio-political actors in a project for co-development of smart city solutions. The process includes phases of planning, development, and implementation, but in a non-linear approach. The phases may overlap and require mobilizing resources and the interests of actors at different stages (Pellikka & Virtanen, 2009). However, integrating socio-political resources with business resources may not be easy, since actors will face complexity with regards to technological and relationship development. The need to integrate knowledge and combine resources across sectors may bring together multiparty actors with both harmonious and conflicting demands as well as diverse legitimate grounds.

An interesting aspect is that combining different parts of technologies creates interdependence of resources. This interdependence is likely to create complexity, considering that the nature of the exchange in nonbusiness relationships differs (Ljung, 2014). For example, the preferred solution of a firm might diverge from the preferred solution of government and NGOs. It is also important to consider for *whom* the solution is useful. What counts as useful, and therefore valuable, to a social and political actor may be of little or no value to a business actor, and vice versa. The value system with re-

gards to business is closely linked to rent-seeking, while value for social and political actors is more linked to societal development and may not be limited to an economic dimension. For instance, an important aim of a city's mayor is to promote the citizens' well-being by improving the quality of life, reducing poverty, promoting social inclusion, improving healthcare and the education system, and so forth. Hence, interaction in this study includes knowledge about others and the ability to work together, which will require firms to adapt their existing technology and managerial skills.

The dominant literature studying smart cities focuses specifically on technology, infrastructure, and technology suppliers (Andersson & Mattsson, 2015), and there is a lack of academic inquiries analyzing the nature of these suppliers' business relationships and network formation. As mentioned above, particular focus is made in this thesis on the role of the socio-political actors on the firms' business activities linked with the smart city projects. Therefore, the investigation of the influence of these actors on the firms' cooperative and competitive behavior, as well as what kind of solution can be achieved, needs to be further studied. Investigating cooperative and competitive behavior as well as exploration and exploitation of resources in an 'extended' business network may help broaden business-to-business research.

1.2 The Purpose of the Thesis and Research Questions

Given the differences among actors, and considering the view of 'extended' business networks, the main concern of this thesis is to understand how companies manage such interactions. When examining development of products and services, literature within business research commonly focuses on companies and their performance in relation to short-term and incremental aspects of innovation, while little attention has been paid to public-private benefits (Bhanji & Oxley, 2013; Mahoney, McGahan, & Pitelis, 2009). Such relationship development becomes even more relevant in a market for smart city technologies, in which nonbusiness actors are the potential buyers and system users. I argue that there is a need to learn more about how firms cope with the inherent complexity in such relationships where actors with different values and limited resources attempt to find novel smart city solutions. Based on this reasoning, the purpose of the thesis is:

To increase our understanding of how interactions between business, social, and political actors influence the development of smart city solutions.

The purpose is divided into two specific research questions, which will be further described below.

1.2.1 Research Questions

As mentioned above, taking into consideration the diversity of actors and the heterogeneity of resources in the development of a smart city, it is important to investigate the complexities that emerge in the relationships among business and nonbusiness actors. A complexity lens is thus applied in order to better examine the tensions that arise from such interactions. It is important to highlight the fact that tension is here seen as ‘contradictions’. This word is defined in the Oxford Dictionary as a ‘strained state or condition resulting from forces acting in opposition to each other’. Contradictions are a common phenomenon in any organizational life. Tensions are inevitable and can at times even be beneficial to companies since they may be fruitful for idea generation, creativity, and learning new methods that benefit all parties involved (Bradford, Stringfellow & Weitz, 2004).

One type of tension that may create turbulence in the interaction between business partners concerns the fact that companies may assume different roles in the network at different times. Decisions with regards to roles, and their effect on decisions on when to cooperate and when to compete, may create frictions in the business relationships between business actors. Such behavioral aspects will be discussed further below, but for now it is relevant to clarify that in this study tensions specifically assume two main aspects. One is the tension that arises from a complex interaction involving the economic and noneconomic dimensions of the exchange. Another aspect is the influence of socio-political actors in the focal business relationship, which may impact aspects of firms’ cooperative and competitive behavior during and after a smart city project. In such a vein, this leads to the first specific research question:

- 1. How does complexity in the interactions with socio-political actors influence firms’ cooperative and competitive behaviors?*

Complexity in interaction is also visible in another type of tension concerning companies’ decisions on resource allocation. For instance, knowledge about how to combine the resources needed is linked to what to explore and what to exploit in future projects for smart cities. If, from one side, a pool of heterogeneous resources may be advantageous for knowledge development in composing a smart city solution, on the other side, where the resources are too heterogeneous, actors may have difficulties in integrating different pieces of knowledge and resources. In addition, depending on how the smart city projects are designed, companies may need to adjust the technology to fulfill specific societal and political needs. In part because municipalities are unique and their necessities and goals differ, socio-political actors may influence a firm’s decision with regards to what to explore and/or exploit. Ac-

According to March (1991), when the knowledge management approach with regards to resource allocation differs, such processes may generate tension given the dual structure of combining knowledge. With such a perspective, in a complex network structure tensions evolve in relation to the use of resources as a result of the complex interaction between businesses and non-business actors. Hence, the second specific research question is:

2. *How does complexity in the interactions with socio-political actors influence firms' use of resources in exploration and exploitation?*

To examine the 'extended' business network complexities and answer these questions, two smart city projects are examined in a Brazilian context. In the projects, firms from Sweden, China and Spain work together with local companies, government, and NGOs. These smart city temporary projects are used by firms as a marketing strategy for market creation and expansion for their IoT-based services and technologies. The cases are investigated in four research papers which constitute the basis of the thesis.

1.2.2 Disentangling the Research Questions in Four Papers

In order to accomplish the purpose and to answer the above two specific research questions, four papers illustrate different aspects related to complexity in the interactions between companies and socio-political actors. Each paper title and research questions are presented in Table 1.

Table 1. The research questions in the four research papers

Paper	Title of the Paper	Research Question
I	A Business Network View on Value Creation and Capture in Public-Private Cooperation	<ul style="list-style-type: none"> ▪ How do public-private arrangements influence value creation and capturing mechanisms?
II	The Cooperation-Competition Interplay in the ICT Industry	<ul style="list-style-type: none"> ▪ Why do firms move between cooperation and competition in the context of the high-tech industry?
III	Business and Socio-Political Interaction in International Service Projects	<ul style="list-style-type: none"> ▪ How do established international service firms cooperate with business and non-business actors to expand in the foreign market?
IV	Innovation Networks – Why do they emerge and how are they configured?	<ul style="list-style-type: none"> ▪ Why do innovation networks emerge and how are they configured?

In the first paper, the emphasis is on the motivations for cooperation between business and socio-political actors and how the complex business relationship may generate positive outcomes beyond profit maximization. The second paper analyzes the cooperation-competition interplay between companies in smart city projects involving social and political actors. The other two papers highlight resource allocation and the socio-political influence on explorative and exploitative activities. The third paper explains the importance of management ability in incorporating business resources into the needs of the socio-political actors for successful cooperation, while the fourth paper seeks to show the complex interaction of actors in different stages of the smart city project, and their influence in the firm's focal business networks.

1.3 Outline of the Thesis

This thesis is a compilation of a 'kappa' and four papers. The 'kappa' is an outcome of my knowledge accumulated during the PhD program. Rather than being a summary of the four papers, it conceptualizes the firms' relationships with socio-political actors by applying an overarching complexity lens. It builds a conceptual link between the opposing pairs cooperation-competition and exploration-exploitation by considering the influence of socio-political actors on the firms' focal business networks.

In the next section of the kappa, the view of the ‘extended’ business network and the complexity that emerges in such a network type is described. After that, the analytical framework is introduced and describes how the network creates complexity. The thesis centers on two sources of complexity: actors’ interactions and resource heterogeneity. On the basis of actors’ interactions, the cooperation-competition is presented, while on the basis of actor resource allocation, the exploration-exploitation is further discussed. Section three introduces the method that has been used to answer the research questions and continues with in-depth analysis and reflections about the research learning process. Section 4 gives an overall view of the research papers, while section 5 is concerned with the analysis and results of the empirical investigation. Section 6 ends with the overall contribution and its implications for theory, practice, and policymakers. The four papers are included after the end of this section. The thesis structure is described in more detail in Table 2.

Table 2. Summary of the thesis structure

Sections	Contents
1. Introduction	- Purpose and research questions
2. Theory	- ‘Extending’ the business network - Complexity in ‘extended’ business network - Business, social, and political actors: an extended business network view - Analytical framework of the thesis - Actors’ interactions - a) Cooperation-competition - Resource heterogeneity b) Exploration-exploitation
3. Method	- A background story - Selecting a case - Research context and research view - The reasons for choosing a case study - Challenges in studying an ‘extended’ business network - Theoretical choices - Data collection - Research process and systematic analysis - Level of analysis - Case description
4. Research Papers	- Short description of each article and its specific contribution to the main conceptual framework of the thesis.
5. Findings	- Analysis of the papers and theoretical discussion
6. Conclusion	- Main contributions and future research directions
7. Papers	- Papers I, II, III and IV are included

2. 'Extending' the Business Network

Business networks are a general representation of the business reality used by a researcher to explain how economic activity is organized and coordinated. It is the researcher, i.e., the observer, who sets the boundary and then delimits what and to what extent the phenomenon will be examined. In industrial marketing literature, researchers assume that a firm's business environment and the organization cannot be easily detached but are part of a web of actors interacting within a network (Powell, 2003; Thorelli, 1986). Hence, organizing in networks is a process that emerges from the actions of interdependent actors whose main assumptions connect actor-bonds, resource-ties, and activity-links (Håkansson & Ford, 2002). Such conceptualization implies 'the market as being a network of relationships'.

'Extending' a business network, therefore, involves changing the perceptual boundary setting of the empirical analysis in order to incorporate other actors. Interestingly, extending the business network creates new theoretical challenges. It implies deep examination of the actors, mainly because they belong to different spheres, have different values, and the exchange between them and companies may only be indirect (Hadjikhani & Thilenius, 2016). Moreover, extension requires the inclusion of both economic and social dimensions that do not have the same meaning when analyzed in a traditional business network. Also, the inclusion of other types of relationships is linked to aspects of where and when to set the boundaries.

Hadjikhani and Thilenius (2016) discuss boundary as a process that characterizes the evolution of the marketing and business field. In their analysis of the field's evolution, they noted that the analysis of the business environment has moved from a transactional and decontextualized perspective towards relationship marketing. They also observed that interaction, cooperation, interdependence, and adaptation became central concerns for the understanding of relationship marketing. Hadjikhani and Thilenius (2016) also emphasize the fact that business research has advanced with regard to the understanding of relationships with the boundaries being settled in terms of 'cooperative' relationships (see, for example, Ghauri et al., 2012; Håkansson et al., 2009; Håkansson & Snehota, 1995; Skaates & Tikkanen, 2003). In such a view, concepts such as trust, knowledge, legitimacy, and commitment have emerged and been used extensively to examine stability or incremental changes in such relationships.

In the same line of thought, another branch of the literature has evolved, focusing on the ‘conflicting’ aspects. Examples include aspects of crisis and the reasons for relationship termination. In these studies, researchers have set the boundaries at the conflicting relationship type (see, for example, Halinen & Tähtinen, 2002; Tähtinen & Havila, 2004; Tidström & Åhman, 2006; Tidström, 2014). In the current study, the boundary is extended to include both business and nonbusiness actors and their influence with regards to a complex interaction that may lead to both cooperative and/or conflictive relationships.

2.1 Complexity in the ‘Extended’ Business Network

Complexity is a concept commonly used in organization science. Andersson (1999: p. 216) explains that as a central construct, complexity has been present in the vocabulary of organization scientists since the 1960s (see, for example, Thompson, 1967; Friedlander & Pickle; 1968), when the open system view of organization was first disseminated. A system can be defined as open when it exchanges resources with a landscape or an environment, and as such is considered a ‘system’ due to its interconnected elements that work together. This notion originated from Kauffman’s work (1993) on evolutionary biology. In his work, Kauffman examines the role of complexity, whose main argument is linked to interaction size and interdependence in an adaptive system. A system is considered complex when it is formed by a large number of parts that have many interactions (Andersson, 1999; Simon, 1996).

The term of complexity has also been stressed within industrial marketing. When conceptualizing business relationships and networks, Håkansson and Snehota (1995) emphasize business relationship complexity by stating that it derives from several intertwined and simultaneous types of exchange between the parties. In line with their view, Ritter, Wilkinson and Johnston (2004) see a network of companies as a complex adaptive system in which they engage in a self-organizing process in response to several micro-interactions that occur between them. Therefore, business networks cannot be controlled and managed by one single participant or a central authority that plans and/or controls resources, information flows, actors’ decisions, and their business activities. On the contrary, all companies involved in the network are involved in it simultaneously. That is, the network structure and performance is a result of the co-production of management and the actions of each participant company (Håkansson & Snehota, 2006).

In business network literature, complexity has also been addressed in relation to network dynamics. Yet complexity is also explained by the diversity of roles played by actors within a network, which may change over time (Baraldi & Nadin, 2006). Therefore, increasing the number and type of par-

ticipants, such as business and nonbusiness, creates a complex network structure. Such a consideration is in line with the complexity theory, which suggests that adding new constituents to a system increases its degree of complexity (Kauffman, 1993). Hence, complexity is contingent on the size and number of indirectly connected subsystems (Halinen & Törnroos, 2005). It is important to clarify that the thesis does not apply complexity theory as a whole, but only some of its ideas, i.e., it is used as a framework to facilitate the understanding of social (human) complex behavior. Therefore, the approach taken by this study is to look at some sources of complexity. By doing so, it may help to comprehend how companies manage relationships and networks.

In this thesis, ‘complexity’ will be explored and discussed. It is important to highlight the fact that, within business literature, ‘complexity’ is a word commonly used and taken for granted but rarely analyzed in depth. Few studies explicitly examine different dimensions of complexity or its nature (see, for example, Vasconcelos & Ramirez, 2011; McCann & Selsky 1984). Since complexity can assume an overarching aspect and multiple dimensions, I will first explain what I mean by the term complexity. Here, I limit myself to the examination of two sources of complexity, i.e., *actors’ interactions* with regard to the process of developing a business relationship and *resource heterogeneity* necessary to develop a technological solution. The reason for choosing these two dimensions is that both different resources and social interaction among partners create interdependence and, therefore, encourage cooperation among actors. Other types of complexity could be linked to – but not limited to – technological specificities. However, this is outside the scope of the purpose of the thesis.

With respect to actors’ interactions, challenges are linked to relationship development within the activities of developing and implementing technology, but also regarding marketing initiatives for firms’ market creation and expansion. As mentioned previously, differences in missions and purposes between actors increase complexity since interests may conflict. While companies pursue business profits, socio-political actors are expected to pursue social goals. Political actors also pursue a unique goal and their best interests are connected with their future expectation of being in office. Thus, votes and therefore voters are an important concern for them, in part because government is accountable to the citizenship as a whole. As a result, economic exchanges and technological resources commonly existent in business interactions often differ from social and political goals which usually have a non-financial exchange or profit base.

As stated above, resource heterogeneity is intrinsically linked to difficulties combining resources to develop and implement technology. The challenges are thus related to the difficulties that emerge from the collective process of learning, adapting the technology, and experimentation, in which an actor’s limited experience, or lack thereof, creates an environment of trial

and error. Such a process is related to procedures, routines, and standardization of tasks developed by actors in the network. The setting in which this dimension will be analyzed is the city, where actors work together by envisioning initiatives aimed at achieving a ‘smart city concept’. The ‘extended’ business network has a complex structure but such a statement does not necessarily imply that the traditional business network has a simple network structure. On the contrary, networks are complex due to the aspects of interdependence among actors and the heterogeneity of resources. However, added complexity is observed in an ‘extended’ network type, due to the varying nature of actors involved and the exchanges between them.

2.1.2 Business, Social, and Political Actors: A Complex Network Structure

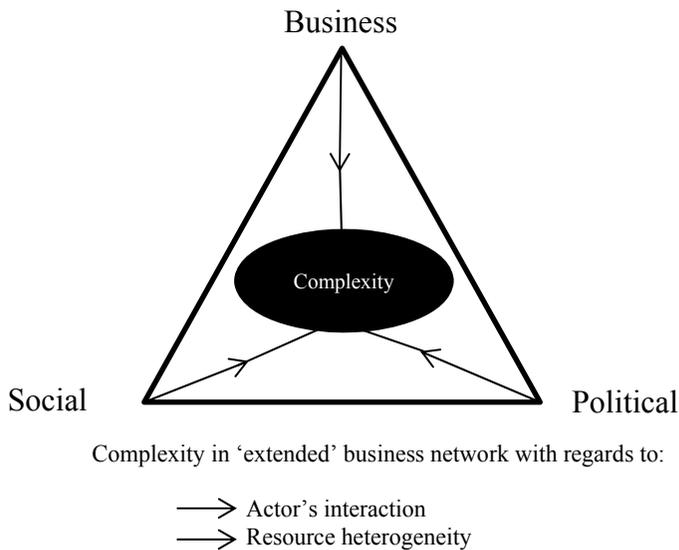
As aforementioned, in this study business and socio-political actors are co-developers of a smart city solution. To develop the solution, different pieces of knowledge must be integrated. Thus, the development is seen as an interaction process. The potential users of the technology will be politicians, public officials, and citizens. The producers are those contributing resources such as technological expertise that comes from the business sphere and also those, such as socio-political actors, contributing local knowledge expertise about the city’s needs.

From the business point of view, socio-political actors become an important resource not only because they may contribute to the adjustment of the technology but also because companies need social acceptance for their specific products/services. However, this type of partnership requires a lot of coordination from companies. When examining MNEs and local cross-sector partnership in the Baltic Sea, Ritvala et al., (2014) noted that in order to minimize the negative effects of conflicts, such interactions required greater social, resource, and organizational coordination mechanisms. Their study also emphasizes the structure of the partnership, which is characterized by absence of required resources, common ground, and collaborative experience.

Figure 1 illustrates an ‘extended’ business network view. It is depicted by a triangle that includes three different main actors: business, social, and political. The triangle indicates that each actor belongs to a different sphere, sustains a different legitimacy, and therefore has different goals and expectations. Complexity is located at the center of the triangle. The arrows represent the actors’ diversity and resource heterogeneity. I emphasize that complexity is observed both as a phenomenon and as an outcome. As a phenomenon, it is characterized by something with many parts where those parts interact with each other in multiple ways, as aforementioned (see Section 1). As an outcome, the result of the interaction between business and socio-

political actors thus creates a complex network structure. Thus, complexity in this context concerns the type of relationship among different actors where the resource exchange is aimed at developing a new technological solution.

Figure 1. Business, Social, and Political Actors: An Extended Business Network View



It is worth mentioning that complexity in an 'extended' business network is observed in several ways. One element of complexity is the number, type, and contact pattern of the actors involved in the relationship. In the triangle, business represents the firms which produce the technology. They differ in size (small, medium, and/or multinationals). Social actors are the NGOs whose representatives are the individuals of civil society. Political actors include public officials and politicians at different levels of public administration. They differ in terms of position, power, and interests. For instance, public officials tend to have a more permanent position as opposed to temporary politicians. The temporary position of politicians implies that priorities, objectives, and values change over time, or are at least expected to change from election to election when new politicians are placed in office. Politicians are also connected to different groups. As Hadjikhani et al., (2008) posit, political actors may be directly or indirectly connected to actors such as media, voters, unions, consumers, citizens, etc. all of whom influence their actions and decisions in different directions. Political actions towards business can be coercive or supportive, where coercive means that compa-

nies need to adapt their business activities to political rules, while supportive means that companies are able to influence political decisions to benefit their own business activities (Hadjikhani & Ghauri, 2001).

From one side, political actors attempt to incorporate values from different groups as a way to enhance their legitimacy. On the other side, companies make investments that affect groups like media, citizens, and others on which politicians are dependent. Such heterogeneity in the structure of the network also applies to the NGOs, since they are also connected to actors outside the political and business network. They form a heterogeneous group with different types of orientation and working scope. Their actions may influence both political and corporate behavior. Similarly to political actions, NGOs' actions towards firms can also be supportive and/or coercive. NGOs can be indirectly coercive by putting pressure on government to influence more socially responsible corporate behavior. An example of direct coercive action can be the boycott of companies' products/services by NGOs as a way to force companies to exercise sustainability. Developing close cooperation with NGOs can help companies to increase customer trust, gaining the support of policy makers and then transforming a coercive action into a supportive one (Ghauri, et al., 2012). Thus, in the 'extended' business network, business and socio-political actors are interdependent, not only on one another but also on the actors surrounding them as their activities influence each other's network connections.

In a traditional business network, a broad array of resources is often exchanged within a frame of relationships between two companies. But in an 'extended type' network, exchange takes another form. In the examination of nonbusiness actors and their influence on firms' business networks, Hadjikhani and Thilenius, (2005) highlight the fact that relationships between business and socio-political actors are based on mutuality and that the aspects of trust, knowledge, commitment, and legitimacy are dissimilar to business-to-business relationships. The authors emphasize that knowledge, for instance, is not related to technological development or adaptation but is instead related to a specific community or context. For companies, acquiring knowledge about political and societal objectives is necessary because these actors are expected to satisfy different groups with harmonic and/or conflicting demands (Boddewyn & Doh, 2011; Choi, Jia & Lu, 2014).

Given such differences in the type of exchange, such cooperation is more susceptible to frictions and conflicts. But despite all of the aforementioned challenges, Mahoney et al., (2009) argue that private and public action may also activate the degree of alignment in interests. Within the network, tensions can be productive for companies as they find ways to 'hold together necessary incompatibles' (Tretheway & Ashcraft, 2004:84). For that reason, it is possible to innovate through cooperation activities, but motivation depends on the constant adaptation of each actor role since heterogeneity is inherent in such cooperation (Le Ber & Branzei, 2010). It can be observed

that ‘extended’ business networks demonstrate a higher degree of diversity and heterogeneity than traditional ones. This clearly reinforces the notion of complexity.

2.2 Analytical Framework of the Thesis

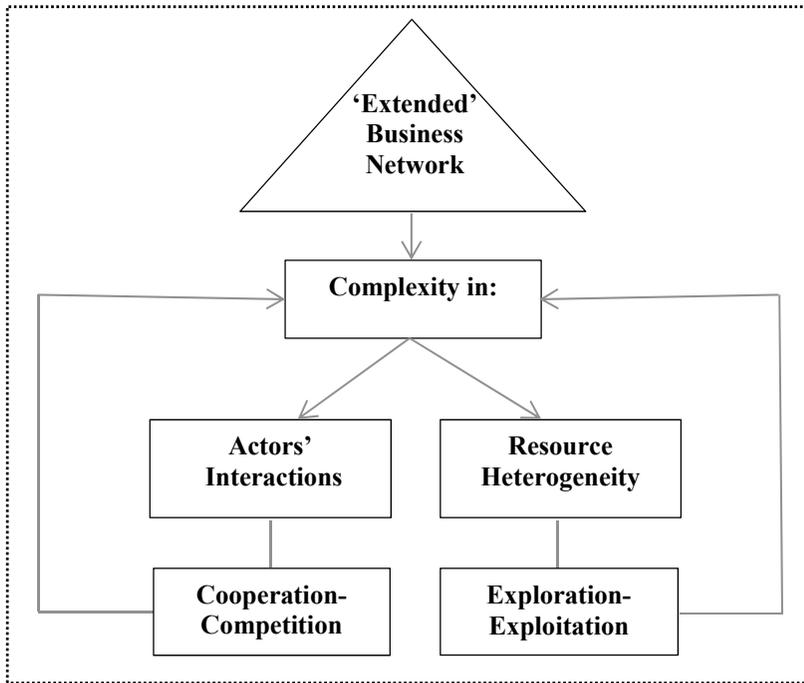
The thesis’ conceptual framework is anchored on the notion of ‘an extended business network’. As shown in Figure 2, the type of exchange between business and nonbusiness creates complexity in: i) the actors’ interactions, and ii) the complexity of combining the actors’ heterogeneous resources. I will first elucidate these two sources of complexity before explaining the reasoning behind the figure.

Complexity observed in actor interactions represents the relational dimension. That is, it refers to the process of developing business relationships, which is mainly tacit and context specific. This tacit aspect is learned through an interactive process which is translated into routines, information sharing, and expectations. It is through interactions that relationships are developed and cultivated. This leads Nonaka (1994) and Håkansson and Snehota (1995) to argue that relationships are considered to be a resource, an asset, rather than merely a mechanism of transaction. In addition to this, it is relevant to explain that a basic condition for actors to be able to act in relation to the resources used is that they recognize the existence of the resources, how they can be used, and how the use of resources will affect the firm’s core business. In this regard, resource heterogeneity can be understood as individual skills, technological know-how, expertise, physical assets, and items of knowledge. Knowledge, specifically, is assumed to have both an explicit and a tacit dimension and will be discussed further in the next section.

As mentioned earlier, the different value systems among actors create complexity and tensions which need to be managed within the relationship. Thus, the result of these tensions depends on the firms’ ability to manage the network and cope with such forces. As can be observed, Figure 2 starts with a triangle illustrating the ‘extended’ business network introduced in the preceding section (see Figure 1, p. 26). The thesis’ main theoretical reasoning is based on the assumption that the ‘extended’ business network creates complexity in actors’ interactions and resource heterogeneity. The arrows thus show the connection between them. On the left hand side, complexity in actors’ interactions may create tensions with regard to a firm’s decision to cooperate and/or compete. On the right hand side, resource heterogeneity creates tensions with regard to a firm’s decision to allocate resources to exploration and/or exploitation. Next, the examination of the actors’ interaction, followed by resource heterogeneity, will provide the basis for explain-

ing the reasons for growing complexity in the network as well as how tensions and complexity create a self-reinforcing feedback loop.

Figure 2. The conceptual framework in the firm's 'extended' business network



2.3 Actors' Interactions

Relationship development is anchored on the notion of interaction among parties and a fundamental concept in marketing as a network. Håkansson and Snehota (1995) explain that interaction is a core element for the exchange and therefore it is essential for development of the relationship. Interaction has been studied in business-to-business and is well documented in the IMP literature (see, for example, Ford, 1990, Ford, & Thomas, 1997; Håkansson & Snehota, 2006; Moller & Wilson, 1995). Interaction embraces a process that may cover short-term periods of exchange (e.g. product/service exchange, knowledge exchange, etc.) and long-term relationship development (e.g. adaptation), the atmosphere affecting/affected by the interaction, the interaction process among actors, and the business environment in which the interaction takes place (Håkansson, 1982).

In this study, actors' interactions refer to development of the relationship between business and socio-political actors. The smart city projects are considered to be short-term episodes for development and implementation, but a long-term relationship behavior might be in place, for instance, if the companies involved will remain in contact with a city planner for technological/service maintenance. This will require relationship continuation after the implementation of the smart city project. Relationship continuation is also expected among partners, since some of them may team up in similar projects but in a different city. Through interaction, a dialogue among actors is set up, knowledge and other resources are exchanged, and actors learn about each other's expectations (Gummesson & Mele, 2010).

The common defining aspects of successful cooperative relationships are anchored in trust and commitment, which are expected to be present between actors. Trust is the belief that a partner will perform actions that will lead to a positive outcome, i.e., will not behave opportunistically. Research has illustrated that trust, for example, can be a good mechanism for reducing friction in the business relationship (Kemp & Ghauri, 1999) and it may also be important in the interaction between firms and socio-political actors. Firms' actions towards commitment can be understood in terms of the size of investment and actions undertaken with respect to the counterpart alone or to other connected actors in the network (Denekamp, 1995). In the process of developing relationships, firms assess which relationships may create value for them and thus may be motivated to intensify the frequency of interactions among key partners. When a relationship is considered valuable, i.e. important, partners will wish to maintain it and for this reason they will commit themselves to it. Therefore, relationships are built on the basis of mutual commitment (Morgan & Hunt, 1994). In such a feedback loop, one can observe that trust influences relationship commitment and both lead directly to cooperative behaviors on which the success of the relationships depends (Morgan & Hunt, 1994).

In an 'extended' business network, trust and commitment elements in a focal business relationship may be affected by socio-political actors. For instance, gaining support from these actors may increase perceived business legitimacy with regards to smart city technologies among network partners and therefore positively influence partners' willingness to cooperate in future smart city projects. Conversely, a negative effect may be related to a lack of perceived technological benefit by socio-political actors. If partners perceive a low ability to gain a future public-private partnership, it might be the case that the partners' willingness to cooperate may reduce and consequently the level of commitment will decrease.

An interesting feature of knowledge development is 'tacit knowledge', i.e., non-explicit knowledge which is based in actions, commitments, and involvement in a specific context (Polanyi, 1958). In such a vein, tacit knowledge is informal, perceptual, implicit, and acquired through informal

ways of learned behavior and procedures (Polanyi, 1958). When studying the dynamic aspect of inter-organizational processes for knowledge creation, Nonaka (1994) sheds light on the importance of a continuous dialogue between tacit and explicit knowledge as a means of generating new ideas. An important fact is that such a process is socially constructed through actor interactions. In relation to technologies applied to cities, which are the focus of this study, relationship development and cooperation play an important role. Therefore, developing relationships is a central part of business and the tacit aspect can be understood as knowledge of how to interact, how to develop trust, how to create legitimacy, how to generate empathy for cooperation, how to solve problems together, and so on. This is in line with Håkansson and Snehota (1989) who stress that firms' relationships 'are one of the most valuable assets that a company possesses'. To gain relationship knowledge about socio-political actors may be relevant for firms aiming to take part in future smart city projects.

Wilkinson and Young (2002) state that a company rarely has total control of all these relationships: on the contrary, they not only influence others but are also subject to others' influence within and around the embedded network of relationships. Thus, companies are required to cope with complexity. If on one hand, full control is not possible to achieve, on the other hand one may ask how managers deal with challenges when designing and implementing strategies. Although recognizing that achieving control is not possible in the business network, Håkansson and Snehota (1995, p.275) affirm that 'actors are constantly looking for opportunities to improve their position in relation to important counterparts', which means that these relationships are changing; hence networks (of relationships) are dynamic. Empirical observations in this study identify the dynamics in the network by examining the tension that arises from interactions among such a diverse group of actors influencing firms' cooperative and competitive behavior. It is interesting also to understand how a firm can cope with such tensions. Tensions include achieving not only cooperative but also competitive advantages. It is worth understanding companies' decisions with regards to when to cooperate and/ or when to compete. This will be further discussed in the section below.

2.4.1 Cooperation-Competition

One of the fundamental challenges that arise in business networks can be observed in situations in which a relationship moves between a state of cooperation and a state of competition. The choice of cooperation and/or competition creates problems in the choice between building capabilities for the future and ensuring a competitive position in the present (Andriopoulos & Lewis, 2009; Medlin, 2006). Related studies examine this inconsistent logic (see, for example, Gnyawali & Park, 2009, 2011; Raza-Ullah, Bengtsson &

Kock, 2014) and critical events or situations where the relationship changes from being cooperative to being competitive (Tidström & Hagberg-Andersson, 2012; Tidström, 2014). Examples of critical events are opportunistic behavior observed in the relationship or any other situation which may oppose the trust and commitment mechanism, although these mechanisms are essential for cooperation development.

Within the two paradigms of cooperation and competition, large numbers of researchers are dedicated to examining co-competition. This phenomenon is defined as a situation in which business partners, more likely in horizontal (between competitors) than in vertical relationships (between customers and suppliers), cooperate and compete at the same time. Bengtsson and Kock (2000) confirm that firms cooperate in activities not related to customer activities, such as cooperation in designing a new product, and simultaneously compete for market share. Thus, co-competition has a positive impact on product development, but only up to a certain point. This happens because the existence of cooperation and competition causes conflict in the relationship; thus, after the threshold point, the costs and challenges involved in managing such a relationship offset the benefits created by it. Luo, Rindfleisch & Tse (2007) affirm that in cooperating with competitors, firms might need to dedicate a substantial amount of resources to protecting their investments, and this necessity for monitoring might decrease their performance. Researchers have advised that firms should have a balanced relationship portfolio by leveraging both competitive and cooperative forces (Park, Srivastava, & Gnyawali, 2014; Wu, 2014).

In the smart city context, the support gained from socio-political actors may affect the cooperation as well as the competitive dynamics between business actors. Since the concept is still emerging, companies may want to develop, for example, pilot projects to demonstrate the technology. However, when selling the smart city solution companies may compete in different ways, for instance to win public bidding and then gain influence to subcontract to other business partners. Moreover, companies may compete for membership, i.e., to take part in a network where business partners are successful in dealing with political actors. Public authorities and NGOs advocating in favor of certain solutions may also affect market expansion and increase revenues in one specific technological area. Examples of specific areas may be urban mobility or security. Little is known about how the interaction with socio-political actors may influence cooperation and competition in networks. In addition, public authorities have the legitimate power to choose partners and place them in cooperation or competition depending on the way that the public service will be designed. It may also be the case that competitors will be 'forced' to cooperate in designing specific solutions for the public.

Cooperation and competition has also been examined in vertical relationships, i.e., between customers and suppliers. However, such relationships are

expected to be more stable in comparison with cooperation between competitors, even though conflicts also can emerge. According to Lacoste (2012), competition between customers and suppliers may occur on the other side of the cooperation, i.e. not when value is created but when firms might be involved in the appropriation of value. Put another way, partners have common interests when it comes to value creation and diverse interests when it comes to value capturing. The author highlights the fact that value creation is considered to be a collective action while value capturing is considered to be an individual action. The activity of developing the smart city concept is linked to value creation. However, once the market knows the benefits of the technology, firms may want to differentiate themselves and capture value from the knowledge created.

Value created in inter-firm relationships and networks refers to explorative issues in terms of innovation and the need to differentiate themselves with regards to products and/or services, while value capture refers to exploitative issues such as cost reduction achieved in the partnership, for example, via production and distribution process (Dyer et al., 2008). Thus, firms in cooperative interactions might have competitive issues or activities that arise over time and then mutual goals might converge for an only partial convergent interest structure (Brandenburger & Nalebuff, 1996; Luo, 2004; Padula & Dagnino, 2007). As a result, similarly to horizontal relationships, vertical relationships require firms to manage cooperative and competitive forces that may emerge in business relationships (Eriksson, 2008). After discussing complexity with regards to actors' interactions, it is also necessary to understand the activity of resource allocation. Cooperation and competition are associated with the use of resources. Companies cooperate to combine resources while competing for resources. This section brings us to the next issue, a discussion that leads from the actors' interactions to resource allocation.

2.4 Resource Heterogeneity

This section explores the role of actors in combining resources for a complex product and service solution such as the smart city. Traditionally, management literature studying resource combination tends to adopt the perspective of business actors, as providers of solutions, who first identify a solution that may be attractive to a customer and then proceed by developing the resource. Such a process is assumed to occur more or less independently. Researchers in industrial marketing, however, emphasize that combining resources is more complex than merely assembling existing resources. It requires close interaction as a means to incorporate one actor's resources into those of another actor (Baraldi & Bocconcelli, 2001; Håkansson & Waluszewski, 2002). Actors, therefore, evaluate available and potential resources to under-

stand what type of resources they already have and what they can do together (Mele et al., 2010). By exploring three different settings in which a biotech innovation took place, Ingemansson and Waluszewski (2009), found that closeness in producer-user settings facilitates solution development. As Cantú, Corsaro and Snehota (2012) suggest, the adoption of a user, i.e., a customer, perspective involves looking at resource combination as a solution to the problems experienced by a customer who will use the solution. Applying this perspective to the smart city setting, it means that firms need to understand the current problems experienced by a mayor, public officials, citizens, or any potential users of the solution. Solution here can be understood as the integration of products and services, including a unique interface between companies and users, and also interoperability among products and services (Davies, 2004; Oliva & Kallenberg, 2003).

From the technological point of view, companies will take strategic actions with regard to learning how to combine different resources more efficiently and finding ways to use the knowledge in a different context. For instance, part of the solution developed in a city setting might be used in another setting; examples may include solutions for consumers in the home appliance market, private security, etc., therefore expanding the company's knowledge and its strategy to explore novelty in different settings. In the network way of reasoning, knowledge is not given and there is always a way of learning something new about a particular way of combining resources (Håkansson & Snehota, 1995). This has implications for learning, adaptation, and development. Within the network, actors are expected to share both resources and knowledge. Relating back to Håkansson & Snehota's (1995) affirmation that companies will constantly look for improving their position in relation to important counterparts, this view is also linked to the idea of accessing resources. A central position may help a firm to enjoy resource advantages, access information more easily, and obtain knowledge from its surrounding counterparts (Wilkinson & Young, 2002).

When studying business in networks and relationship development, Håkansson et al., (2009) claim that 'companies are a result of the skills, resources, actions and interactions with suppliers, distributors, other customers and even competitors'. In the city setting where interactions also involve other actors outside the traditional business network, companies learn how to interact and what the social and political interests are. Being a project leader may facilitate access to this specific information. To manage such a type of interaction may become a source of competitive advantage for firms aiming to develop technologies for cities. In the same line of thinking, Moore (1998) affirms that for companies' distinct capabilities to evolve, others must evolve in support. Therefore, managing interactions with socio-political actors may help companies to increase revenues, primarily if such actors advocate in favor of the benefit generated. This may also have implications for the firm's focal business network. For example, success in developing smart city solu-

tions for different cities may be associated with increased business legitimacy and this may attract new future projects.

Research has shown that developing new resource combinations requires changes in the interface of resources, which involves interaction between actors who possess some control over the required resource (Cantú, Corsaro & Snehota, 2012; Corsaro, Cantú & Tunisini, 2012). In a city setting, business resources are directly linked to capabilities and technological competences, while socio-political resources refer to the understanding of the social context, challenges and opportunities faced by the city, etc. Political actors also exercise control over the city's resources in terms of urban planning and therefore they have the power and legitimacy to decide if a share of the city's budget will be allocated for buying technologies that the companies develop.

It is interesting to know how firms may succeed in a new market for IoT based-services applied to cities whose users and co-developers are not traditional business partners. The traditional business network perspective explains reasons to encourage cooperation. First, the technical development will occur only if it is perceived to solve a problem or achieve a goal for users. Therefore, resources will only have a meaning in relation to actors. Second, because the resources required in any combination are controlled by different actors in the industrial setting, relationships should be developed. However, in a city setting users differ, i.e., the client is not a company and complexity becomes the process in which integrating resources means incorporating business resources into the needs of socio-political actors. As can be observed, the resource dimension is expected to be intrinsically interwoven with the actor dimension and at the intersection between actors and resources, the concept of smart city solution emerges. Thus, resources become interdependent and relationship development facilitates the knowledge process.

In addition to this, it is interesting to understand the influence of nonbusiness actors in contributing to technological development with non-financial assets that may indirectly influence both the development and implementation of innovation. Examples include ideas, relationship knowledge, tacit knowledge, advice, emotional support, etc., which will indirectly impact on companies' focal networks and their business opportunities. There is, for instance, a large body of research showing consumer interaction through internet technology and cooperation with companies as producers of new ideas (Coviello & Joseph, 2012; Kazadi, Lievens & Mahr, 2016). Considering that political actors may be customers of a smart city solution, and taking into account that socio-political actors may cooperate in projects as co-developers of the solution, they may contribute as producers of new ideas. Examples include the exchange of information or providing feedback about the solution after the implementation. Hence, close interaction with them may assist firms with idea generation. In the study of nonbusiness actors'

influence on business networks, Hadjikhani and Thilenius (2005) demonstrate that firms' connections with nonbusiness actors on one hand imposes effects on technological long-term investment and that on the other, such connection increases the partners' commitment to designing rules to manage the product relationship. In the case of the smart city, socio-political actors may contribute to and/or hinder firms from managing resource allocation. In addition to this, it is relevant to examine how a firm can cope with tensions related to when to explore and when to exploit the resources developed in the interactions, which will be further explored in the following subsection.

2.4.1 Exploration-Exploitation

While innovation is vital for a firm's survival, it requires a knowledge management process that denotes searching for new ideas and then fostering radical innovation or improving products/services via incremental innovation. In order to succeed, companies are expected to excel at both explorative and exploitative innovation, and companies that are able to work on both strategies are so-called 'ambidextrous organizations' (March, 1991). If explorative activities are linked, among others, to searching, experimentation, risk taking, and innovation, exploitative activities are concerned with refinement, selection, production, and execution of existing knowledge and capabilities (March 1991). Thus, such activities are in essence associated with learning and adaptation.

While exploitation entails the use of existing knowledge to pursue innovation, exploration in contrast entails variation to generate new combinations of knowledge. Since the knowledge management approach differs, such processes are fundamentally conflicting (Gupta, Smith, & Shalley, 2006; Lutbatkin, Simsek, Ling, & Veiga, 2006; March, 1991). Raisch et al., (2009) question whether the explorative and exploitative process should be taken partially outside the firms' boundaries. In line with this thought, Im and Rai (2008) explain that combined explorative and exploitative knowledge sharing affects relationship performance in long-term supplier customer exchanges. However, most of the studies in organization theory do not investigate the knowledge process involved in exploration and exploitation from a business network perspective, although such a process is acknowledged as important (Håkansson & Johanson, 2001). Few studies have examined such activities inside business relationships (see, for example, Medlin & Törnroos, 2015) but these activities have not yet been examined in an 'extended' business network.

Interestingly March (1991: p 71) stresses that the choice of resource allocation with regards to exploration and exploitation is complex, because such a process involves judgments and therefore, 'embody intertemporal, interinstitutional, and interpersonal comparisons, as well as risk preferences'. This suggests the need for studying actors' perspectives of resource activity allo-

cation toward exploring and exploiting. In this thesis, exploring and exploiting are associated with the process of gaining knowledge. The explorative and exploitative activities for smart city development are project bounded and through these companies gain specific knowledge and experience to engage with socio-political actors and develop pre-bidding activities or product/service offers for future public-private partnerships. The knowledge process, thus, occurs within a network of relationships involving actors' interactions and their activity of combining resources. The network is temporary, dynamic, and project based. Both the smart city concept and IoT based services are still in the development phase. Thus through projects, companies explore a new market and the experience gained in one project may be transmitted to subsequent projects.

Hitherto in the smart city setting, exploration and exploitation have a close link to projects for market creation and market expansion respectively. As mentioned in the introduction, IoT-based services still lack diffusion, acceptance, and market legitimacy. As these technologies evolve, cooperation becomes critical and a fast way for firms to gain access to new information, new technologies, and markets (Thilenius et al., 2016). If one considers the positive impact of technology in cities, it might be the case that the public sector will choose to allocate public resources to various smart city projects. Political actors, therefore, may influence firms' exploration and exploitation decisions.

In such a vein, exploration-exploitation activities are situated in a single continuum rather than considered as two independent choices by the firm (Levinthal & March, 1993). This suggests that firms are expected to balance exploration and exploitation activities as well as cooperation and competition activities over time. In order to understand these activities it is necessary to examine what happens between projects and within the actors' interactions as they become related in the network. The following section will detail the research process, and thus how the previously described research has affected both the analysis and results of the investigation. Hence, the next section delves into methodology.

3. Methodology

This section presents the research method. It starts with a background of my research endeavor and the criteria for choosing a case. Next, the research context and the research view applied in this study are discussed. After that, the reasons for employing a case study and the methodological challenges in studying an ‘extended’ business network are outlined. The theoretical choices undertaken in this study are then provided and followed by the data collection and description of the research process. Next comes an explanation of how complexity became the thesis’ main umbrella. The section ends with a description of the smart city cases and the research papers.

3.1 A Background Story

My journey as a PhD student began in 2012 when, as a starting point, I took part in a research project group whose main goal was to understand the process of relationship development by multinational companies. The main interest was to study such relationship development in emerging markets with special focus on the interaction with social and political actors. Well-known in terms of their uncertainty, unpredictability, volatility, and intriguing social and political systems in which opacity surpasses transparency, emerging markets were an interesting context to embark upon. I became interested in the BRICS (Brazil-Russia-India-China and South Africa) economies. Thus, the next step was to identify a project in which companies and socio-political actors have been involved and which would therefore allow me to examine relationship development.

3.2. Selecting a Case

As mentioned above, the starting point for my research was to identify a project involving cooperation between business and nonbusiness actors. Initially the criteria used for identifying a suitable first case included product innovation, an emerging economy context, and community impact. In order to increase the credentials of the product developed, I searched for projects that had preferably received an international recognition. Then I identified a list of inter-organizational international homepages – such as the WHO

(World Health Organization) and UNFCCC (United Nation Framework Convention on Climate Change) – which enjoy broad legitimacy and promote awards for innovative projects. After careful examination I determined that the UNFCCC has an interesting initiative for pioneering projects, called ‘Momentum for Change’. I then searched for projects recognized as innovative during the period from 2010 to 2012. A number of projects were innovative but only one involved an ICT solution specifically in an emerging market. The case was designated by UNFCCC as ‘Curitiba Connected Buses’. The project was an initiative that came from the Brazilian government and involved partnership with companies and NGOs.

After choosing an ICT project that met my criteria, I started to design the interview protocol and then schedule some interviews. It is worth noting that during the research process a second case was introduced when, in searching for updated information about ‘Curitiba Connected Buses’, it was noted that companies involved in this project were developing a similar project elsewhere, with a wider scope. Thus, a second case was added. In the following, Case 1 will be designated as ‘the Curitiba smart city project on urban mobility’ and Case 2 as ‘the Aguas smart city’. The cases will be described later in section 3.10. I will now introduce the research context in which the cases were developed.

3.3 Research Context

The cities in which the smart city concept has been developed and implemented are located in Brazil. The country deserves a brief overall description from a social and economic perspective. When I started the PhD program in the autumn of 2012, the Brazilian economy was booming. An emerging and growing middle class was expanding its domestic consumption, and this attracted new foreign direct investment (FDI). With a population of over 200 million inhabitants, the Brazilian market provides great business opportunities. Brazil's economic and social progress between 2003 and 2014 raised 29 million people out of poverty, and inequality dropped significantly. The income level of the poorest 40 percent of the population rose on average by 7.1 percent (in real terms) between 2003 and 2014, compared to a 4.4 percent income growth for the population as a whole (World Bank, 2017).

Research focusing on emerging economies has noted that such markets tend to be *(i)* highly complex in terms of their socio-political system (Ghauri et al., 2012), *(ii)* unpredictable mainly because the rules are unclear and the mechanisms for securing property rights are uncertain (Ahlstrom & Bruton, 2006), *(iii)* volatile (Meyer, 2001), and *(iv)* heterogeneous (Sheth, 2011; Peng, 2000). According to the IBGE (Brazilian Institute of Geography and Statistics), Brazil has some municipalities with a human development index compared to developed nations such as Switzerland, while at the same time

certain other municipalities have a human development index comparable to Sub-Saharan Africa. In this study there is no great discrepancy between the two cities under analysis. Both cities have high human development index, with Curitiba scoring 0.823 and Aguas scoring 0.854 (IBGE).

Despite the positive Brazilian context when this study started, it is important to highlight the unexpected economic, social, and political changes the country has undergone in recent years. For instance, the impeachment of the president has contributed to undermining the confidence of consumers and investors. Such a dramatic change and the country's current overall context depict quite well why Hadjikhani and Johanson (1996) define an emerging economy as being a 'turbulent market'. Turbulence in the Brazilian market is given and has always been present in the business environment. Examples include hyperinflation in the 1980s and 1990s, the Asian crisis and its effect on the Brazilian economy in the early 2000s, and then the subprime crisis, which started in 2007 and impacted the global economy as well as the commodity prices on which the Brazilian economy is dependent. Combined with political instability in recent years, the Brazilian economy has faced recent increasing level of unemployment and economic stagnation. In such a complex context, Brazil has become an even more interesting market to study, primarily when observation leads to an understanding of the strategies used by firms to succeed in such an 'unstable' business environment.

3.4 Research View

For a researcher, it is always important to reflect upon ontology and epistemology. According to Burrell and Morgan (1985), ontology refers to the way reality is perceived and then observed. Reality can be perceived to be objective or subjective. Objective perceived reality is that external to the individual; reality is a given, 'out there' in the world. Subjective perceived reality is that which is a product of individual cognition. Epistemology, however, refers to the way that knowledge is grounded. Knowledge can thus be harder, real, and capable of being transmitted in tangible ways. Another type of knowledge is one that is softer, more subjective, and tacit. In terms of methodological nature, social science is related to the way in which a researcher obtains 'knowledge' about the social world, and this may influence how the observation and analysis will be carried out. The choices range from applying the positivistic traditional view, for example, in a quantified way and therefore one that is objective in nature, or in a more subjective and qualitative way.

In this thesis, the research view with regards to the study of relationships is subjective; knowledge is softer, unique, and essentially personal in nature. The examination of relationship development between business and non-business actors constitutes the unit of analysis. Hence, given the aspect of

the nature of the subject under investigation, the study applies a qualitative case study methodological stance. In the following section, the criteria used to identify relevant cases as well as the main reasons for choosing a case study will be addressed.

3.5 The Reasons for Choosing a Case Study

From a network perspective, this study considers the views of diverse actors, i.e., business and nonbusiness, aiming to obtain a holistic explanation of the phenomena. Yin (2011) points out that case study is suitable when the phenomenon is hard to separate from its context, which is undoubtedly the case here since interactions within smart city projects are studied in the 'real' context of the city. Furthermore, case studies are also helpful in capturing actors' differences in terms of values, beliefs, and intentions (Yin, 1998; 2011). In addition, a case study is suggested when a processual analysis is undertaken. Thus, using a case study to examine how a smart city project unfolds over time allows the inclusion of processual dynamics and complexities (Jarzabkowski, Bednarek & Lê, 2014; Langley, 1999). The idea of capturing dynamism is in line with the view that the case study has the potential to capture change and the dynamics of the studied phenomenon (Eisenhardt, 1989: p 534). In light of these specifications, it is clear that a case strategy is suitable for this study. It is now necessary to clarify the challenges I faced when studying an 'extended' business network.

3.6 Challenges in Studying an 'Extended' Business Network

It is important to note that the examination of firms' business networks constitutes a methodological challenge for researchers. Halinen and Törnroos (2005) explain that the difficulties in studying firms' business networks are manifested in several ways. The main argument is that the network analysis involves more than two actors, which increases potential access problems and the workload in data gathering. Other aspects include the network boundary. The network setting may extend without boundaries through connected relationships. Thus, there is a challenge in defining and delimiting a case. In this study, the project helped me to delimit the network whose time dimension was limited to three settings: project idea and development, implementation, and launch. Hence, the change process is observed only during these three specific phases. Thus, the study uses a longitudinal perspective for the data analysis.

Similar to the issue of defining network boundaries is the study of the relationship development. Section 2.3 discusses the tacit dimension of relationships. Observations rather than interviews may help to grasp this dimension, but this study is retrospective, i.e., it happened when the projects had already been launched and therefore an important part of the relational aspect of the interaction was not observed. Halinen and Törnroos (2005) stress that the researcher within a network field always loses something of the network as a real-life system. Another challenge is related to the degree of diversity among actors and their identification – whether they can be categorized as business, social, or political. For instance, in this study business actors are firms from the ICT industry and its categorization is easy to define. However, the board members of one of the NGOs studied were formed by civil society and temporary public officials assigned by the politician in office. In such an example, one may ask whether such an actor can be characterized only as ‘nonbusiness’ if one of the board members is appointed by the politician. Moreover, another NGO participating in the project is owned by one of the MNEs. In such a context, the challenge was to consider whether or not the NGO is a ‘nonbusiness’ actor. Such a degree of diversity was also observed with regards to the political actors. Interviews were performed with both public officials and politicians. Some of the public officials have a permanent position while some, despite being named as public servants, have a temporary position appointed by the politician in office.

It can be observed that there are heterogeneity issues between and within socio-political actors and this may constitute a problem with respect to how to categorize them in the study. I noted this, and from the methodological point of view the study of business networks is, as Halinen and Törnroos affirm, indeed complex. The additional complexity in this study in comparison to studies examining only business actors is that, in the industrial business setting actor categorization becomes irrelevant. In order to simplify the process of categorization, I have considered the NGO that belongs to the MNE as a social actor, given that the organization does not have a direct profit mission. For the political actors, they are divided into two groups: public officials and politicians, with public officials being those who have a permanent position while politicians are those elected and/or assigned. For instance, I have considered a secretary assigned by the politician in office to be a politician due to the temporary nature of this position.

3.7 Theoretical Choices

In this study, the network approach was chosen as a theoretical frame of reference. The reason for this choice is that this perspective focuses on the conditions between firms and not only on the firms’ internal structures. Could any other theory in general have contributed to this study? Why, for

example, is the ‘strategy theory’ or ‘resource-based view’ not used? Ford, Gadde, Håkansson and Snehota (2003), like Baraldi et al., (2007), argue that strategy theory and the resource-based view are concerned with ‘the Myth of Independence’. In these schools of thought, companies are able to analyze the environment in which they operate and then develop and implement strategies anchored to their own resources.

When performing my study, I was interested in the aspects of interdependence among actors in the development of smart cities projects. The notion of interdependence has not been highlighted in the resource based view theory and strategy theory. Secondly, an important aspect is linked with the degree of control over resources. As mentioned in Section 2, studies have demonstrated that product development, mainly in the ICT industry, demands a convergence of multiple technologies that one single company is not able to produce. Such an affirmation challenges the above theories with regard to the degree of control over resources a firm can achieve. These findings, in line with the IMP tradition, deny the assumption that a firm has substantial strategic autonomy. The smart city project under examination in this study clearly shows a need for combining different resources. Furthermore, if another theoretical framework had been used it would be a totally different study.

3.8 Data Collection

In order to uncover the ‘black box’ of the complexities in an ‘extended’ business network, several different sources of data were needed. The case study methodology allows the researcher to use different types of data (Dubois & Gadde, 1999). Data sources comprise semi-structured interviews with complementary secondary data (including companies’ CSR reports, companies’ solution brochures, local and international news). This combination of interviews and secondary data is important since it allows the research to triangulate information across and within data sources (Gibbert, Ruigrok, & Wicki, 2008) and thus increases validity (Gibbert et al., 2008).

The primary data were collected as a result of interviews conducted in Sweden and Brazil during two periods. The first round occurred between September and December 2013, while the second round occurred between December 2015 and beginning of January 2016. The first round is based on 44 interviews while the second is based on 26 interviews, each conducted face-to-face. The interviews lasted between 1 and 1.5 hours on average, with an estimated 60 hours of recording material. All interviews were fully transcribed. Initially, respondents were chosen based on their direct involvement in the project and after that a snowball technique has been applied. In such a technique, names of people who could potentially contribute to the study were suggested during the interviews. Table 3 displays a summary of the

number of the interviews as well as informants and their respective roles in the organizations.

Table 3. List of respondents

Organization	Respondent by professional position	Interviews	Location
Ericsson	Managers, Head of marketing, innovation, CSR department, engineers, consultants and analysts.	18	Sweden,
Huawei		5	Brazil
Telefonica/ Vivo	Engineers, head of innovation department, project managers, business developers.	16	Brazil
Telefonica Foundation	Head of CSR initiatives, communication managers and public relations	5	Brazil
ISPM	Head of innovation	3	Brazil
Dataprom	Engagement management, head of marketing, director of innovation	6	Brazil
URBS	Public officials in department of finances, project managers, president.	11	Brazil
ICI	Project managers	4	Brazil
City Hall	Secretary of tourism	1	Brazil
IPUCC	Head of city urban planning	1	Brazil
Total number of interviews		70	

3.8.1 Research Process

With regard to the research process, this study has followed an abductive approach. In the abductive way of working, the researcher moves back and forth between theory and empirical material. Such an approach encourages the researcher to be active and engaged. Dubois and Gadde (2002; 2014) call this a ‘systematic combining’ of the theory used with the empirical domain investigated. Abductive reasoning usually starts with a surprising observation or experience (Van de Ven, 2007: p.101) to build theory. Initially, by purpose, I had a general rather than a precise research question. The objective was to have flexibility in the research process and modify the research strategy as long as the data were collected. From the beginning, semi-structured interviews, as stated in this section (see 3.8), were designed to grasp motivations for cooperation and also aspects related to relationship development with trust, commitment, and legitimacy as central concepts.

A preliminary set of interviews was undertaken, but interestingly, I noticed that some information from the interviews were not totally in accordance with secondary sources. In the annual reports, the cooperative behavior

of the companies was placed in focus as well as the success of the project. However, information from the interviews indicated that the cooperation was not as good as the annual reports portrayed. When asked about cooperation, interviewees described situations that suggested competition. When I first analyzed the data I noticed that the relationship among partners was characterized by both elements of cooperation and elements of competition. Meanwhile I turned to the literature on business relationships and network theory following the IMP tradition. By looking at this perspective I noted that the competition and cooperation literature could also give me a basis on which to reformulate my interview questions as long as more information was gathered. Different aspects of this systematic combining process are more thoroughly depicted and explained in each research paper (for more detail, please see the papers attached in this thesis after Section 6). The goal in this section, however, is to provide a general idea of the process of research employed in the thesis.

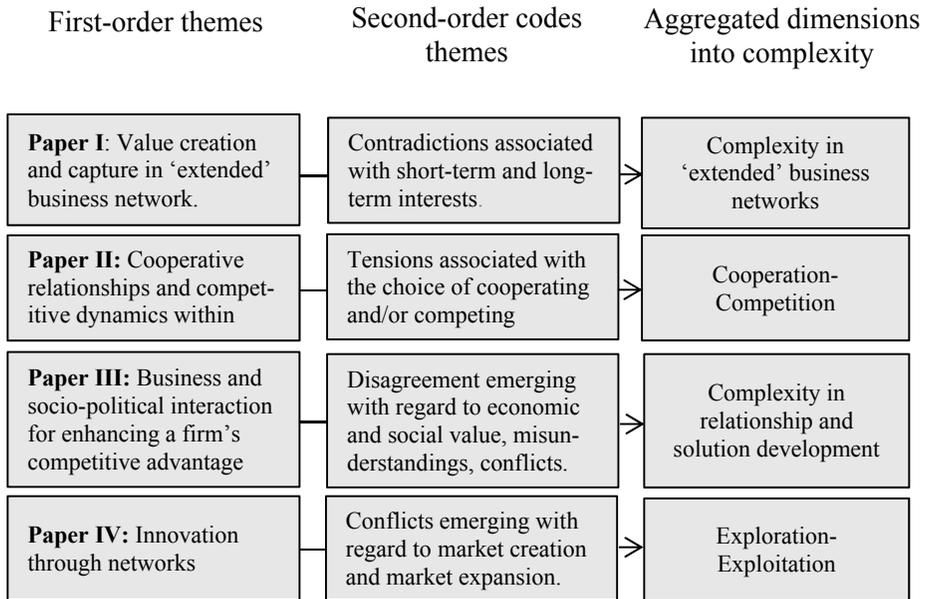
3.8.2 Qualitative Rigor through Systematic Analysis

By being attentive with regards to the business relationship involving cooperation and competition, I tried to understand how the respondents argumentatively connected constructs. For example, some interviewees tended to discuss cooperation with partners while ‘conflict’, ‘friction’, and ‘opportunism’ were used more frequently than the word ‘competition’ per se. Some of the respondents avoided the term competition when I tried to introduce it during the interviews. Once I noticed this, I carefully tried to use their words and terms, rather than mine, in order to better understand their lived experience in line with Gioia, Corley and Hamilton’s (2013, p: 5) advice for ‘*research as engagement*’ aiming to stay close to the interviewees, up to a certain point, without lacking rigor in the qualitative research.

Hence, during the research process, in order to assure rigor in my analysis, I have been inspired by Gioia’s et al., (2013, p: 20) method, especially in terms of organizing the data into 1st (first) and 2nd (second) order categories and then assembling the data into a more structured form. In the first round of data analysis, the objective was to build several categories by using informants’ terms, and then cluster these categories into codes that were similar and dissimilar as a way to reduce the number of categories and give them a label. After that, the objective was to create second order analysis whose objective was to search for emerging themes and try to find concepts that could help me to describe and explain the phenomena under analysis, following what Gioia et al., (2013) name as ‘aggregate dimensions’ of the data. This process has enabled the abductive process of combining both the data and theory. The data analysis has been facilitated by N-Vivo, which allowed a more systematic data analysis. Since the analysis was an ongoing process, not all possible and relevant literature was identified in advance. In the be-

ginning, it was unclear which type of literature would be the frame. However, this was revealed as part of the evolution of the case study through systematically combining data and theory. The data reduction technique has been employed in all papers and has also been used to help find a comprehensive theme for the thesis. Figure 3 displays the process of connecting each paper in a more overarching data structure.

Figure 3. Data structure in each paper: Complexity in the 'extended' business network



3.8.3 Level of Analysis in the Empirical Material

Despite applying a qualitative method, the empirical material presented in the thesis illustrates the broad view of a multilevel perspective. In other words, the conceptual approach connecting the four papers bridges relationship and network levels of data structure and analysis. In papers I, II, and III, interactions are succinctly analyzed at the relationship level, while paper IV focuses on the network level of analysis. A study by Hadjikhani et al., (2008) on the network view of MNE's socio-political behavior provided an important basis for the papers. The thesis' structure at the level of analysis and type of case structure is displayed in Figure 4. The first two papers are based on a single case while the papers III and IV are based on a comparative case study.

Figure 4. The design of the thesis at the level of analysis and type of case structure

Level of Analysis	Relationship Focus		Network Focus
Papers #	Paper I & Paper II	Paper III	Paper IV
Type of Case Structure	Single Case	Comparative Case	Comparative Case

3.9 Ethical Considerations

The thesis followed the ethical norms for conducting qualitative research as formulated by the Swedish Research Council. Respondents were informed about the purpose of the data that were collected. Interviewees were asked for permission with regard to recording. The majority allowed the recording of the material and previous data publications in the form of book chapters were sent to main contributors within the organizations under examination. All interviewees were also informed about the purpose of the academic research and were informed about the possibility of academic publication of the material collected. This was done to ensure that responses were voluntary. No financial incentives were provided to respondents participating in the study (Diener & Crandawall, 1978). Some of the respondents required possible questions to be submitted in advance, which was done.

3.10 Case Description

In this section, the cases will be described. Regarding the overall project aim, the main actors involved and the project outcome are presented. First, the Curitiba smart city project is introduced, and after this the Aguas smart city project is outlined.

Case 1 – Curitiba Smart City Project on Urban Mobility

The aim of the project was to introduce 3G technology to the city's buses along with the development of an operational control center (OCC) that could permit fleet monitoring and management in real time. The project took place in Curitiba, a city well-known for its innovative Bus Rapid Transit (BRT) system which involves bus-only lanes that allow buses to travel efficiently along their routes without having to compete with other modes of transportation. The main companies involved in the project were the Swedish company Ericsson – which develops hardware and software for telecom services, Brazilian Dataprom – whose business is the development of hardware/software for transport solutions, and Spanish Telefonica/Vivo – a telecom operator that provides connectivity between devices. In addition, two nonbusiness actors, URBS and ICI, were also involved in the project. URBS is a state-owned organization whose main task is the operation and supervision of the city's transit system, while ICI is a nonprofit organization responsible for the supply of IT (information technology) solutions to URBS.

Despite being a software developer for URBS, ICI did not have a technological solution available in-house so they coordinated the project together. ICI identified that wireless communication could be a route to improve the transportation system. To compose the solution, Dataprom provided the card reader equipment installed in each bus station, which was adjusted to receive an embedded Telefonica/Vivo SIM (Subscriber Identity Module) card to allow connectivity. Ericsson delivered its F3607gw mobile broadband modules with GPS (Global Positioning System) capabilities. The combined technologies allowed URBS to track the geographical position of each bus and then enabled better management of bus routes, time spent at bus stops, speed, etc. This allowed passengers to plan their journeys and save time. The municipality, through URBS, invested over 10 million US dollars in the project.

Project Outcome: The project was successfully implemented in 2012, benefiting 3.2 million citizens of Curitiba. The solution solved several communication problems; it enabled better control of electronic ticketing and increased security for staff and passengers. A result of the project is that the level of passenger satisfaction has increased substantially. Further, in addition to national recognition and success, the UNFCCC also acknowledged

this initiative as an innovative solution giving international visibility for the firms involved. With a more efficient public transport system, URBS could help to mitigate emission and energy use.

Case 2 - Aguas Smart City Project

The main objective of the pilot project was to transform Aguas city into a digital hub with technology improving public services. The project included a range of applications such as smart parking, smart street lightning, and e-government platforms. The major actors from the business side were Telefonica/Vivo, Ericsson, Huawei, and ISPM, as well as several local startup companies. Ericsson and Telefonica/Vivo had previously worked together, as mentioned in the previous case (see Case 1). Huawei is a Chinese company specializing in telecommunication equipment and services, while ISPM is a Brazilian company specializing in the development of IoT platforms within 4G technologies. Other actors included the city mayor, public officials, and two NGOs, Vanzolini Foundation and Telefonica Foundation.

Telefonica/Vivo initially invested over 560,000 US dollars in the project in 2015, after making a proposal to the city mayor to expand technological solutions aligned with the city's social needs. There was no financial investment by the city, but the companies received permission to use the city as a lab for their technology as well as to demonstrate the technology being used in a real city context. With 3000 inhabitants (IBGE, 2013) and a high level on the human development index, the city was chosen due to its small size and low level of required investment by companies. For the Telefonica/Vivo's partners, investment was also made in equipment, labor force, and training. The estimated total investment in this project was around 4 to 5 million US dollars.

In the project, Ericsson was responsible for the smart parking and smart street lighting solutions while Huawei was responsible for smart security with surveillance cameras installed in the city. Additionally, ISPM was in charge of integrating all services into its IoT platform. The company developed digital application solutions in the health service, such as a service to schedule appointments and remote monitoring of clinical symptoms of patients via the web. Moreover, two apps were developed which enable more direct engagement between citizens and the local government. In the education area, Telefonica/Vivo donated 410 netbooks and tablets to students in the city's public schools and developed an education digital platform. The service allows access to digital content (e.g., books, videos, and news). As part of the project, the Telefonica Foundation and Vanzolini Foundation together have trained school teachers to use the new interactive platform.

Project Outcome: The project was successfully implemented in 2015, benefiting the citizens of Aguas and improving public services as well as

citizen satisfaction. The project received substantial local media coverage and also received international visibility among the entrepreneurial community with recognition as being an innovative project by TM Catalyst Forum.

4. Research Papers

The overarching purpose of this thesis is to understand how interactions between business, social, and political actors influence the development of smart city solutions. The conceptual framework developed in section 2.2 (see figure 2, page 29) is operationalized through the analysis of the firm's 'extended' business network under the complexity lens linked to the dimensions of actors' interactions and resource heterogeneity. Four papers address different angles of this framework. In this section, a summary of each paper is provided (see Table 4, p. 57 for an overview of the papers).

Paper I: A Business Network View on Value Creation and Capture in Public-Private Cooperation

The paper adds knowledge to the ongoing debate on including actors from the political sphere and civil society, such as NGOs, as a means to better understand today's market conditions (Ghauri et al., 2012; Hadjikhani et al., 2008). Therefore, the aim is to comprehend how public-private cooperation influences value creation and capturing mechanisms. Network researchers argue that actors achieve value within and through their relationships and networks (Freitag & Young, 2014). One of the main drivers for public-private cooperation is the possibility to enlarge value creation and create mutual benefits for the partners involved. Similar to inter-firm partnerships, value in public-private cooperations is understood as a collective process created by the sum of the benefits obtainable from the exchange, 'regardless of whether it is the firm (i.e., private actors), the customers, or any other participant in the transaction who appropriate that value' (Zott, Amit & Massa, 2011).

The analysis is based on a single case, illustrating the development of a technological solution for public transportation in southern Brazil (see Case 1, section 3.10, p. 48). The case exemplifies the positive outcomes that public-private cooperation may provide to actors in respect of knowledge development and business legitimacy. The case shows that cooperation was not very smooth and conflicts emerged in different phases of the project. Challenges included the difficulty in properly adjusting the technology, managing business to business relationships, managing contradictions in terms of eco-

conomic and social goals, and different actors' points of view. Although misunderstandings were presented in the relationship, benefits created were superior to the costs of managing the conflicts and therefore creating a successful business partnership. Success, thus, is explained by a theoretical framework proposed in the paper that illustrates the existence of a convergent point where interests and value overlap.

This paper contributes to the discussion in industrial marketing research on value. First, it focuses explicitly on resource complementarity (Håkansson & Snehota, 1995). The study brings novel insights into how resources controlled by actors from different spheres are combined to create new value. The discussion of how new capabilities can be created in public-private cooperation is demonstrated. Second, complementarity of resources and cohesiveness of motives explain the reasons for cross-sector cooperation. This is in accordance with researchers such as Lundberg & Andresen (2012), Mahoney et al., (2009), and Pittaway, Robertson, Munir, Denyer and Neely (2004), who suggest that scholars need to build theories to better comprehend the reasons that encourage cross-sector interactions. An understanding of the various motives of the actors and an understanding of their cohesiveness may, as also discussed by Ritvala & Salmi (2011), assist in planning and implementing more successful short-term cooperation in multi-actor constellations of this type. Finally, the paper highlights the fact that cohesiveness of motives and complementarity of resources are important underlying mechanisms for creating and capturing value in the cooperation and therefore bringing private and public actors together. The managerial implications drawn from the findings suggest that managers need to identify the economic and social values for all involved parties in order to manage such cooperation.

Paper II: The Cooperation-Competition Interplay in the ICT Industry

Industrial and international marketing research has put much effort into the analysis of cooperative forms of interaction (see, for example, Ford & Håkansson, 2013, Håkansson & Snehota; 1995, Hadjikhani & Thilenius, 2005), while the aspect of competition in business relationships has attracted less attention. A different view with regard to competition is considered by Medlin and Ellegaard (2015: p.8) who do not see competition as a background variable in the business network. The authors' argument is based on the idea that 'firms cooperate to compete'. This paper considers this view and contributes to the debate on competition within networks of firms by focusing on the 'interplay' between cooperation and competition. Building on a business network perspective, the paper aims to understand why firms

move between cooperation and competition in the context of high-tech industry. Rather than concentrating only on cooperation with competitors or competition with business counterparts, the focus of the paper is observation of firms that over time both compete and cooperate with each other. The discussion is based on a single case involving the Swedish multinational Ericsson and some of its main counterparts in Brazil (see Case 1, section 3.10, p. 47), where changes in their relationships over time are analyzed.

The findings show the implications of resource interdependence on the firms' relationship dynamics and explain relationship continuation during critical events, i.e. situations that have a significant impact on the relationship. The main argument is that business relationships survive despite periods of competition if interdependence is high. Thus, firms move between cooperation and competition within business relationships, rather than ending the relationships when starting to compete. It is not a new discovery that resource interdependence is a vital issue in cooperative relationships. However, the essential aspect is that interdependent partners will tolerate competitive situations, or a certain degree of opportunism, as long as the tensions and conflicts do not offset the benefits. One interesting aspect observed in the paper is that the cooperation-competition interplay is associated with firms' positioning in the network. A centrally positioned actor will choose who to bring into the partnership, with firms' positioning changing from project to project. The willingness to be a central actor, i.e., a project leader, places traditional buyer and supplier partners in competition. Therefore, cooperation and/or competition become(s) contextual rather than characterized by the traditional way in which competitors are those selling a similar product or service.

Another interesting contribution is related to the time lag that separates one project from another. The time highlighted justifies the use of the word 'interplay' instead of the 'simultaneous' aspect stressed in the cooptation literature. Different levels of analysis create different interpretations. At the relationship level of analysis the two elements coexist, but when analyzing on the activity level there is a time lag that separates the contradictory elements; at least for the case examined in this study. At the project level, partners can cooperate in one project and compete in another, but it is not possible for cooperation and competition to happen in the same activity, at the same time, for the same project. According to the cooptation literature, the two logics should not be separated from each other, i.e., if firms are either cooperating or competing, this is not considered cooptation. The study indicates that at both relationship and project level there is clear evidence of the cooptation paradox, but if the level of analysis is the activities within a project at the same time, the cooptation paradox disappears and the logic becomes either/or instead of both/and. This creates a need for the development of a more profound conceptual approach applied to the cooptation paradox, since the field lacks consen-

sus on its definition, and the distinction between what is cooperation and what is not remains unclear.

The managerial implications with regard to the contradictory existence of cooperation and competition are that this imposes challenges on managers. In a complex business environment, managers should have a mindset that can recognize the existence of both cooperative and competitive forces while being able to manage tensions. The ability to navigate between the two contradictory logics creates venues for success, since it is important to identify the competitive dynamics within the network while at the same time being able to identify cooperative business opportunities.

Paper III: Business and Socio-Political Interaction in International Service Projects

Research examining public-private relationships within international business and management literature tends to center the analysis on the macro-level of activities commonly based on the MNEs' internationalization phase (e.g., contact with host governments, trade associations, etc.) while few studies (see Salmi & Heikkilä, 2015) have focused on strategic activities necessary when MNEs already have an established position in a foreign market. In order to address this critical gap, the paper aims to examine how cooperation with socio-political actors helps service MNEs to strengthen their competitive market position in a foreign market. The analysis is undertaken on the micro-level of interactions (i.e., MNEs, public officials, and non-governmental organizations) and therefore brings a novel perspective to this less studied type of network.

The examination of MNEs' socio-political behavior is important to enhance the comprehension of firms' entire market behavior (Hadjikhani, 2008; Ring et al., 1990). This study contributes to the literature by providing an empirical illustration of a complex relationship where differences in goals, values, and organizational practices require managerial abilities to minimize conflicts and leverage business opportunities. Based on two cases related to smart city development (see section 3.10, Cases 1 and 2, p. 47-48), the paper illustrates cross-border activities where service MNEs from Sweden, Spain, Brazil, and China work together with local actors to strengthen their competitive market position. The service MNEs in the paper are those specifically from the ICT industry. The investigation of this type of MNE was chosen since the technology developed in the industry is believed to impact a country's development, mainly when it comes to issues such as environmental sustainability and poverty reduction (World Bank, 2016).

The results reveal that an important strategy used by service MNEs is to get involved in cooperative service projects involving business and socio-

political actors. Successful cooperation is partially explained by the managers' skills at incorporating the business resources with the needs of the socio-political actors. The key implication, in line with Salmi & Heikkilä (2015), is that extensive public-private networking is indeed required even when MNEs have an ongoing operation and enjoy an established position in the foreign market. By including the analysis of the firms' interaction with socio-political actors, the study contributes to the international business literature. From a managerial point of view, it has been highlighted in the paper that in order to strengthen firms' competitive market positions, managers should approach people with diverse political influences, show genuine interest and commitment concerning societal needs, try to develop technologies that can help public authorities to solve societal problems while bringing benefits in terms of cost reductions for mayors, and finally cultivate close relationships of mutual interests.

Paper IV – Innovation Networks – Why Do They Emerge and How Are They Configured?

In today' highly competitive business environment, to stay innovative is the goal of any company. Such an objective becomes even more relevant in the high tech industry due to the rapid pace of technological transformational and disruptive technologies. In addition to that, in response to the increasing costs of R&D, reduced product life cycles and the complexity involved in the innovation process which requires integration of different pieces of scientific knowledge, companies are innovating through networks (Fjeldstad et al., 2012; Toh & Polidoro, 2013). A substantial stream of literature exists on networks, but these studies tend to concentrate more on inter-firm cooperation. However, innovation networks include not only traditional business partners such as customers, suppliers, etc. but also other actors, for example nongovernmental organizations (NGOs), and even government. There is still limited knowledge about mutual motivations that allow such inter-organizational networks to emerge or how different interests can be accommodated during such a process. Therefore, the aim of this paper is to contribute to recent calls for innovation through networks (Freytag & Young, 2014, Kedia & Mooty, 2013) by examining why innovation networks emerge and how they are configured.

To address such an issue, two cases of the development of a smart city solution are investigated (see section 3.10, Cases 1 and 2, p. 47- 48). Rather than focusing only on the firm level, the target is to analyze the cases at the network level by incorporating the views of various network participants. The innovation process investigated in this study includes both firms' development and implementation of the smart city solution. According to a linear

view, the process begins with idea generation followed by product/service development and ends when a technological solution is launched on the market. But the recognition of a nonlinear approach emphasizes the actors' interactions in which phases of development and implementation overlap as a consequence of the interactions (Pellikka & Virtanen, 2009). Interaction is a basic requirement for cooperation and through it actors access and combine resources (Håkansson & Snehota, 1995; Powell, 1990). Innovation, thus, is seen as a process in which the flow of ideas and activities are coordinated among actors through an interactive process of combining and recombining resources.

Hence, in this study, a nonlinear view is assumed and innovation is closely linked to a process of mobilizing actors and their respective resources within activities of searching, acting and convincing actors on an opportunity to develop a smart city concept. The basic premise of explaining the emergence of innovation networks, through these activities, is that the resources of a single company are rarely sufficient to cover the whole process. Therefore, resources' interaction with other actors facilitates not only the idea generation but also implementation of the smart city solution.

The paper contributes to the business network literature in several regards. In focusing on the collective behavior of actors in developing a solution, an explanation of the network configuration and organization for innovation is provided. By applying a network approach, the study shows that an innovation network emerges because firms are limited in pursuing and integrating complex knowledge on their own and for that reason cooperation becomes crucial. In such a vein, the key implication of this study is that networks represents a fast mean of gaining access to know-how while adding non-technological and intangible assets such as – but not limited to – information and legitimacy that cannot be easily compiled and produced internally by a company. Second, the locus of innovation is not limited to the traditional business-to-business relationships, but can also arise from interactions with nonbusiness actors such as NGOs and local government. Furthermore, these nonbusiness actors are also important to support and help firms' to legitimize a new technology. Finally, the study suggests that the innovation is characterized by a dynamic complex process of *searching-acting-convincing* regarding an opportunity. The cases reveal that there is not such a clear separation or linearity between these activities in the projects, since actors move back and forth between them. Thus, searching, acting, and convincing are interrelated. In addition, this study helps managers to better understand the complexity involved in combining actors' resources to develop the smart city solution. Leading firms need to consider pursuing opportunities (e.g. technological adjustment) and deal with the understanding of how technologies should be adapted in order to generate acceptance and diffusion.

Table 4. The link between papers

	Progression towards research aim	Method applied	Progression towards research insights
I.	The main purpose is to investigate a process of public-private cooperation in urban planning. Specifically, the paper tries to comprehend how this type of hybrid organizational arrangement influences value creation and capturing mechanisms.	Single Case Study	The paper framework emphasizes the motives for value creation – not limited to profit motives - and the distribution mechanism when public-private actors team up. Cross-sector cooperation can be viewed as a generator of social value, and that economic and social value creation can be mutually reinforcing. Difficulties arise from the need to accommodate economic and social value. However managing such problems created opportunities for value creation and capturing.
II.	The aim of this paper is twofold: 1) to understand why firms move between cooperation and competition in the context of the high-tech industry, and (2) what are the main implications of switching between cooperation and competition?	Single Case Study	The main argument is that business relationships survive despite periods of competition if interdependence is high. Thus, firms move between a state of cooperation and a state of competition within business relationships, rather than ending the relationships when starting to compete. When well managed, the cooperation-competition interplay created opportunities for innovation and enhancement of firms' competitive market position.
III.	To examine how, through projects with a social purpose, foreign service MNEs deal with society and public officials in an emerging economy. Specifically, how does cooperation with local actors to improve public services in cities in Brazil helps MNEs to strengthen their competitive position in a foreign market?	Comparative Case Study	The paper demonstrates that companies were embedded in different kinds of social and political relationships. Given the idiosyncrasies present in such relationships, conflicts are expected to emerge. A managerial implication is that to manage such relationships managers need to identify what norms, values and beliefs drive the actors involved and how to manage when such norms and values intersect. When conflicts are handled well, socio-political support leverages opportunities for market creation and the firm's technological acceptance.
IV.	Why do innovation networks, as a new form of organizing, emerges and how are they configured?	Comparative Case Study	This study suggests that the process of developing a solution through smart city projects is connected with the activity of searching, acting and convincing on an opportunity. The findings demonstrate that there is no clear separation or linearity between these activities since they are intertwined. These activities are closely linked to firms' decisions in relation to when to explore and when to exploit.

5. Findings

The main assumption presented in the thesis is that the complexity in an ‘extended’ business network seems to be higher than in a traditional business network due to differences in the nature of the exchange. Hence, the purpose of the thesis is to understand how business, social, and political actors interact in projects for the development of smart city solutions. A special focus, as aforementioned, is the influence of socio-political actors on the firms’ business network. Therefore, in order to fulfill this purpose, the thesis has two research questions: a) how does complexity in the interactions with socio-political actors influence firms’ cooperative and competitive behavior?, and b) how does complexity in the interactions with socio-political actors influence firms’ use of resources in exploration and exploitation? This section discusses the overall findings obtained from the research material and the four research papers in connection with the analytical framework introduced in Section 2.2 (see Figure 2, p. 29) of the thesis.

When studying the influence of the socio-political actors in the firms’ business networks by using the analytical framework, three factors emerged. These are: (1) firms’ willingness to occupy a central position in the network, (2) time affecting the business relationship, and (3) perceived value impacting on firms’ decisions. These factors are used as a tool to unpack the complexity inherent in the ‘extended’ business network and to help me explain the behavior of the business, social, and political actors. While the aim of being a central actor helps companies to gain better socio-political experiential knowledge, which has an implication in the firm’s business network, time is important since it refers to the interaction process during the project execution and the strategies used by actors right after project completion. In addition, value is related to the benefits perceived by the actors from the interactions, and helps to explain what actors have done in order to capture the benefits created. The above three factors are explained as directly connected to the two main core issues, designated as complexity in actors’ interactions and resource heterogeneity.

I organize the findings in the following manner: first complexity in actors’ interactions is discussed, and then some explanations of firms’ cooperative and competitive behavior are provided. After that, complexity in resource heterogeneity is shown, followed by firms’ use of resources in exploration and exploitation. The section ends with a concluding discussion about the characteristics of the ‘extended’ business network.

5.1 Complexity in Actors' Interactions: The Relational Dimension

This study demonstrates the complexity in interactions. Specifically, multiple differences were observed among actors in both relational and resource dimensions. In the relational dimension, examples include differences in competences, goals, motivations, intentions, experiences, and even differences in time perspectives. Such differences created uncertainties about the outcome of the interaction and consequently the overall result of the smart city projects. Differences also increased complexity in the relationship, leading to frictions and disagreement between actors. Thus, the smart city projects were characterized by episodes of cooperation and conflict. Complexity in actors' interactions will now be operationalized by centrality, time, and value.

Centrality

This thesis indicates that in the development of smart city solutions, companies assume different roles in the network. Considering that public authorities make the decision from whom to buy the solution, a company may participate in a project as the integrator of the solution by offering the whole service (end-to-end) and then forming a network in which partners will work together with the project leader to compose the solution. In such a case the leader of the project may have a central role and act as a boundary spanner, connecting business, social, and political actors. In another situation, a company can participate in a smart city project as a supplier of part of the solution, acting, for example, as a provider of the connectivity or as a product vendor (of hardware, software, or assets), or by only managing the service as a third party via the operational supervision of the smart city solution. Change in roles and positions creates complexity since it has implications on business actors' interactions and decisions to cooperate and/or to compete against their counterparts. It is relevant to explain that conflicts in the business relationship were noticed in Case 1, but information from the interviews provided observations that were beyond the project boundary. Thus, I mapped out different projects in which two business partners involved in Case 1 cooperated. This enabled a longitudinal analysis covering the period during which the companies cooperated, i.e., from 2011 to 2016. By doing so it was noted that the centrality issue, which was confirmed later with new interviews, was also a concern for other firms involved in Case 1.

In the study, the word 'centrality' is associated with a coordination role. Being at the center means getting the benefits of coordinating groups of actors and then bridging different networks (c.f. Abrahamsen et al., 2012; Anderson et al., 1998). Centrality, thus, allows a project leader to gain better or deeper socio-political experiential knowledge, since the project coordinator

will have a closer interaction with such actors than will other business partners. Knowledge of socio-political actors and the socio-political environment is likely to give the project leader an advantage in comparison to its counterparts. This may increase the possibility of the central business actor gaining future public procurements. Moreover, another advantage gained by the project leader is that its increased perceived legitimacy will possibly attract other new types of partnership. This will increase the central actor's chances of new business opportunities in the local city setting or perhaps even internationally. Therefore, membership and leadership in such 'extended' business networks have important competitive implications, as illustrated in the cases (Cases 1 and 2, see Section 3.10, p. 48-49).

Through the analysis of the cases, successful partnerships helped firms to enhance their market position and corporate legitimacy with regards to technologies applied to smart cities. Such findings are in line with researchers like Ghauri et al., (2012); Marquina & Morales, (2012), and Polonsky & Jevons, (2009), who state that socio-political actors may influence competition and corporate market image during entry and expansion into foreign markets. However, as more partners perceive the advantages of being a central actor and become more interested in occupying such a position, more conflicts may be expected to occur in the firms' business networks. This observation adds knowledge to previous research since it goes a step further in acknowledging that socio-political actors may influence companies' behavior regarding cooperation and competition with their counterparts. The existence of cooperation and competition adds complexity and can be harmful to the business relationship. As Luo et al., (2007) suggest, the existence of the two forces involves costs and benefits, but the costs of managing such relationships should not offset the benefits.

The interaction with socio-political actors thus appears to be a valuable means of achieving future competitiveness in smart city projects or any other type of public-private project in which an ICT technology becomes a central core. The theoretical implication is that centrality allows a company to stay close to socio-political actors and that the social trust and legitimacy gained from a successful smart city project is transferred to the business relationship. In other words, legitimacy gained by the central actor spreads in the network and diffuses from one relationship to another and this impact diffuses back to the central firm, enhancing its overall market position (cf. Hadjihkani & Thilenius, 2009). As a result, such an advantage perceived by business partners with regard to the central actor will encourage competition among firms regardless of whether the company is a direct competitor or a supplier of the technology.

Time

Time is another issue observed in the empirical material, even though time is not directly conceptualized in the four papers. Throughout the papers, however, business and socio-political interactions have been observed through the development of smart city projects which have an initial and an end phase. Since projects are time bounded, time and projects are closely connected and therefore the perspective is grasped from the research findings. Observations from Papers I and III suggest that time is perceptual and that it is interpreted differently by actors. In part this is because the economic logic of actors differs. Politicians, for instance, have a time perspective that differs from business actors. Since their positions are temporary, they tend to be more interested in projects that bring them greater visibility in a short period of time, i.e., within a time period during which the voters easily perceive the benefits. Examples highlighted in the papers are urban mobility projects which are considered to be perceived easily, while projects in education take several years for the benefits to be observed.

Such a time perspective might have implications for the way in which the companies develop, adapt, and present the solution to the political actors. Furthermore, differences in time perspective were noted by companies with regards to the process of making decisions. The time taken for decision-making seems to be longer when compared to the industrial business setting. For example, the solution manager working in one of the participant companies involved in the smart city project (see Case 1, Section 3.10, p. 48) states, *'dealing with the government is not easy due to time restrictions. The timeline from presenting the benefits of the technology until the bidding and then effectuation of the business deal takes some time, but between companies decisions are more straightforward'*. Such interview quotes are highlighted in Paper III and imply that negotiations with the government are more complex since governments are often constrained by laws and regulations and, therefore, the process becomes more bureaucratic and takes a longer time. This creates an additional complexity due to the high uncertainty involved in the process, since the business actor does not know if the deal will indeed be closed.

Another source of complexity exists with regards to time between the pre bidding process and the whole implementation of the solution. The fact is that the solution is expected to be implemented during the time period when the political actor making the decision is still in office. The challenge is that it takes time to reach a decision, but once the decision is taken, companies have a short time period to develop and implement the solution. Or at least they may be under pressure to finish within a time period before the next election. This can create friction in the relationship between companies and the political actor. Where the implementation does not entirely meet the time period of the political actors in office, companies may face other challenges.

For example, if a political actor is replaced before project completion, due to the electoral period, this may require changes in coordination since a new politician is likely to have different interests or a different agenda of priorities.

An additional interesting aspect in relation to time is that during the development phase, resources are exchanged and relationships are developed. When the project is completed, resource exchanges between actors cease. In other words, resource exchange moves from being active to being inactive after project completion; however, this does not necessarily imply that the relationship will terminate with the end of the project. A company may want to maintain the relationship between projects in order to increase its probability of repeating the selling process by getting involved in a new project with the same buyer (cf. Hadjikhani, 1996; Bengtson et al., 2018). There are several reasons that a new project sale may occur. A buyer may want to make new adjustments to the technology, or perhaps the existing technology becomes obsolete for new social demands. Another example, related to budget constraints, is that the municipality in the previous procurement may have been able to buy only part of, rather than the whole solution. But with the possibilities presented by a new budget, the municipality may afford to add a new technology to improve a public service. Hence, the purchase process between a company and a public actor differs, since it depends on various aspects such as budget, laws, and regulations, in comparison to a purchase process between firms. As aforementioned, complexity in dealing with public actors exists due to the uncertainty associated with the negotiation period.

In such a context, companies' marketing activities are not limited to the process of negotiation in pre-bidding activities but also involve 'after sales marketing' as a way to reduce the possibility of discontinuity (cf. Cova & Salle, 2007). This has been observed in the case of Ericsson (see Cases 1 and 2, Section 3.10, p.47-48). After project completion, the business actor has been involved in other projects linked to the smart city concept in the same city. The firm's interactions with socio-political actors created interdependency, and this is an important aspect for future development of the relationship. The results are close to the study of Hadjikhani (1996), where it is shown that marketing actions are not aimed at only one specific project.

Value

The interaction between business and socio-political actors created value for all participant actors in the smart city projects studied. However, the possibilities of creating benefits for actors were not clear from the beginning. In Case 2, highlighted in Paper III and also in Paper IV, public officials were not well familiarized with the technology, and companies then faced more resistance due to the poor understanding of the potential benefits

that it could generate. In Paper IV, the need for companies to convince and even educate public officials with regard to the new technology was apparent. This is emphasized by the city tourism secretary; he was one of few public officials who could see the importance of the technology. He stated: *‘They did not know how the technology could help them’*. Lack of knowledge with regards to the technology added complexity to the firms’ interactions with socio-political actors since they needed to devote special attention to explaining, showing, and educating public officials beforehand.

Paper I emphasizes the value creation process and stresses that value creation was a collective activity between companies and socio-political actors, but that once the project ended actors wanted to capture the value created. After the end of the project, some companies tried to differentiate themselves from the other participating firms. Strategies for differentiation, via specific marketing activities, were used by companies as a way of positioning themselves in the market. The politician in office during project execution indirectly used the project in his political campaign as a means to build political legitimacy and social trust. For the social actors, the project generated a perception that the smart city project was an important issue for community development.

To come closer to the values of the community, for example, the NGO in Case 1 (see Section 3.10, p. 48) changed its brand name from ‘Institute of Informatics of Curitiba City’ to ‘Institute of Intelligent Cities’. Its mission was also adjusted towards the city’s sustainable goals. It might be the case that the NGO wanted to differentiate itself from other social actors in the local market. These findings are in line with previous research which affirms that companies act in their own self-interest and disregard the optimization of mutual value created (Dyer et al., 2008; Lacoste, 2012). The findings add knowledge to the previous study since their conclusion was a result of observations of the industrial setting. An interesting aspect in this study, however, is that in an ‘extended’ network such a behavior is also observed among social and political actors, as well as companies. Actors try to differentiate themselves within their own network, i.e., vis-à-vis their partners. In part this is due to their differences in terms of accountability. Socio-political actors, as also discussed by Hadjikhani and Ghauri, (2001), are accountable to citizens as a whole, while companies are responsive to specific stakeholder groups.

With respect to the business actors, differentiation is a way to show gains in legitimacy and trust, mainly because, as mentioned in the previous section, the companies’ intention is to become project leaders. Paper III shows that companies’ interactions with socio-political actors generate other types of noneconomic value, such as business legitimacy. Business legitimacy diffused from the social and political interaction and therefore enhanced the companies’ competitive market positioning. This observation, in accordance

with Hadjikhani et al., 2008, is based on the view that socio-political relationships are expected to strengthen legitimacy and affect business by adding to companies, profits. In the opposite direction, lack of knowledge and a deficit in legitimacy has a contrary effect and diffuses from companies to socio-political actors. For instance, lack of knowledge was observed with regards to poor understanding of socio-political values. One episode exemplifying this was observed in Case 2 (see case description in Section 3.10, p. 49), when companies demonstrated an intention to charge for services while at the same time using the city to promote themselves. Such behavior created discomfort and generated conflicts between city hall and firms. City hall did not want to charge citizens for services that the companies were implementing, mainly because the city was being used by them to demonstrate the technology. The complexity observed here is the lack of companies' understanding of the differences between business and socio-political expectations. The companies were focusing more on business profits and short term interests rather than on creating a new market for their technologies.

Another source of complexity was the lack of knowledge observed from the political side in dealing with multinational companies. Paper III again highlights such differences between projects; that is, the public officials in Case 1 had previous experience of working in projects involving large companies. This created a better understanding in terms of organizational practices, which facilitated the cooperation. However, public officials in Case 2 were less experienced in dealing specifically with multinational corporations, and for that reason more misunderstandings and frictions were noted in the relationship. The overall benefits created were, however, greater than the shortcomings, and all actors were committed to the success of the project.

Paper IV also contributes to the idea of perceived value. Companies' cooperation with socio-political actors is important in assuring local support and acceptance for their technological solutions. However, the need for differentiation is depicted in one of the phases of the project, in the paper called 'convincing phase'. The companies thus used different strategies as a way to distinguish themselves in the market. Examples include Huawei's business summit to demonstrate the smart city solution, the use of boundary spanners such as diplomats by Ericsson to increase legitimacy in new public-private cooperation for urban mobility in Curitiba, and creation by ISPM of a spinoff company entirely dedicated to smart city technologies. The key implication for cooperation is that it will be worthwhile if, and only if, the collective goals fulfill the individual goals. Motivations for inter-organizational cooperation are thus centered on the assumption that the creation of value requires actors' future expectations of value capture, regardless of whether they are business, social, or political actors. Thus, value capturing highlighted in the paper goes above and beyond the profit maximization issue.

When selling the solution, companies communicate not only the value created by the technological solution, but also the societal benefits. The two projects have also been emphasized in the companies' CSR reports. Hence, companies observed in the study have shown interest in societal issues. Some scholars of business networks (see, for example, Hadjikhani et al., 2016) have studied companies' proactive behavior in implementing CSR strategy as a marketing tool in foreign markets. But the difference in this study compared to previous research is that, although the smart city technology can be communicated in the companies' CSR report, it is part of the firms' core business. In other words, studies emphasizing CSR activities tend to observe companies' involvement in projects for charity. The societal message used by companies in this study goes beyond the charity perspective to demonstrate corporate social behavior, since it is part of the companies' business model (cf. Schaltegger, Ludeke-Freund & Hansen, 2012; 2016). The technology developed is part of the firms' core business and has therefore been used to show companies' behavior both as an economic and social actor.

5.1.1 When to Cooperate and When to Compete

In this study, firms' cooperative and competitive behavior is closely connected with the notion of centrality. Paper II illustrates this quite well by associating centrality with the project leader and then showing the existence of interplay between cooperative and competitive relationships. The case (see Case 1, described in Section 3.10, p. 48) analyzed in the paper reports situations that exemplify how companies change behavior from one project to another. As stated previously, being a central actor means acting as a boundary spanner, connecting firms from one side and social-political actors from the other. This can lead to cooperative behavior if some partners are included as a supplier of part of the solution, or competition if some partners are left out. In part this happens because a centrally positioned actor will choose who to bring into the partnership, with positioning concomitantly changing from project to project. The willingness to be a central actor, i.e., a project leader, places traditional buyer-supplier partners in competition. In such a case, competition is not linked to its traditional definition with two business actors competing against each other when offering a similar product and/or service. The competition here is associated with a willingness to occupy a central role in private-public partnerships. Thus, cooperation and/or competition are explained in the paper as being contextual.

A central position is in line with Håkansson and Snehota (1995), who state that actors in a business network are constantly looking for opportunities to improve their position in relation to important actors. This is also observed in an 'extended' business network, where socio-political actors become important counterparts. It was observed that gaining their support

and influencing them towards growth constituted the companies' goals. A relevant point to highlight is that companies playing the coordination role will sometimes behave as cooperators and sometimes as competitors in relation to their business counterparts. The results are close to research such as that of Lacoste (2012) and Easton & Araujo (1992), who claim that relationships contain elements of competition and cooperation. But these studies have not taken into consideration such an outcome being influenced directly or indirectly by socio-political actors, as this thesis has.

Time and centrality raise the question of dynamism related to cooperation and competition. Paper II again makes an important contribution and explains that during the activity of developing the project there is a lag period which separates cooperation from competition. It was shown that partners can cooperate in one project and compete in another, but cooperation and competition will not happen in the same activity, at the same time, for the same project, in the cases studied. Collective behavior is observed by partners during project execution while competitive behavior is more prominent after project implementation. Another aspect of dynamism observed in the relationship connecting centrality and time is that business actors will try to maintain a central position for future projects and that therefore, between projects, they will nurture relationships with key partners, as also emphasized by Hadjikhani (1996). In smart city projects, socio-political partners become important and companies may want to stay in contact as a means to assure their status-quo. In Paper I, time is not explicitly observed but findings suggest that the motivation for cooperation has a link with actors' expectations of future projects.

In an 'extended' business network, as mentioned earlier, the exchange is expected to integrate social and economic objectives. Interactions with socio-political actors generated substantial benefit. i.e., value to the participant companies studied in Cases 1 and 2 (see case description in Section 3.10, p. 47- 48). Value is observed in all papers, with greater attention paid to this in Papers I and II and less discussion in Papers III and IV. From a general perspective, value creation in developing smart city projects generated competitive advantages for firms and also influenced their cooperative and competitive behaviors. In Paper I, I highlight that a high perception of value creation increased motivation regarding cooperation, and how this was a useful mechanism for reducing conflict during the development of the project. Furthermore, future expectations for more value creation, i.e., benefits, business opportunities, increase brand awareness, etc. generated commitment by all actors since they associated more value creation with a greater probability of value capture. The success of the implementation of the project enhanced commitment and trust in the focal relationship between two companies, Ericsson and Telefonica/Vivo. For instance, the Curitiba smart city project (see Case 1, Section 3.10, p. 48) created new possibilities for partnerships between them, such as the Aguas smart city project, where the two companies

teamed up again. It has been argued in previous research that cooperation between involved actors in one project impacts on future cooperation between them (see Bengtson et al., 2018; Hadjikhani, 1996; Leite & Bengtson, 2015; Leite & Latifi, 2016). Empirical observations show that relationships with socio-political actors are perceived by companies as valuable. This is emphasized by Ericsson's head of government relations, who says that '*government is an important partner to us, mainly for market creation*'. Furthermore, the project allowed firms to use their technology normally used in one setting – for instance the solution created for PC application – to be used, with some adjustments, in a city setting. One interesting aspect is that the cooperation generated support from socio-political actors. In Case 1, companies developed a video in which public officials talk about the benefits generated by the technology. In Case 2, the city tourism secretary participated in smart city seminars by talking about how the technology had positively affected the municipality.

To sum up, the expectation for future value creation in projects involving socio-political interaction has implications for firms' cooperative and competitive behavior. Empirical observation suggests that smart city projects are characterized by episodes of cooperation and competition. While companies' motivations for cooperation were related to knowledge generation, business legitimacy, social acceptance, and support for their technology, socio-political actors were motivated to gain social and political legitimacy. NGOs were interested in enhancing their corporate image and mission, and political actors saw in the project a way to show their involvement in projects generating positive community impact. Once the project ended, different forms of competition, as stated in Paper II, appeared between business partners, especially in the activity of selling the solution; competition for differentiation, competition for legitimacy with regard to the technology in the local and international market, competition for being centrally positioned in the network when future business opportunities involving other business partners and government appeared, to name just a few. Thus, cooperation enhances companies' competitive market positioning, but it also suggests that in relational terms competition for centrality may lead the relationship among business partners to move from win-win situation to a win-lose if rivalry for occupying a central position intensifies over time.

5.2 Complexity in Resources Heterogeneity

Complexity in resource heterogeneity was observed in the activity of combining resources. Complexities were detected in various circumstances during the development of the smart city projects. Examples included failure to adjust the technology, poor functioning of the system affecting the project image and the respective involved actors, challenges in integrating different

pieces of knowledge, and lack of experiential knowledge from business actors of working together in a city setting. Problems were also noted with regard to public officials' lack of understanding of how the technology could be beneficial to the city. Other differences were related to the time response for technological adjustments. As can be observed, if from one side, political actors still lack understanding of the cost and benefits of a smart city, on the other side companies lack practical experience in a city setting despite having the technological know-how. Lack of experience increased uncertainty about what the final outcome would be, and for some actors, the project was a process of learning by doing. This is in part explained by the stage of development of the smart city idea. As mentioned throughout the thesis, the smart city is a new concept i.e., a new idea in both developed and developing nations, and in many cities the concept is still in the planning phase. Consequently, the smart city projects contain episodes in which firms may allocate resources for exploration and exploitation. Below, I will show how centrality, time, and value explain the actors' behavior to unpack the complexity in resource heterogeneity.

Centrality

Until now, centrality has been discussed in the relational dimension but the willingness to be a central actor is also linked to a strategic position connecting actors' resources, and therefore also has implications in the business network. The more access to resources a firm has, the greater the access to information and this may help a firm to develop a broader view of the situation (cf. Burt, 2004) and then learn how to solve problems in such a pool of heterogeneous resources. Paper III elucidates this, by showing differentiation strategies used by firms. Observations drawn from the empirical material from Case 2 (see case description in Section 3.10, p. 49) indicate that a project leader may have more direct contact with and access to public officials. But being a project leader may not be an easy task since it requires specific competences or managerial abilities to coordinate the project and to understand business, social, and political demands, as well as local market knowledge and a profound understanding of differences in expectations and values among actors. In addition, a project leader needs to know what available resources the other partners have. In Case 2, for instance, the telecom operator was project leader and the company became knowledgeable in how the solution could be integrated with different pieces of knowledge coming from different partners.

Coordination, thus, entails the link between the project leaders' business partners and their specific resources from one side, and socio-political actors and their local knowledge expertise from another side. Certainly not all companies will have the same capability for coordination. Complexity in combining resources entails a good understanding of how to accommodate

various interests. Paper IV illustrates the complexity faced by the central actor in coordinating a different pool of resources and respective actors. In Case 2, for instance, the central actor together with the business partners faced several difficulties in adjusting their previous technology to a city setting. The business actors' lack of experiential knowledge generated uncertainties about the final outcome. At the same time, in order to reduce the risk of failure and a poor perceived impact by the citizens, as emphasized in Paper IV, Telefonica/ Vivo needed to constantly monitor not only what was going on in the project but also to avoid any negative news in the local media if something went wrong.

As can be observed, being a central actor requires skills and competition to occupy such a position will certainly occur between companies that possess a greater amount of resources or at least know how to mobilize such resources. Failures to coordinate and manage different relationships may be costly. Paper III illustrates this by showing a situation in which, in Case 2, Telefonica/Vivo's failure to provide connectivity to the citizens, which was not related to the project per se, caused a negative impact on the project image. Another example is related to a situation, in Case 1, in which the company underestimated the broadband coverage necessary for the functioning of the urban mobility solution. This failure caused malfunctioning of the system and entailed rework in the project, generating delays in the implementation and conflicts between partners. It took some time for the partners to realize which part of the solution was inadequate. In this situation, the NGO involved in the project (Case 1) took on the role of mediating between and reconciling business partners and political actors. One interesting strategy noted in Case 2 (see Section 3.10, p. 49) and emphasized in Paper III, is that Telefonica/Vivo has an NGO and uses this nonprofit foundation to enhance market legitimacy and design a different type of interaction with the government and public officials. The foundation promotes initiatives to improve citizens' lives in some municipalities within the country. As a 'neutral' actor, the foundation has reduced conflicts and even penalties from regulators to the Telefonica Group due to 'poor broadband connectivity'.

Complexity in the process of integrating different parts of the solution generated conflicts in particular during project execution and also in the relationship between actors. If, on one hand, the project brought services that benefited society, a lack of business legitimacy in certain areas not directly related to the project affected project image and the firms' competitive positions. Complexity is related to resource interdependencies. Failure in one part of the solution affects the other parts, due to the interdependency of resources distributed among actors in the network. This contextual observation thus suggests that power and influence will be concentrated in the hands of few companies, which will try to dominate the market and influence the government's decisions while minimizing the risks of failure.

In Paper III, findings also suggest that successful cooperation is linked, as previously concluded by Hadjikhani et al., (2008), to firms' abilities to develop business resources to meet the needs of political actors and others in the political system. It is worth noting the actions of the project leader's business partners with regards to strategies for differentiation. The willingness of partners to distinguish themselves was observed in relation to each other in Case 2 (see case description in Section 3.10, p. 49), but not in relation to the central actor, i.e., Telefonica /Vivo. For instance, business summits organized by one company involved in the project had the central actor's participation. Two other business partners state on their websites that the smart city project in Brazil was possible through partnership with the central actor. Such a perceived gain in legitimacy by the business partners with regards to the telecom operator boosted its status in the local market despite failures. Thus, success in coordination by a central actor may be associated with a higher level of perceived legitimacy. In addition, the diffusion of information about successful coordination would indirectly strengthen the position of the firm among the public, NGOs, local political units, and business partners.

An interesting contextual observation is that the Brazilian government has recently (in 2017) carried out a public consultation exercise with regards to the new technologies available in the market as well as what society expects in terms of new applications for smart city services. Pioneer initiatives observed in the two cases clearly put these companies in a situation of advantage in providing suggestions to the government in respect of what should be done. The cases can be used as a reference to inform the government how the technology can improve public services. Again, this relates back to the aspect of power and influence that a central actor may have on political decisions. The overall aim of the companies involved in the smart city projects, however, is to set an agenda that satisfies both social and economic demands. This is contingent on firms' abilities to gain political knowledge and is in line with studies by Hadjikhani and Ghauri (2001), who claim that the more political knowledge a company can obtain the more influence it gains and the more support it will receive. The main point is that the previous study does not take into consideration the aspects of centrality that this study does. Given the advantageous possibilities that a central actor might obtain, companies will strive for centrality, as this study makes clear. As a consequence, this may add complexity in the business relationship, leading to conflicts, primarily if centrality becomes an important goal among business partners.

Time

With regards to resource exchange, time also emerged as an important factor influencing the process of combining resources. During the projects, some

actors were observed to be more active than others. In the initial phase, socio-political actors worked actively with companies by exchanging information and reducing bureaucracy. For example, the need for licenses (see paper III) was reduced in Case 2 (see case description in Section 3.10, p. 49). Moreover, companies, NGOs, and public officials had some meetings to discuss what would be done together, what was necessary, and in which part of the city the technology could be first tested and then implemented. Paper IV illustrates a network evolution based on the activities performed. In the paper, the network of actors was initially small and it then grew during the development process. This indicates dynamism in the network, with some business actors jumping in and out in different phases of the project. In addition some members, such as socio-political actors, had different roles during the project, i.e., being active in some phases and more passive or even inactive in other phases. A similar situation was detected in Case 1. For instance, socio-political actors became inactive during the technological integration, since this is a type of a capability they lack. Despite this, however, they followed what went on during the process.

Hence, time to develop a relationship as conceptualized in industrial network literature might differ and be more complex in an 'extended' business network. For example, relationship development takes time to nurture among business partners (Ford, 1990, Håkansson & Snehota, 1995) and therefore time assumes a more long-term perspective in which firms' relationships follow an incremental and continuous path. In an 'extended' business network, the ties are weaker since the position of political actors is not stable and the values of the connected actors change more often. For the particular social actor participating in the projects, this notion can be partially applied. In Case 1, the position of some of the board members of the NGO was contingent on the political actor. That is, it was appointed by the politician in office, and thus changes were observed to occur periodically. In Case 2, this view was not applicable since the NGO belonged to one of the companies and therefore values should be in line with the firm's corporate strategy. Again, this is a question of dynamism that may differ in a network formed by business actors compared to an 'extended' network. While this study is close to the thoughts of researchers like Ford and Håkansson (2006), who describes business networks as an interactive and inherently dynamic situation, this study is different since it examines a different exchange type which includes both economic and societal demands.

The main implication is that in an 'extended' network, changes and instability are more frequent and therefore the dynamism discussed in such a network goes beyond the dynamism discussed in the business-to-business relationships. For instance the traditional buyer-supplier relationship, that is, the one between companies, differs from a situation where the buyer is a political actor. The natural glue that unites companies is the continuation of new purchase or business opportunities, giving a natural aspect of continuity,

while in a relationship with social and political actors, the glue is weaker since the aims of the actors are not related to business continuity but depend on the agenda, i.e., the interests of the current social and political actor. Many scholars have explored the behavior of firms in a socio-political context (e.g. Hadjikhani & Ghauri, 2008; Jansson et al., 2007; Ritvala et al., 2014); however, the aspect of network dynamics with respect to projects has not been discussed explicitly in their analysis as in this study.

Value

It is also relevant to highlight how socio-political actors contributed to value creation in the network. For instance in Case 1, the idea of having a transport system connected to a 3G technology came from them and gave companies new opportunities in a segment that was not yet included in the companies' core business. In Case 2, companies have benefited from feedback provided by both the municipality and the citizens with regards to the apps developed. These findings are in line with the results from Coviello and Joseph (2012), as well as Kazadi et al., (2016), that show how close interaction with consumers can provide companies with new ideas. The difference in this study is that here the users of the system are the socio-political actors, who are seen as producers of new ideas for companies and, thus, can be considered a source of competitive advantage.

Another different perspective with respect to value among actors can be related to the costs of the resources invested. Costs incurred during and after the completion of the project vary between actors. For instance, in Case 1 the municipality has invested 10 million US dollars to improve urban mobility. Costs during project development and implementation were the responsibility of the companies. That is, the companies needed to plan and coordinate well and to assume risks primarily if costs surpassed what had been previously negotiated. This is emphasized by the sales manager of Dataprom, who affirms that *'We need to set a security margin with regards to prices. The problem encountered in public procurement is that even if the deal is secured today, the payment will only be received at the end of the project'*. In addition to this, Case 1 (for more detailed discussion, see Paper I) shows situations where delays in adjusting the technology by Telefonica/Vivo generated rework and additional costs. But once the project was completed, the costs reverted to the public authority in terms of maintenance. It was not possible to observe the cost aspect from the social actor point of view, but certainly the social actor will be concerned that costs should not be high since these will be transferred to the community somehow.

As can be noted, the economic logic differs between actors. To sum up, the project has an end period for companies while for the municipality it remains in place for years. This is in line with the observations by Hadjikhani (1996), who claims that maintenance may create interdependence

even when there is no resource exchange between the customer and the buyer. A typical example is selling spare parts derived from technological interdependence. An important point, however, connecting centrality with costs and resources, is that a central actor may develop strategies to keep its status quo. Hence it is expected to be involved in developing pioneer technologies. Thus, the future needs for a buyer to substitute the technology are likely to create new interdependencies between the buyer of the previous project and the seller, which is the political actor.

5.2.1 When to Explore – When to Exploit

With regards to the resource dimension, the value created has implications for how actors, in particular firms, make use of the knowledge developed. Empirical material shows that the actors have different views in relation to exploration and exploitation. Complexity here refers to how companies may cope with differences in objectives. For instance, the socio-political actors' view is related to one specific region or community and they are not concerned about how the technology will be used in other contexts. In contrast to this, the multinational companies' goal is to transfer the knowledge created from one city to another and even to cities located in other countries.

In addition, other contradictions, still related to dissimilar preferences, were noticed. For example, while the socio-political actors' optimum preference is linked to having a technology customized as much as possible to the interests of their particular community or city, companies might prefer to use the knowledge created in other cities, i.e., by scaling it up and therefore gaining economies of scale. Customization can range from a solution uniquely tailored to an individual customer, to slight variations of standard solution configurations (cf. Fredriksson & Gadde, 2005). Therefore, depending on how the public procurement is designed and the demands of the social and political actors, their preferences may have an influence on how companies will allocate resources.

An interesting aspect is that, although companies may have a limited interest in a high level of customization of the solution developed, i.e., in exploiting, this can also be positive since it is likely to create high technological and social interdependence (Hadjikhani, 1996). This also can encourage the needs for new technological adaptation which may lead to new discoveries and consequently technological advancements. This becomes the basis for future development of the relationship since such a process will require close interactions. Hence, socio-political influence on exploration and exploitation is related to customization. In municipalities demanding a higher degree of customization of the solution by socio-political actors, companies will devote resources to exploitation, which implies a high degree of technical and social interdependence, while in municipalities requiring a low degree of customization, exploration will be applied instead. This finding is

close to the view that project selling does not lead to continuity since periodical purchasing is a common fact in any project (see also Hadjikhani, 1996; Hadjikhani & Thilenius, 2005, Bengtson et al., 2018). One episode exemplifying customization was observed in case 1 (see section 3.10, p. 48), when public officials in coordination with the NGO required companies technological adaptation to attend URBS needs. Managers at URBS stated that: *'We checked to verify that URBS requirements were adequately addressed by the proposed product/service. We only bought the solution after such verification was achieved'*.

Another explanation with regards to resources can be connected back to the centrality issue. A central actor will have better access to information about customization. A central actor will enjoy increased knowledge, increased and easier access to a large pool of resources, and information which has implications on learning. By developing new technologies based on such information, new resource interdependence can be created and this may reduce the buyers' ability to search for other solution providers. While this observation is close to the thoughts of Hadjikhani (1996), it is relevant to take into consideration the fact that in the ICT industry, where rapid technological change and disruptive technologies are more frequent, interdependence might become less relevant to assuring repeated project selling. While from one side, the knowledge process involved in exploration and exploitation has been recognized as important (see Håkansson & Johanson, 2001), on the other side, few studies have observed such activities in business relationships (see Medlin & Törnroos, 2015). This study attempts to understand such important activities in a relationship containing not only business but also nonbusiness actors, as well as how the activities can be affected by socio-political actors.

In a more overarching analysis, one can say that resource allocation has a link with firms' cooperative and competitive behavior. An important observation is that competition will be linked to centrality and that firms not only cooperate to enhance their competitive market position, as stated by Dollinger & Golden (1992), but that, as shown by this study, companies will also compete for cooperation, i.e., to be part of a network that provides partners with opportunities for growth and greater advantages in knowledge, resources, and expertise.

5.3 Concluding Discussion

Based on the findings of this study, I have observed that an 'extended' business network has characteristics that differ from the traditional business network in three ways: the nature and purpose of the relationships, the dynamics of the relationships, and the outcome of the relationships. In terms of nature, in the traditional business network the economic logic among busi-

ness partners are similar and this can facilitate cooperation. However, in the 'extended' business network, the economic logic of business partners diverges from that of the socio-political actors, and this can create frictions in the relationship. The complexity relies on the need to accommodate both economic and social goals. With respect to the purpose, in the traditional business network the goal is to create value via business profits, while in the 'extended' network the purpose is to create value beyond profit maximization.

With regards to relationship dynamics, as with an industrial business network, mutual learning and adaptation are anchored on trust between business partners, but in the 'extended' network the process occurs between business and nonbusiness actors. Thus, the relationship developed and maintained is based on the social, political, and business needs rather than solely on the business needs, i.e., in economic terms. In the cases studied here, distinct strategies were used by business partners as a way to nurture relationships with socio-political actors. For example, one business actor has created a spin-off company dedicated to smart city development as a way to engage with socio-political actors. Another has units devoted to interacting with the government, while another invested in having a foundation committed to social issues, etc. As can be noted, the type of commitment in the 'extended' business network substantially differs, and the success of the cooperation depends on finding a balance between economic and societal needs. Another aspect of the relationship dynamics is that socio-political actors can influence companies' behavior in relation to cooperation and competition as well as their decisions with regards to resource allocation in exploration and exploitation. In addition to this, in the 'extended' network, the pace of change is faster than in the traditional business network. The complexity relies on the need to adjust resources to align with the period when the political actor is still in office. Another change related to the electoral period is whether or not the political actor is replaced before project completion. Companies might then face changes in the project goal, since the new politician may set a new agenda or priority. These few examples show that change seems to occur more frequently than in the traditional business network.

From a managerial perspective, companies need to manage different economic, social, and political demands. A situation causing a bad reputation, for instance, due to an excess of conflicts in the relationship can make it difficult for a company to survive in a foreign market. The outcome of the relationship is linked to aspects of continuity and discontinuity, with discontinuity generating short-term advantages while continuity means new selling projects with the same municipality. Furthermore, the aspect of centrality may harm the focal business relationship since actors may act opportunistically, primarily if the business actors become too focused on winning public procurements. Thus, the final outcome in relational terms could lead to win-lose rather than win-win situations if rivalry for centrality becomes strong

between business partners. To conclude, the findings discussed above clearly suggest that 'extended' business networks differ from traditional business networks. By showing these characteristics, a better understanding is provided of how the interaction between business and nonbusiness influences the development of smart cities' solutions. These overarching insights, therefore, fulfill the purpose of this thesis.

6. Theoretical Contribution

From an industrial marketing perspective, there is no doubt that much knowledge has been generated in the last 30 years concerning various types of inter-organizational interactions and partnerships (see, for example, Håkansson & Snehota, 2000; Halinen & Törnroos, 1998; Johanson & Mattsson, 1994). Most recently there is acknowledgment of the importance of including social and political actors in the study of business networks as a means to better understand today's market conditions (Hadjikhani et al., 2001, 2008, 2012; Ritvala et al., 2014). More knowledge, however, is still required in this stream of marketing literature. Welch and Wilkinson (2004) suggest, for instance, that researchers need to look beyond the non-economic role of political actors, since their influence may be greater than this and they might be in control of important economic resources. With such a view in mind, this study contributes to this ongoing debate by extending firms' business networks. The key motivation was to include actors beyond the traditional business network and analyze the complexities and tensions that arise in such triadic interactions. Hence, the thesis makes four noteworthy contributions.

First, the attempt to develop the 'extended' network view under the complexity lens is a contribution to both industrial marketing and business network literature. As discussed and summarized in the previous section, the 'extended' business network is different from the industrial network in several ways and membership has important competitive implications. Observations show that successful cooperation in this network type relies on the need to accommodate both economic and social goals. By studying such complex interactions, the study addresses recent calls that highlight the need to extend the boundaries of the business network as a means to explore new theoretical and empirical territories (see, for example, Ritvala et al., 2014; Thilenius et al., 2016). In addition to this, a recent criticism in the literature is that studies examining interaction between business and the public sphere are lagging behind practice (Salmi & Heikkilä, 2015; Welch & Wilkinson, 2004). The cooperation between actors observed in this study provides a practical perspective, by explaining how socio-political actors can be a source of competitive advantage. Examples include socio-political actors' contributions to ideas, helping companies to enhance social and political acceptance of their technologies, and advocating in favor of the benefits of the technology developed. Hence, socio-political actors are a source of competitive advantage

for companies. An interesting observation has also been made by Hadjikhani (2016) on companies' CSR activities as a strategy to address corporate citizenship. However, unlike his study where CSR is commonly linked to charity projects, this study shows firms using their core business activities to demonstrate corporate social issues. Such a perspective certainly needs further examination.

Second, in this study complexity is operationalized in two ways. One is related to actors' interactions, which relate to the number and relationships of different actors in the network. The other stems from resource heterogeneity, which originates from the need to combine and integrate different resources together. The complexity relies on the necessity to incorporate some of the resources of business and nonbusiness actors, which include economic and noneconomic, technological and non-technological. Through the thesis, I discuss the tensions that arise from complexity. Previous studies have devoted attention to examining cooperation and competition (Gnyawali & Park, 2011; Raza-Ullah, Bengtsson & Kock, 2014; Tidström & Hagberg-Andersson, 2012) as well as exploration and exploitation (Lutbatkin et al., 2006; March, 1991) within business networks. However, unlike this study, these previous studies do not take into consideration the interactions between companies and social-political actors in their analysis. While we know a great deal about various aspects of the influence of social-political actors on firms' business networks (e.g. Boddewyn, 1988; Ghauri et al., 2012; Hadjikhani & Ghauri, 2001; Ritvala & Salmi, 2011; Ritvala et al., 2014), we do not know much about how various aspects of these interactions affect companies' cooperative and competitive behavior as well as their decisions on resource allocation. Hence, this study has taken a step forward and stresses the needs for further conceptual work including such contradictory forces in companies' interactions with socio-political actors.

Third, from a methodological point of view, the study is rich since it includes more actors and discusses the dualities (cooperation-competition and exploration-exploitation) as well as showing the differences between the public and private spheres. From the perspective on method, as stated by Halinen & Törnroos (2005), business network studies are already complex and adding more actors creates more challenges for the analysis. Enlarging the boundaries and adding more actors, did indeed make the analysis more difficult. However, despite the difficulties faced, the study allowed me to provide a better idea of the different nature, dynamics, and outcomes of this type of interaction. Future studies may develop hypotheses based on these characteristics of 'extended' business networks which will help to advance business network research.

Finally, the findings show that firms' willingness to occupy a central position in the network, the time perspective affecting the business relationship, and the perceived differences in value impacting firms' decisions were the tools used to explain the complexity inherent in the 'extended' business

network. While providing an interesting perspective that complements our understanding of business and socio-political interaction, the framework adds value to both industrial marketing and business network studies. Thus, theoretical insights discussed in this study may provide a good basis to push business network research forward. By building on the thesis results, future research could examine these three factors in different industries.

Managerial Implication

This study argues that interactions between business and social-political actors are complex due to the fact that success of the relationship depends on finding a balance between economic and social needs. Therefore, managers need to identify the differences in values, expectations and economic logic as a means to facilitate cooperation. Understanding such differences will help managers to achieve both the firms' respective goals and expectations and the overall goals of the cooperation involving social and political actors.

Based on findings, this thesis also points managers to the importance of firms' cooperation with socio-political actors in projects for the development of smart city solutions. Despite the challenges faced by firms and illustrated in the thesis via the cases (see case 1, 2), many benefits were achieved through the cooperation. Thus, managers are required to cope with the complexity inherent in such type of relationships, primarily due the fact that interactions with nonbusiness actors represent a valuable intangible resource. Support from socio-political actors is essential to legitimize companies' technological know-how, increase their business legitimacy, provide them with users' knowledge related to a specific setting, and enhance companies' market positioning. As a result, the accomplishment of the cooperation goes above and beyond the benefits from simply generating immediate revenues. Consequently, knowing how to manage such relationships constitute a source of competitive advantages for firms.

Another important point to highlight is that, if from one side companies are advised to cultivate relationships with socio-political actors (Hadjikhani et al., 2008) which may increase the aspect of mutuality, on the other side managers should be aware of the boundaries of their engagement. Such aspects become even more relevant in turbulent markets where firms are exposed to greater political risk. Hence, managers need to find a balance between staying close to but simultaneously keeping a certain distance from socio-political actors.

Finally, as managers face the task of nurturing relationships with socio-political actors for the development of smart city projects, a key challenge, primarily for the central actor, is that management requires diplomacy. In other words, coordination require knowledge about how to bring business and nonbusiness actors together, how to identify and highlight interdepend-

encies, motivate and facilitate cooperation, while at the same time aligning interests and values and reducing conflicts in a constructive way. With respect to the influence of socio-political actors on firms' behavior, this study also suggests that managers must pay attention to the centrality issue since this may lead companies to be embedded in cooperative or competitive relationships with their counterparts. The existence of the opposing forces, as Luo et al., (2007) highlight, requires careful attention since the costs and challenges involved in managing such a relationship should not offset the benefits created by it. Managers' ability to cope with tensions and conflicts are crucial to create a win-win, rather than, win-lose situation. Maintaining a good relationship with business partners is important if cooperation might be necessary in future smart city projects.

To sum up, this study offers insights to managers regarding the complexities that arise from interactions involving business and nonbusiness actors. Overall, the thesis provides a framework for researchers to more systematically examine business and socio-political interaction and its implications. It also suggests managers with a set of important concepts and approaches they could use in their attempt to nurture relationships with nonbusiness actors.

Implication for Policymakers

Sustainable cities are becoming more and more a global concern. Interdependence between companies, government, and society as a whole will increase, and it is likely that more and more governments and NGOs will turn to companies for future cooperation since, as Powell, Koput and Smith-Doerr (1996) state, complex social problems cannot be answered by one single entity. While companies have made efforts to contribute to a more sustainable society, they are limited by the technical and human systems they embody. An important point is that, while companies need to learn what societal needs are in order to address corporate citizenship, governments also need to know more about companies to better engage with them in building sustainable cities.

Limitation and Future Research Direction

This thesis has some limitations that also offer opportunities for future research. First, it is based on two case studies within the same industry and limited to the same country, Brazil. Hence, the phenomenon should be investigated through large scale empirical studies. Through multiple context and case studies, it will be possible to carry out further analysis and then improve our understanding of such complex networks of partners. Second, this study has highlighted the fact that centrality, time, and perceived value were the

main factors explaining companies' behavior. Other factors exist that were not analyzed in this study; for example, cultural aspects, primarily because some of the companies involved in the projects have headquarters located in another country and because corporate strategy may affect the subsidiary and therefore the way the company interacts in the local context. Third, by focusing on complexity, two common constructs to evaluate firms' behavior were applied: cooperation-competition (Håkansson & Ford, 2009; Medlin, 2006; Bengtsson & Kock, 2014; Gnyawali & Park, 2011) and exploration-exploitation (Araujo & Easton, 2005; Medlin & Törnroos, 2015). Although such tensions emerged empirically from the data, it might be the case that other sources of tensions exist. Thus, future researchers could use other types of tension, such as the actors' sense of belonging to or identity in a network of partners and their need for differentiation. Another example could be the challenges in accommodating individual and collective goals.

One more point is that in this study the 'extended' business network is assumed to be complex. However, it was not possible to quantify how complex the 'extended' business network is. Hence, future research could develop measurements to quantify the degree of complexity of traditional networks in comparison to the 'extended' one. Fourth, this study applies solely a complexity lens but future research could focus on the connection between knowledge and complexity. Complexity is likely to be associated with or lack of knowledge; greater understanding about how to deal with social and political actors probably is related to a lower degree of complexity. This is also related to aspects of centrality, since the central actor will have a higher probability of developing such knowledge. Therefore, a link between complexity, knowledge, and centrality may be a particularly rich field for future research.

Furthermore, ICT and its related IoT developments open new opportunities to connect activities, resources, and actors in business networks. ICT players, for instance, are becoming newcomers in several industries due to the digital transformation of products and services, and this will allow cross-industry partnerships. For example, traditional city services such as transit and transport, security or public street lighting which are recognized as low-tech are now moving to integrate high-tech solutions. So a natural question arises about whether centrality will matter across industries. Are there fundamental differences between low-tech and high-tech industries that can be further investigated with a complexity lens? Which actors will play a central role in bridging different industries and sectors? Will the overall competitive behavior of companies increase or decrease as cooperation across sectors or industries increases? I hope that future studies will address these questions. Last, but certainly not least, future research could also examine business managers' abilities to identify, develop, and manage cooperation with socio-political actors concerning the above mentioned areas.

References

- Abrahamsen, M. H., Henneberg, S. C., & Naudé, P. (2012). Using actors' perceptions of network roles and positions to understand network dynamics. *Industrial Marketing Management*, 41(2), 259-269.
- Ahlstrom, D., & Bruton, G. D. (2006). Venture capital in emerging economies: Networks and institutional change. *Entrepreneurship theory and practice*, 30(2), 299-320.
- Anderson, P. (1999). Complexity theory and organization science. *Organization Science*, 10(3), 216-232.
- Anderson, H., Havila, V., Andersen, P., & Halinen, A. (1998). Position and role-conceptualizing dynamics in business networks. *Scandinavian Journal of Management*, 14(3), 167-186.
- Anderson, J. C., Håkansson, H., & Johanson, J. (1994). Dyadic business relationships within a business network context. *The Journal of Marketing*, 1-15.
- Andersson, U., Holm, D. B., and Johanson, M. (2007). Moving or doing? Knowledge flow, problem solving, and change in industrial networks. *Journal of Business Research*, 60(1), 32-40.
- Andersson, P., and Mattsson, L. G. (2015). Service innovations enabled by the 'internet of things'. *IMP Journal*, 9(1), 85-106.
- Andriopoulos, C., & Lewis, M. W. (2009). Exploitation-exploration tensions and organizational ambidexterity: Managing paradoxes of innovation. *Organization Science*, 20(4), 696-717.
- Atzori, L., Iera, A., & Morabito, G. (2010). The internet of things: A survey. *Computer networks*, 54(15), 2787-2805.
- Baccarani, D. (1996), 'The concept of project complexity: a review', *International Journal of Project Management*, 14(4), 201-4.
- Baraldi, E., & Bocconcelli, R. (2001). The quantitative journey in a qualitative landscape: developing a data collection model and a quantitative methodology in business network studies. *Management Decision*, 39(7), 564-577.
- Baraldi, E., and Nadin, G. (2006). The challenges in digitalising business relationships. The construction of an IT infrastructure for a textile-related business network. *Technovation*, 26(10), 1111-1126.
- Baraldi, E., Brennan, R., Harrison, D., Tunisini, A., & Zolkiewski, J. (2007). Strategic thinking and the IMP approach: A comparative analysis. *Industrial Marketing Management*, 36(7), 879-894.
- Bengtsson, M., & Kock, S. (2000). "Coopetition" in business Networks—to cooperate and compete simultaneously. *Industrial marketing management*, 29(5), 411-426.
- Bengtson, A., Pahlberg, C., & Pourmand, F. (2009). Small firms' interaction with political organizations in the European Union. *Industrial Marketing Management*, 38(6), 687-697.

- Bengtson, A. Havila, V., Åberg. S. Beyond project closure: Why some relationships recur in subsequent projects, *Project Management Journal*, 49 (2) (2018), pp. 1-16
- Bhanji, Z., & Oxley, J. E. (2013). Overcoming the dual liability of foreignness and privateness in international corporate citizenship partnerships. *Journal of International Business Studies*, 44(4), 290-311.
- Boddewyn, J. J. (1988). *Advertising self-regulation and outside participation: a multinational comparison*. New York [NY]: Quorum Books.
- Boddewyn, J., & Doh, J. (2011). Global strategy and the collaboration of MNEs, NGOs, and governments for the provisioning of collective goods in emerging markets. *Global Strategy Journal*, 1(3-4), 345-361.
- Bradford, K. D., Stringfellow, A., & Weitz, B. A. (2004). Managing conflict to improve the effectiveness of retail networks. *Journal of Retailing*, 80(3), 181-195.
- Brandenburger, A. M. & Nalebuff, B. J. 1996, *Co-opetition*. New York: Doubleday.
- Burrell, G., & Morgan, G. (1985). *Sociological paradigms and organizational analysis: Elements of the sociology of corporate life*. Routledge.
- Burt, R. S. (2004). Structural holes and good ideas. *American journal of sociology*, 110(2), 349-399.
- Cantù, C., Corsaro, D., & Snehota, I. (2012). Roles of actors in combining resources into complex solutions. *Journal of Business Research*, 65(2), 139-150.
- Caragliu, A., Del Bo, C., & Nijkamp, P. (2011). Smart cities in Europe. *Journal of urban technology*, 18(2), 65-82.
- Choi, S. J., Jia, N., & Lu, J. (2014). The structure of political institutions and effectiveness of corporate political lobbying. *Organization Science*, 26(1), 158-179.
- Corsaro, D., Cantù, C., & Tunisini, A. (2012). Actors' heterogeneity in innovation networks. *Industrial Marketing Management*, 41(5), 780-789.
- Cova, B., & Salle, R. (2007). Introduction to the IMM special issue on 'Project marketing and the marketing of solutions' - A comprehensive approach to project marketing and the marketing of solutions. *Industrial Marketing Management*, 36(2), 138-146.
- Coviello, N. E., & Joseph, R. M. (2012). Creating major innovations with customers: Insights from small and young technology firms. *Journal of Marketing*, 76(6), 87-104.
- Dalsace, F. (2004). Beyond the transaction: A Supplier Choice Model Within Long-term Buyer-seller Relationships. In *EMAC Conference*.
- Davies, A. (2004). Moving base into high-value integrated solutions: a value stream approach. *Industrial and Corporate Change*, 13(5), 727-756.
- Denekamp J. (1995). Intangible assets, internationalization and foreign direct investment in manufacturing. *Journal of International Business Studies*, 26(3), 493-504.
- Diener, E., & Crandall, R. (1978). *Ethics in social and behavioral research*. U Chicago Press.
- Dollinger, M. J. and Golden, P. A. (1992). Interorganizational and collective strategies in small firms: Environmental effects and performance. *Journal of Management*, 18(4), 695-715.
- Dubois, A., & Gadde, L. E. (1999). Case Studies in Business Market Research-An abductive approach. In *In McLoughlin, D. and Horan, C.(eds) Proceedings of the 15th Annual IMP Conference*, University College Dublin, September.
- Dubois, A., & Gadde, L. E. (2002). Systematic combining: an abductive approach to case research. *Journal of business research*, 55(7), 553-560.
- Dubois, A., & Gadde, L. E. (2014). 'Systematic combining'—A decade later. *Journal of Business Research*, 67(6), 1277-1284.

- Dyer, J. H., Singh, H. and Kale, P. (2008), 'Splitting the Pie: Rent Distribution in Alliances and Networks, Managerial and Decision Economics', *Frontiers of Strategic Management Research*, 29(2), 137-148.
- Easton, G., & Araujo, L. (1992). Non-economic exchange in industrial networks. *Industrial networks: A new view of reality*, 62-84.
- Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of management review*, 14(4), 532-550.
- Eriksson, P. E. 2008, 'Achieving Suitable Coopetition in Buyer-Supplier Relationships: The case of AstraZeneca', *Journal of Business-to-Business Marketing*, 15(4), 425-454.
- Fjeldstad, Ø. D., Snow, C. C., Miles, R. E., & Lettl, C. (2012). The architecture of collaboration. *Strategic Management Journal*, 33(6), 734-750.
- Ford, D. (1990). *Understanding business markets: Interaction, relationships and networks*. Academic Press.
- Ford, D., & Thomas, R. (1997). Technology strategy in networks. *International Journal of Technology Management*, 14(6-8), 596-612.
- Ford, D., Gadde, L. E., Hakansson, H., & Snehota, I. (2003). Managing business networks.
- Ford, D., & Håkansson, H. (2013). Competition in business networks. *Industrial Marketing Management*, 42(7), 1017-1024.
- Fredriksson, P., & Gadde, L. E. (2005). Flexibility and rigidity in customization and build-to-order production. *Industrial Marketing Management*, 34(7), 695-705.
- Freytag, P., & Young, L. (2014). Introduction to special issue on innovation and networks: Innovation of, within, through and by networks. *Industrial Marketing Management*, 43(3), 361-364.
- Friedlander, F., & Pickle, H. (1968). Components of effectiveness in small organizations. *Administrative science quarterly*, 289-304.
- Gadde, L. -E., Huemer, L., & Håkansson, H. (2003). Strategizing in industrial networks. *Industrial Marketing Management*, 32(5), 357-364.
- Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2013). Seeking qualitative rigor in inductive research: Notes on the Gioia methodology. *Organizational research methods*, 16(1), 15-31.
- Gibbert, M., Ruigrok, W., & Wicki, B. (2008). What passes as a rigorous case study? *Strategic management journal*, 29(13), 1465-1474.
- Ghauri, P. (2004). Designing and conducting case studies in international business research. In: Ghauri PN, Buckley PJ. Globalization and end of competition: a critical review of rent-seeking multinationals. In: Buckley PJ, editors. The challenge of international business. Basingstoke: Palgrave, 2004; pp. 83-100
- Ghauri, P., Hadjikhani, A., & Elg, U. (2012). The three pillars: Business, state and society: MNCs in emerging markets. In *Business, Society and Politics* (pp. 3-16). Emerald Group Publishing Limited.
- Gnyawali, D. R., & Park, B. J. R. (2009). Co-opetition and technological innovation in small and medium-sized enterprises: A multilevel conceptual model. *Journal of small business management*, 47(3), 308-330.
- Gnyawali, D. R., & Park, B. J. R. (2011). Co-opetition between giants: Collaboration with competitors for technological innovation. *Research Policy*, 40(5), 650-663.
- Gummesson, E., & Mele, C. (2010). Marketing as value co-creation through network interaction and resource integration. *Journal of Business Market Management*, 4(4), 181-198.

- Gupta, A. K., Smith, K. G., & Shalley, C. E. (2006). The interplay between exploration and exploitation. *Academy of management journal*, 49(4), 693-706.
- Hadjikhani, A. (1996). Project marketing and the management of discontinuity. *International Business Review*, 5(3), 319-336.
- Hadjikhani, A., and Ghauri, P. N. (2001). The behaviour of international firms in socio-political environments in the European Union. *Journal of Business Research*, 52(3), 263-275.
- Hadjikhani, A., & Johanson, J. (1996). Facing foreign market turbulence: Three Swedish multinationals in Iran. *Journal of International Marketing*, 53-74.
- Hadjikhani, A., Lee, J. W., and Ghauri, P. N. (2008). Network view of MNCs' socio-political behavior. *Journal of Business Research*, 61(9), 912-924.
- Hadjikhani, A., Lee, J. W., & Park, S. (2016). Corporate social responsibility as a marketing strategy in foreign markets: the case of Korean MNCs in the Chinese electronics market. *International Marketing Review*, 33(4), 530-554.
- Hadjikhani A, Thilenius P. (2005), 'The impact of horizontal and vertical connections on relationships' commitment and trust', *Journal Business and Industrial Marketing*, 20(3), 136-47.
- Hadjikhani, A., & Thilenius, P. (2009). Industrial relationships and the effects of different types of connections. *Industrial Marketing Management*, 38(6), 679-686.
- Hadjikhani, A., & Thilenius, P. (2016). 'Tic-Toc-Tic-Toc': Thoughts on the Tempo of Business Network Extension. In *Extending the Business Network Approach* (pp. 359-375). Palgrave Macmillan, London.
- Halinen, A., & Törnroos, J. Å. (2005). Using case methods in the study of contemporary business networks. *Journal of Business Research*, 58(9), 1285-1297.
- Halinen, A., & Törnroos, J. Å. (1998). The role of embeddedness in the evolution of business networks. *Scandinavian journal of management*, 14(3), 187-205.
- Halinen, A., & Tähtinen, J. (2002). A process theory of relationship ending. *International Journal of service industry management*, 13(2), 163-180.
- Håkansson, H. (1982). Industrial marketing and purchasing of industrial goods: an interaction approach. *New York*.
- Håkansson, H., Ford, D., Gadde, L-E., Snehota, I. & Waluszewski, A. (2009). *Business in Networks*. Chichester: John Wiley & Sons Ltd.
- Håkansson, H., & Ford, D. (2002). How should companies interact in business networks? *Journal of business research*, 55(2), 133-139.
- Håkansson, H., & Snehota, I. (2006). No business is an island: The network concept of business strategy. *Scandinavian Journal of Management*, 22(3), 256-270.
- Håkansson, H., and Snehota, I. (1995), *Developing relationships in business networks*. London: Thomson International.
- Håkansson, H., & Snehota, I. (1989). No business is an island: the network concept of business strategy. *Scandinavian journal of management*, 5(3), 187-200.
- Håkansson, H., & Waluszewski, A. (2002). Path dependence: restricting or facilitating technical development?. *Journal of Business Research*, 55(7), 561-570.
- Håkansson, H., & Waluszewski, A. (Eds.). (2007). *Knowledge and innovation in business and industry: The importance of using others*. Routledge.
- Håkansson, H., & Johanson, J. (2001). *Business network learning*. Amsterdam, London, Oxford: Elsevier Science Ltd., Pergamon.
- Im, G., & Rai, A. (2008). Knowledge sharing ambidexterity in long-term intraorganizational relationships. *Management Science*, 54(7), 1281-1296.
- Ingemansson, M., & Waluszewski, A. (2009). Success in science and burden in business. On the difficult relationship between science as a developing setting and business as a producer-user setting. *The IMP Journal*, 3(2), 20-56.

- Jansson, H., Saqib, M., & Sharma, D. D. (1995). The state and transnational corporations. *Books*.
- Jansson, H., Johanson, M., & Ramström, J. (2007). Institutions and business networks: A comparative analysis of the Chinese, Russian, and West European markets. *Industrial Marketing Management*, 36(7), 955-967.
- Jarzabkowski, P., Bednarek, R., & Lê, J. K. (2014). Producing persuasive findings: Demystifying ethnographic textwork in strategy and organization research. *Strategic Organization*, 12(4), 274-287.
- Kauffman, S. A. (1993). *The Origins of Order* Oxford University Press. *New York*.
- Kazadi, K., Lievens, A., & Mahr, D. (2016). Stakeholder co-creation during the innovation process: Identifying capabilities for knowledge creation among multiple stakeholders. *Journal of Business Research*, 69(2), 525-540.
- Kedia, B. L., & Mooty, S. E. (2013). Learning and Innovation in Collaborative Innovation Networks. *Restoring America's Global Competitiveness through Innovation*, 3-27.
- Kemp, R. G. M., & Ghauri, P. N. (1999). *Cooperation and conflict in international joint venture relationship*. University of Groningen.
- Lacoste, S. (2012). 'Vertical coepetition': The key account perspective. *Industrial Marketing Management*, 41(4), 649-658.
- Langley, A. (1999). Strategies for theorizing from process data. *Academy of Management Review*, 24(4), 691 – 710.
- Le Ber, M. J., & Branzei, O. (2010). Value frame fusion in cross sector interactions. *Journal of Business Ethics*, 94, 163-195.
- Leite, E. R., & Bengtson, A. (2015). Cross-sector collaboration between business and non-business actors: The case of an ICT-project in Brazil. *Modern techniques for successful IT project management*, 265-284.
- Leite, E., & Latifi, M. (2016). The Role of NGOs in Business Networks: Partnership in Innovation. In *Extending the Business Network Approach* (pp. 83-97). Palgrave Macmillan, London.
- Levinthal, D. A., & March, J. G. (1993). The myopia of learning. *Strategic management journal*, 14(S2), 95-112.
- Li, J. J., Poppo, L., & Zhou, K. Z. (2008). Do managerial ties in China always produce value? Competition, uncertainty, and domestic vs. foreign firms. *Strategic Management Journal*, 29(4), 383-400.
- Ljung, A. (2014). *The Multinational Company and Society: A Study of Business Network Relationships in Latin America*. Doctoral Thesis, Uppsala: Department of Business Studies.
- Lubatkin, M. H., Simsek, Z., Ling, Y., & Veiga, J. F. (2006). Ambidexterity and performance in small-to medium-sized firms: The pivotal role of top management team behavioral integration. *Journal of management*, 32(5), 646-672.
- Lundberg, H., & Andresen, E. (2012). Cooperation among companies, universities and local government in a Swedish context. *Industrial Marketing Management*, 41(3), 429-437.
- Luo, Y. (2004). *Coopetition in international business*. Copenhagen Business School Press DK.
- Luo, X., Rindfleisch, A. and D.K. Tse. (2007), 'Working with rivals: the impact of competitor alliances in financial performance', *Journal of Marketing Research*, 44(1), 73–83
- Mahoney, J. T., McGahan, A. M., and Pitelis. C. (2009). Perspective-the interdependence of private and public interests. *Organization Science*, 20,6, 1034-1052.

- March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization science*, 2(1), 71-87.
- Marquina, P., & Morales, C. E. (2012). The influence of CSR on purchasing behaviour in Peru and Spain. *International Marketing Review*, 29(3), 299-312.
- Mahoney, J. T., McGahan, A. M. & Pitelis. C. (2009). Perspective-the interdependence of private and public interests. *Organization Science*, 20, 6, 1034-1052.
- McCann, J. E., & Selsky, J. (1984). Hyperturbulence and the emergence of type 5 environments. *Academy of Management Review*, 9(3), 460-470.
- Medlin, C. J. (2006). Self and collective interest in business relationships. *Journal of Business Research*, 59(7), 858-865.
- Medlin, C. J., & Törnroos, J. Å. (2015). Exploring and exploiting network relationships to commercialize technology: A biofuel case. *Industrial Marketing Management*, 49, 42-52.
- Medlin, C. J., & Ellegaard, C. (2015). Conceptualizing competition and rivalry in a networking business market. *Industrial Marketing Management*, 51, 131-140.
- Mele, C., Russo Spina, T., & Colurcio, M. (2010). Co-creating value innovation through resource integration. *International Journal of Quality and Service Sciences*, 2(1), 60-78.
- Meyer, K. E. (2001). Institutions, transaction costs, and entry mode choice in Eastern Europe. *Journal of international business studies*, 32(2), 357-367.
- Morgan, R. M., & Hunt, S. D. (1994). The commitment-trust theory of relationship marketing. *The journal of marketing*, 20-38.
- Moore, K. (1998). Trust and relationship commitment in logistics alliances: a buyer perspective. *Journal of Supply Chain Management*, 34(4), 24-37.
- Möller, K. K., & Wilson, D. T. (Eds.). (1995). *Business marketing: An interaction and network perspective*. Springer Science & Business Media.
- Möller, K. K., & Halinen, A. (1999). Business relationships and networks: Managerial challenge of network era. *Industrial marketing management*, 28(5), 413-427.
- Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization Science*, 5 (1), 14-37.
- Oliva, R., & Kallenberg, R. (2003). Managing the transition from products to services. *International journal of service industry management*, 14(2), 160-172.
- Padula, G. & Dagnino, G. B. 2007, 'Untangling the Rise of Coopetition', *International Studies of Management and Organization*, vol. 37, no.2, pp. 32-52.
- Park, B. J., Srivastava, M. K., & Gnyawali, D. R. (2014). Impact of coopetition in the alliance portfolio and coopetition experience on firm innovation. *Technology Analysis & Strategic Management*, 26(8), 893-907.
- Peng, M. W. (2000). *Business strategies in transition economies*. Sage.
- Pellikka, J., & Virtanen, M. (2009). Problems of commercialisation in Small Technology-based Firms. *International Journal of Entrepreneurship and Innovation Management*, 9(3), 267-284.
- Pittaway, L., Robertson, M., Munir, K., Denyer, D., & Neely, A. (2004). Networking and innovation: a systematic review of the evidence. *International journal of management reviews*, 5(3-4), 137-168.
- Polanyi, M. (1958), *Personal Knowledge*, Chicago, IL: The University of Chicago Press.
- Polonsky, M., & Jevons, C. (2009). Global branding and strategic CSR: an overview of three types of complexity. *International Marketing Review*, 26(3), 327-347.
- Powell, W. (2003). Neither market nor hierarchy. *The sociology of organizations: classic, contemporary, and critical readings*, 315, 104-117.

- Powell, Walter W. (1990). Neither market nor hierarchy: networks forms of organization.
- Powell, W. W., Koput, K. W., and Smith-Doerr, L. (1996), 'Inter-organizational collaboration and the locus of innovation: Networks of learning in biotechnology', *Administrative Science Quarterly*, 41, 116-145.
- Raza-Ullah, T., Bengtsson, M., & Kock, S. (2014). The coopetition paradox and tension in coopetition at multiple levels. *Industrial Marketing Management*, 43(2), 189-198.
- Raisch, S., Birkinshaw, J., Probst, G., & Tushman, M. L. (2009). Organizational ambidexterity: Balancing exploitation and exploration for sustained performance. *Organization science*, 20(4), 685-695.
- Ritvala, T., & Salmi, A. (2011). Network mobilizers and target firms: The case of saving the Baltic Sea. *Industrial Marketing Management*, 40(6), 887-898.
- Ritvala, T., Salmi, A., & Andersson, P. (2014). MNCs and local cross-sector partnerships: The case of a smarter Baltic Sea. *International Business Review*, 23(5), 942-951.
- Ring, P. S., Lenway, S. A., & Govindarajan, M. (1990). Management of the political imperative in international business. *Strategic Management Journal*, 11(2), 141-151.
- Ritter, T., Wilkinson, I. F., & Johnston, W. J. (2004). Managing in complex business networks. *Industrial marketing management*, 33(3), 175-183.
- Salmi, A., & Heikkilä, K. (2015). Managing relationships with public officials—A case of foreign MNCs in Russia. *Industrial Marketing Management*, 49, 22-31.
- Schaltegger, S., Lüdeke-Freund, F., & Hansen, E. G. (2012). Business cases for sustainability: the role of business model innovation for corporate sustainability. *International Journal of Innovation and Sustainable Development*, 6(2), 95-119.
- Schaltegger, S., Hansen, E. G., & Lüdeke-Freund, F. (2016). Business models for sustainability: Origins, present research, and future avenues.
- Sheth, J. N. (2011). Impact of emerging markets on marketing: Rethinking existing perspectives and practices. *Journal of Marketing*, 75(4), 166-182.
- Simon, H. A. (1996). *The sciences of the artificial*, MIT press.
- Skaates, M. A., & Tikkanen, H. (2003). International project marketing: an introduction to the INPM approach. *International Journal of Project Management*, 21(7), 503-510.
- Thilenius, P., Pahlberg, C., & Havila, V. (Eds.). (2016). *Extending the Business Network Approach: New Territories, New Technologies, New Terms*. Springer.
- Thorelli, H. B. (1986). Networks: between markets and hierarchies. *Strategic Management Journal*, 7(1), 37-51.
- Thompson, J. D. (1967). *Organizations in action: Social science bases of administrative theory*. Transaction publishers.
- Tidström, A. (2014). Managing tensions in coopetition. *Industrial Marketing Management*, 43(2), 261-271.
- Tidström, A., & Åhman, S. (2006). The process of ending inter-organizational cooperation. *Journal of Business & Industrial Marketing*, 21(5), 281-290.
- Tidström, A., & Hagberg-Andersson, Å. (2012). Critical events in time and space when cooperation turns into competition in business relationships. *Industrial Marketing Management*, 41(2), 333-343.
- Toh, P. K., & Polidoro, F. (2013). A competition-based explanation of collaborative invention within the firm. *Strategic Management Journal*, 34(10), 1186-1208.

- Trethewey, G. E. A., & Ashcraft, K. L. (2004). Special issue introduction: Practicing disorganization: The development of applied perspectives on living with tension. *Journal of Applied Communication Research*, 32(2), 81-88.
- Tähtinen, J., & Havila, V. (2004). Enhancing research in exchange relationship dissolution.
- Vasconcelos, F. C., and Ramirez, R. (2011). Complexity in business environments. *Journal of Business Research*, 64(3), 236-241.
- Van de Ven, A. H. (2007). *Engaged scholarship: A guide for organizational and social research*. Oxford University Press on Demand.
- Waluszewski, A. (2011). Rethinking innovation policy. *The IMP Journal*, 5(3), 140-156.
- Welch, C., & Wilkinson, I. (2004). The political embeddedness of international business networks. *International marketing review*, 21(2), 216-231.
- Wilkinson, I., & Young, L. (2002). Marketing theory in the next millennium: Looking backwards and forwards. *Journal of Business Research*, 55(2), 81-85.
- World Bank (2016), Digital Dividends, Available at: <http://documents.worldbank.org/curated/en/896971468194972881/pdf/102725-PUB-Replacement-PUBLIC.pdf>
- World Bank (2017), Global Outlook – A fragile recovery, Available at: <http://pubdocs.worldbank.org/en/216941493655495719/Global-Economic-Prospects-June-2017-Global-Outlook.pdf>
- Wu, J. 2014, 'Cooperation with competitors and product innovation: Moderating effects of technology capability and alliances with universities', *Industrial Marketing Management*, 43(2), 199-209.
- Yin, R.K., (1998). The abridged version of case study research: Design and method.
- Yin, R. K. (2011). *Applications of case study research*. Sage.
- Zanella, A., Bui, N., Castellani, A., Vangelista, L. & Zorzi, M., (2014). Internet of things for smart cities. *Internet of Things Journal*, IEEE, 1(1), 22-32.
- Zott, C., Amit, R., & Massa, L. (2011). The business model: recent developments and future research. *Journal of management*, 37(4), 1019-1042.



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DISSERTATIONS FROM THE SWEDISH RESEARCH SCHOOL OF MANAGEMENT AND INFORMATION TECHNOLOGY

Doctoral theses (2003-)

1. **Baraldi, Enrico (2003)**, *When Information Technology Faces Resource Interaction: Using IT Tools to Handle Products at IKEA and Edsbyn*. Department of Business Studies, Uppsala University, Doctoral Thesis No. 105.
2. **Wang, Zhiping (2004)**, *Capacity-Constrained Production-Inventory Systems: Modelling and Analysis in both a Traditional and an E-Business Context*. IDA-EIS, Linköpings universitet och Tekniska Högskolan i Linköping, Dissertation No. 889
3. **Ekman, Peter (2006)**, *Enterprise Systems & Business Relationships: The Utilization of IT in the Business with Customers and Suppliers*. School of Business, Mälardalen University, Doctoral Dissertation No 29.
4. **Lindh, Cecilia (2006)**, *Business Relationships and Integration of Information Technology*. School of Business, Mälardalen University, Doctoral Dissertation No 28.
5. **Frimanson, Lars (2006)**, *Management Accounting and Business Relationships from a Supplier Perspective*. Department of Business Studies, Uppsala University, Doctoral Thesis No. 119.
6. **Johansson, Niklas (2007)**, *Self-Service Recovery*. Information Systems, Faculty of Economic Sciences, Communication and IT, Karlstad University, Dissertation KUS 2006:68.
7. **Sonesson, Olle (2007)**, *Tjänsteutveckling med personal medverkan: En studie av banktjänster*. Företagsekonomi, Fakulteten för ekonomi, kommunikation och IT, Karlstads universitet, Doktorsavhandling, Karlstad University Studies 2007:9.

8. **Maaninen-Olsson, Eva (2007)**, *Projekt i tid och rum: Kunskapsintegrering mellan projektet och dess historiska och organisatoriska kontext*. Företagsekonomiska institutionen, Uppsala universitet, Doctoral Thesis No. 126.
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18. **Fridriksson, Helgi-Valur (2008)**, *Learning processes in an inter-organizational context: A study of krAft project*. Jönköping International Business School, Jönköping University, JIBS Dissertation Series No. 046.
19. **Selander, Lisen (2008)**, *Call Me Call Me for some Overtime: On Organizational Consequences of System Changes*. Institute of Economic Research, Lund Studies in Economics and Management No. 99.
20. **Henningsson, Stefan (2008)**, *Managing Information Systems Integration in Corporate Mergers & Acquisitions*. Institute of Economic Research, Lund Studies in Economics and Management No. 101.
21. **Ahlström, Petter (2008)**, *Strategier och styrsystem för seniorboende-marknaden*. IEI-EIS, Linköping universitetet och Tekniska Högskolan i Linköping, Doktorsavhandling, Nr. 1188.
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