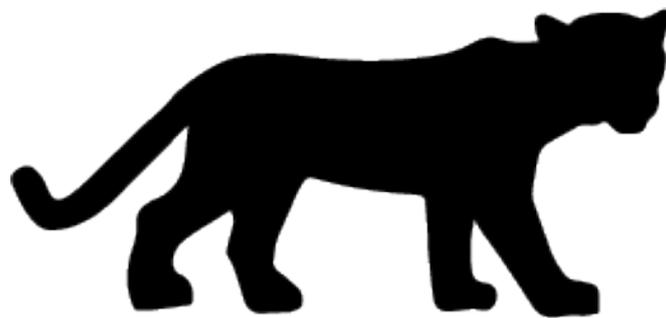


**Regional Innovation Policies:
The Role of the Institutional Contexts and
Institutional Entrepreneurs**

Arnault Morisson de La Bassetière



Doctoral Dissertation

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Regional Innovation Policies:
The Role of the Institutional Contexts and Institutional
Entrepreneurs

**Regionaal innovatiebeleid:
de rol van de institutionele context en
institutionele ondernemers**

(met een samenvatting in het Nederlands)

Proefschrift

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Chapter 1

Introduction

1.1. Relevance of the Topic

Policymakers often put regional innovation policies at the top of their agendas, as they view innovation as a panacea that “provides the foundation for new businesses, new jobs, and productivity growth and is thus, an important driver of economic growth and development” (OECD, 2015b, p. 13). In the European Union (EU), for instance, the future programming period of the EU Cohesion Policy 2021-27 dedicates the bulk of its budget to promoting a Smarter Europe through the confirmation of the Smart Specialization Strategy (European Commission, 2018). The Smart Specialization Strategy is a policy concept to support regional prioritization in innovative sectors, fields, or technologies through the entrepreneurial discovery process, a bottom-up approach to reveal what a region does best in terms of its scientific and technological endowments (Foray, David, & Hall, 2009).

In the academic literature, there are different rationales for policy interventions. Regional innovation policies are increasingly subject to “policy-mix” recommendations to reduce market failures, system failures, and/or evolutionary failures (Flanagan, Uyarra, & Laranja, 2011). For neoclassical economists, government interventions distort markets, and, as a result, decrease social surplus and impose a deadweight loss upon society (Bator, 1958). Neoclassical economists acknowledge, however, that governments should intervene if—and only if—there is a market failure (that is, in a situation in which the free market is not producing an efficient level of allocation). Regional policymakers are, instead, increasingly designing regional innovation policies to reduce system and evolutionary failures due to the limitations of the neoclassical approach to provide targeted regional innovation policy recommendations, especially in the context of peripheral regions (see OECD, 2011a). The regional innovation system (RIS) approach emphasizes that regional governments can intervene to promote collective learning and to limit the dysfunctional interactions that lead to “system failures,” as interactions between many different actors that cooperate, collaborate, and learn with each other, are central to the process of innovation (Laranja, Uyarra, & Flanagan, 2008; Smith, 2000). For some authors, system failures, rather than market failures, should be the starting point for policy intervention (Metcalf, 2005). In evolutionary economic geography (EEG), regional innovation policies need to stir evolutionary mechanisms to promote variations and avoid lock-ins (Lambooy & Boschma, 2001).

Regional innovation policies have often tended to be shaped by “best practice models,” such as “growing the next Silicon Valley,” derived from well performing regions, which are then, applied indiscriminately to regions around the globe (Sturgeon, 2000). The EEG and RIS approaches emphasize, however, that regional innovation policies must be tailored to their regional contexts to be successful (Lambooy & Boschma, 2001; Tödting & Trippel, 2005). The literature in EEG and RIS have made significant advances in supplying theoretical and conceptual frameworks to recommend tailored place-based and place-sensitive policies to respond to specific regional contexts. The RIS concept emphasizes that there is no “one-size-fits-all” regional innovation policy, as regions have different institutional contexts, prior

innovation capabilities, and knowledge and industrial base (Tödtling & Trippl, 2005). The EEG approach has made significant advances in providing evidence-based methods to guide policymakers in selecting and promoting new industrial path development (Asheim, Boschma, & Cooke, 2011; Balland et al., 2018).

1.2. Gaps in the Academic Literature

This PhD thesis comprises four different chapters that aim to address four different gaps in the academic literature. The first gap that this PhD thesis will address is to investigate the design and implementation of regional innovation policies in different regional institutional contexts, and the exploration of to what extent, they are similar and different in order to draw some relevant policy implications. Many regional innovation scholars still tend to look at the institutional contexts in which policies are designed and implemented as black boxes (see Uyarra, 2010). The often-prescribed policy recommendation is to design place-based innovation policies to respond to regional innovation specificities (Barca, 2009; Barca, McCann, & Rodríguez-Pose, 2012). Regions, however, differ in their capacities to design and implement place-based policies due to differences in the quality of their governments (Charron, Dijkstra, & Lapuente, 2014), their capacities to absorb funds (Oughton, Landabaso, & Morgan, 2002), and their institutional capabilities (Farole, Rodríguez-Pose, & Storper, 2011). Peripheral regions especially are facing many difficulties in designing and implementing context-specific place-based policies, such as with the smart specialization strategy (Foray, 2018; Marques & Morgan, 2018).

The second gap that this PhD thesis will address is to explore an ambitious policy strategy implemented in a peripheral region to foster extra-regional knowledge linkages. The literature on path development emphasizes the importance of extra-regional knowledge (Trippl, Grillitsch, & Isaksen, 2017) and absorptive capacity (Grillitsch & Nilsson, 2015), which are important policy issues for peripheral regions, to foster new industrial path development. Extra-regional linkages and the capacity to translate extra-regional knowledge through knowledge gatekeepers are seen as fundamental in successful innovation systems and must be investigated from a policy perspective in peripheral regions (see Bathelt, Malmberg, & Maskell, 2004; Giuliani, 2005; Morrison, 2008).

The third gap that this PhD thesis will address is how institutional entrepreneurs have aimed to accelerate institutional changes during regional structural change through specific actors within their RIS. The concepts of place leadership and institutional entrepreneurship have been introduced as an important research agenda to investigate the processes leading to institutional changes and new industrial path development (Grillitsch & Sotarauta, 2018; Sotarauta & Pulkkinen, 2011). Institutional changes are especially important during regional structural change, due to the instabilities and inefficiencies that it can generate on the RIS (Perez, 2004, 2010). Accordingly, the RIS and EEG literature have begun to incorporate insights from different streams of literature, such as transition studies, political economy, and sociological perspectives (see Boschma, Coenen, Frenken, & Truffer, 2017; Mackinnon, Dawley, Pike, & Cumbers, 2019).

The fourth gap that this PhD thesis will aim to address is how to combine innovation policies with social policies to recommend more inclusive innovation policies at the urban level. The EEG and RIS approaches investigate the causes of an improved regional innovation capacity, which is seen as an end in itself, neglecting the consequences of improved innovation

capacities at the social level. Knowledge-based regional development creates new social challenges for policymakers that cannot be discussed as separate issues in the academic literature. Indeed, metropolitan-regions that are becoming more innovative are also facing new challenges, such as gentrification, inequalities, and income polarization (Autor, Levy, & Murnane, 2003; Florida, 2017).

1.3. Outline and Research Questions

This PhD thesis is policy-oriented and has as its main objective to provide policy recommendations to better design and implement regional innovation policies. The four main chapters supply empirical evidence through disentangling the institutional contexts in which policies are designed and implemented. The researcher empirically investigates through a qualitative approach, namely the case-study method using multiple sources of evidence, to answer each research question in order to address specific gaps in the academic literature. For this PhD thesis, the primary data mostly consisted of a total 110 semi-structured expert interviews with key stakeholders, of which 31 in Chapter 2, 51 in Chapter 3, 76 in Chapter 4, and 17 in Chapter 5, and non-participant observations, which are situations in which the researchers were outsiders of the groups under study while taking notes of the situations, in each institutional context. The secondary data consisted of desk research and audio-visual materials.

The four main chapters investigate the institutional contexts leading to better regional innovation policies, the contexts in which they emerged, the actors driving institutional changes, and their dynamic interactions. The chapters involve four different institutional contexts, namely Medellín in Colombia, Eindhoven in the Netherlands, the Basque Country in Spain, and Chattanooga in the United States, that influence regional actors and policies. The institutional context in Medellín (Colombia) is characterized by the relatively weak role of governments and the stronger role of regional elites. The institutional context in Eindhoven (the Netherlands) is characterized by a coordinated market economy (Hall & Soskice, 2001). The institutional context in the Basque Country (Spain) is characterized by its regional autonomy, strong coordination from the public sector, and “collective entrepreneurship” from public and private actors (Morgan, 2016). Lastly, the institutional context in Chattanooga (the United States) is characterized by a liberal market economy (Hall & Soskice, 2001).

The PhD thesis goes beyond the traditional focus of the EEG and RIS literature on regional innovation policies to also combine innovation policies with social policies, as both types of policies are fundamental to promote inclusive regional economic development. More precisely, the central research question guiding this thesis is:

Main research question. *How to better design and implement regional innovation policies in different institutional contexts?*

Chapter 2

Regions need to tailor their own place-based policies, as there is no “one-size-fits-all” regional innovation policy framework (Tödtling & Trippl, 2005). Each region is characterized by different institutional capacities related to political, economic, and social contexts enabling or constraining the design and implementation of place-based policies. The second chapter aims to shed some light inside the black box of regional innovation policy design and implementation in different institutional contexts. In particular, the chapter compares—while exploring their

similarities and differences—the design and implementation of innovation policies within regional innovation agencies in different institutional contexts. The second chapter of this thesis explores the following research question:

RQ2. *What can regional innovation agencies do to better design and implement regional innovation policies across institutional contexts, and to what extent are the RIAs' similar and different across these three institutional contexts?*

The research method is based on an instrumental-use multiple case study approach to explore the design and implementation of place-based policies within the institutional contexts of four regional innovation agencies (RIAs) established in three different regional contexts inside and outside the European Union (EU): Brainport Development in the Brainport region (the Netherlands), Innobasque and SPRI in the Basque Country (Spain), and Ruta N in Medellín (Colombia). The cases were purposefully selected to draw implications across institutional contexts. Indeed, the cases are widely different: an innovation leader and metropolitan-region in the Dutch case, an innovation follower and autonomous region in the Spanish case, and a metropolitan-region on the knowledge periphery in the Colombian case. The data used in this chapter comes from primary and secondary sources, namely 31 face-to-face semi-structured interviews—7 at Brainport Development, 10 at Innobasque and SPRI, and 14 at Ruta N Medellín—documents, and non-participant observations. In analyzing the RIAs' similarities and differences, this chapter explores the design and implementation of place-based innovation policies in different institutional contexts while noting some general and specific policy implications depending on the regional institutional contexts to better deliver regional innovation policies.

Chapter 3

The literature on path development emphasizes the importance of extra-regional knowledge (Trippel, Grillitsch, & Isaksen, 2017) and absorptive capacity (Grillitsch & Nilsson, 2015). These are important policy issues for peripheral regions, to foster new industrial path development. There are important policy challenges for regional governments in regions on the knowledge periphery to successfully create extra-regional linkages with innovation leaders due to their position in the knowledge network. This chapter addresses this gap by investigating how the regional government in a region on the knowledge periphery can support the acquisition, absorption, and diffusion of extra-regional knowledge to foster new industrial path development. The third chapter looks at the following research question:

RQ3. *What can a regional innovation agency in a region on the knowledge periphery do to build an innovation policy strategy fostering extra-regional knowledge linkages?*

This chapter purposefully focuses on the case of Ruta N, a regional innovation agency operating on the knowledge periphery in Medellín, Colombia, to answer the research question. The data used in this chapter comes from primary and secondary sources, namely 51 face-to-face semi-structured interviews, documents, audio-visual materials, and non-participant observations. The municipally-owned intermediary organization, Ruta N, stimulates new industrial path development by facilitating the acquisition, diffusion and absorption of extra-regional knowledge within the regional innovation system. To do so, Ruta N acts as a knowledge gatekeeper, engaging in the “tropicalization” of extra-regional knowledge to facilitate its absorption. Its experience is indicative of one possible path, connecting local elites with international leaders, increasing absorptive capacity, and facilitating knowledge transfer.

Chapter 4

During regional structural change, the socio-institutional structure and the techno-economic structure are temporarily decoupled due to the relative inertia of the socio-institutional structure compared to rapid changes in the techno-economic structure—leading to inefficiencies and instabilities in the system causing transitional failure (Perez, 2004, 2010). Institutional changes, which are critical during periods of structural change, are not well understood (Sotarauta & Pulkkinen, 2011). Institutional entrepreneurs, actors who have a strong interest in shaping institutional arrangements, can play an important role in promoting institutional changes (Battilana, Leca, & Boxenbaum, 2009) and ultimately in affecting regional economic development (Sotarauta & Pulkkinen, 2011). This chapter empirically investigates institutional entrepreneurs and institutional changes from a regional perspective. More specifically, chapter 4 helps to fill the gap in the academic literature by empirically investigating the role of institutional entrepreneurs coming from the private sector to affect socio-institutional changes through specific actors, namely a regional innovation agency, during a period of regional structural change. In light of this gap, Chapter 4 asks:

RQ4. *What can institutional entrepreneurs do to affect institutional changes through regional actors during regional structural change, and to what extent were they successful?*

Chapter 4 selected the case of Medellín and Ruta N, a regional innovation agency in Medellín (Colombia), that has a wide mandate to support regional structural change. The data used in this chapter came from primary and secondary sources, namely 76 face-to-face semi-structured interviews, documents, audio-visual materials, and non-participant observations. In this chapter, the interviews include the interviews conducted in Chapter 3 and interviews conducted in August 2018. This chapter finds that the private sector, under the informal leadership of the *Grupo Empresarial Antioqueño*, has played the role of institutional entrepreneurs to influence socio-institutional changes through the creation of the regional innovation agency, Ruta N. The regional innovation agency has promoted socio-institutional changes to limit instabilities and inefficiencies from regional structural change. This chapter argues that in regions located on the knowledge periphery in which the socio-institutional structure has not yet fully co-evolved with the novel techno-economic structure, the regional government can accelerate the evolution of the socio-institutional structure by learning from regions that already have transitioned into the novel techno-economic paradigm.

Chapter 5

Knowledge-based urban developments have been criticized for being non-participative top-down initiatives that encourage gentrification and economic, social, and racial polarization (Moulaert 2000; Shin & Stevens 2013; Swyngedouw, Moulaert, & Rodriguez 2002). The academic literature has widely assessed the negative impacts of the knowledge economy on the urban fabrics but has not provided it with policy responses to build more inclusive place-based, knowledge-based urban redevelopments. The chapter 5 aims to fill the gap by supplying policy responses and strategies to better distribute the benefits of pursuing the knowledge-based urban development strategy. The research question that Chapter 5 aims to answer is:

RQ5. *How can policymakers stimulate innovation while limiting social problems when pursuing knowledge-based urban development strategies?*

The city of Chattanooga (United States) was selected in Chapter 5 as a single exploratory case study. The data used in this chapter come from primary and secondary sources, namely 17

CHAPTER 1

face-to-face semi-structured interviews, documents, and non-participant observations. This chapter investigates the programs that are being implemented to limit gentrification when pursuing a place-based and knowledge-based urban development strategy. Chapter 5 finds that the programs being implemented in Chattanooga can be regrouped into three categories: socio-economic, urban, and housing. The socio-economic strategy aims to foster digital equity and an entrepreneurial culture. The urban strategy aims to transform the downtown area into a place interesting and welcoming to everyone. The housing strategy aims to build affordable housing stocks in the downtown area. Lastly, Chapter 5 argues that, under certain conditions, gentrification in knowledge-based urban development projects can increase social mix and the spread of knowledge spillovers.

Chapter 2

Regional Innovation Governance and Place-Based Policies: Design, Implementation, and Implications

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2.1. Introduction

Policymakers and regional governments are increasingly putting innovation policies at the top of their policy agendas (OECD, 2011a), as innovation is seen as the pathway to a higher standard of living. In the European Union (EU), the future programming period of the EU Cohesion Policy 2021-27 (European Commission, 2018) dedicates the bulk of its budget to promoting a Smarter Europe through the confirmation of the Smart Specialisation Strategy (S3) after a first experiment during the 2014-20 programming period (European Commission, 2012). S3 is a policy concept to support regional prioritization in innovative sectors, fields, or technologies through the entrepreneurial discovery process, a bottom-up approach to reveal what a region does best in terms of its endowments in science and technology (Foray, David, & Hall, 2009).

In the concept of a regional innovation system (RIS), which is used as a systematic analytical approach to investigate the innovation process within regions, there is no “one-size-fits-all” regional innovation policy, as RISs differ widely regarding prior innovation capabilities, industrial base, and institutional contexts (Tödtling & Trippl, 2005). As a result, the main policy recommendation is to design place-based and place-sensitive policies to respond to regional innovation specificities (Barca, McCann, & Rodríguez-Pose, 2012). A place-based policy is defined as “a long-term strategy aimed at tackling persistent underutilization of potential and reducing persistent social exclusion in specific places through external interventions and multilevel governance” (Barca, 2009, p. VII).

Regions are, however, highly unequal when designing and implementing place-based policies due to differences in the quality of their governments (Charron, Dijkstra, & Lapuente, 2014), their capacities to absorb funds (Oughton, Landabaso, & Morgan, 2002), and their institutional capabilities (Farole, Rodríguez-Pose, & Storper, 2011). The Smart Specialisation Strategy (S3) concept, which is the most ambitious place-based policy approach within the EU Cohesion Policy, has led to design and implementation challenges in many regions (Foray, 2018; Marques & Morgan, 2018). As any place-based policy strategy, S3 requires supportive institutions and strong policy capabilities at the regional level (Coffano & Foray 2014). Place-based policy strategy explicitly advocates employing appropriately designed local knowledge and learning-enhancement tools in regional policies, and the smart specialisation argument is one such tool (McCann & Ortega-Argilés, 2013).

This article aims to address the gap in understanding some of the institutional mechanisms underpinning the design and implementation of place-based policies in various institutional contexts by looking at the experience of four regional innovation agencies (RIAs). Influenced by the new public management (NPM), regional governments are creating RIAs as regional innovation governance structures to deliver place-based policies to strengthen regional innovation capabilities (OECD, 2011a). RIAs differ across regions and countries depending on the institutional framework, the degree of decentralization, and the regional competitive advantages, sectoral specialisation, and the presence of leading actors (e.g., firms, clusters, universities).

The authors use an instrumental-use multiple case study approach to explore the institutional arrangements underpinning the design and implementation of place-based policies in four regional innovation agencies (RIAs) established in three different RISs inside and outside the European Union (EU). The RIAs selected are Brainport Development, located in

the Brainport Region of the Netherlands, Innobasque and the Society of Industrial Promotion and Restructuring (SPRI), located in the Basque Country in Spain, and Ruta N, located in Medellín in Colombia. The RISs selected are an innovation leader (the Brainport region), an innovation follower (the Basque Country), and a metropolitan-region on the knowledge periphery (Medellín). The article uncovers some of the features within the RIAs' institutional arrangements enabling or constraining the efficient design and delivery of place-based policies. RIAs have the role to continuously monitor their RIS, to find weaknesses in their RIS and to find the solutions to upgrade their RIS. The authors argue that, under certain conditions, regional innovation governance structures, such as RIAs, operating within specific institutional arrangements could be adopted in regions that face difficulties designing and implementing place-based policies.

2.2. Theoretical Framework

The concept of regional innovation system (RIS) is an analytical approach that emphasizes the importance of the geographical scale in understanding knowledge production and differences in regional innovation outcomes. RISs differ significantly among countries and within countries, making the region the most interesting innovation system unit to investigate (Braczyk, Cooke, & Heidenreich, 1998). Doloreux and Parto (2005, p. 134) defines an RIS as “a set of interacting private and public interests, formal institutions and other organizations that function according to organizational and institutional arrangements and relationships conducive to the generation, use and dissemination of knowledge.” Innovation systems are based on evolutionary, non-equilibrium theories in which innovation is a result of interactive processes both internal and external to the firms (Lundvall, 1992; Nelson, 1993). In the RIS literature, the technological innovation process is non-linear and involves complex “feedback mechanisms and interactive relations involving science, technology, learning, production, policy, and demand” (Edquist, 1997, p. 1). The innovation process occurs over time and involves the interactions of a wide range of “organizations that gain, develop, and exchange various kinds of knowledge, information, and other resources” (Edquist, 1997, p. 2). Interactions are thus the most important determinant of technological innovation since it facilitates learning and the accumulation of knowledge (Asheim & Isaksen, 2002; Lundvall, 1992).

The RIS literature increasingly aims to provide targeted regional innovation policy recommendations, which is coinciding with the greater role given to regional governments in shaping innovation policies (OECD, 2011a). The rationale for government intervention is that regions may be prone to suboptimal interactions leading to lower innovation outcomes, as actors that cooperate, collaborate, and learn from each other, are central to the innovation process (Laranja, Uyarra, & Flanagan, 2008). Innovation by firms cannot be understood in terms of independent decision-making at the firm level, but rather as a system of complex interactions prone to “system failures” or suboptimal interactions in the system (Smith, 2000). Additionally, specific evolutionary mechanisms, such as path dependency, cumulative causations, inertia, and routines, can lock regional paths in inferior or superior technological trajectories (Dosi, 1988). Access to and exploitation of extra-regional knowledge can, as a result, favour new knowledge recombination and new regional paths (Trippel, Grillistch, Isaksen, 2017). Innovation policies must take into account specific system failures that can exist in certain regions. Tödting and Trippel (2005) point out that peripheral regions may be at risk of organizational thinness, old industrial areas may be at risk of lock-in, and some metropolitan regions may be at risk of fragmentation.

Institutions and, more specifically, institutional arrangements such as the triple-helix model of innovation that aims to promote interactions between universities, the private sector, and public institutions, matter for regional development (Etzkowitz & Leydesdorff, 2000; Rodríguez-Pose, 2013). At the regional level, the civil society is increasingly involved in triple-helix arrangements, thus forming the quadruple-helix model of innovation, to favour citizen participation and open innovation (Carayannis & Campbell, 2009). Institutional entrepreneurs, actors who have a particular interest in shaping institutional arrangements, can play an important role in creating or reforming institutions (Battilana, Leca, & Boxenbaum, 2009). To be effective, regional innovation policies must be tailored to specific regional institutional arrangements (Rodríguez-Pose, 2013). EU Cohesion Policy and its innovation policy strategy, the Smart Specialisation Strategy (S3), are rooted in previous place-based rationales, based on the explicit prioritization of activities related on existing regional capabilities (Foray, David, & Hall, 2009). Regions are, however, highly unequal when designing and implementing place-based policies due to their differences in the quality of their governments (Charron, Dijkstra, & Lapuente, 2014), their capacities to absorb funds (Oughton, Landabaso, & Morgan, 2002), and their institutional capabilities (Farole, Rodríguez-Pose, & Storper, 2011).

The different rationales for policy interventions and the “policy-mix” recommendations to reduce market failures, system failures, and/or evolutionary failures through place-based innovation policies under a multi-level governance setting imply that regional policymakers are dealing with extreme levels of policy complexity (Flanagan, Uyarra, & Laranja, 2011). Academics often have too much faith in the capacities of policymakers to design, coordinate, and implement innovation policy recommendations, and in the capacities of the regional innovation systems to break evolutionary mechanisms, such as path dependency (Flanagan & Uyarra, 2016). Influenced by the new public management (NPM), metropolitan and regional governments are establishing regional innovation agencies (RIA) as organizations within a wider institutional framework to strengthen regional innovation capacities. NPM is associated with doctrines of public accountability and organizational best practices with high levels of managerial autonomy, particularly regarding personnel and financial management (Verhoest, Van Thiel, Bouckaert, & Laegreid, 2012). Although managerial autonomy and reduced political influence might increase efficiency, effectiveness, and accountability, it adds a layer of policy complexity for regional governments in an already complex policy realm (Pollitt, Talbot, Caulfield, & Smullen, 2004). An RIA is an innovation intermediary that can be defined as “an organization or body that acts as an agent or broker in any aspect of the innovation process between two or more parties” (Howells, 2006, p. 720). There is a great diversity among them in terms of size, mission, activities, and ownership and funding structure (OECD, 2011a). Potential government failures, however, do not always make government intervention required or desirable. Indeed, a policy failure, which is the failure of a policy to achieve its objectives, may arise due to the inadequate policy design, implementation, and governance (Dal Bó, 2006).

In light of the above discussions, this paper’s theoretical framework may be summed up as follows. First, regions should design and implement place-based policies, as there is no “one-size-fits-all” regional innovation policy. Second, place-based policy rationales and recommendations imply high-level policy complexity. Third, regional governments are heterogeneous in terms of their capacities to deal with that level of policy complexity. Lastly, regional innovation agencies could provide some institutional arrangement features to deal with place-based policy design and implementation. The case studies presented in the next sections will serve to provide some support to the above arguments. Indeed, the purpose of this paper is to explore the institutional arrangements underpinning the design and implementation of place-based policies in four regional innovation agencies (RIAs) established in three different RISs inside and outside the European Union (EU).

2.3. Methodology

This paper explores some of the institutional mechanisms underpinning the design and implementation of place-based policies in different institutional contexts by looking at the experience of four regional innovation agencies (RIAs). The research methodology is based on an instrumental-use multiple case study approach, using primary and secondary data to generate insights and new hypotheses that can be used to inform changes in practices, programs, and policies through homogenous sampling. The authors use case studies “out of the desire to understand complex social phenomena” in which researchers have no control (Yin, 2013, p. 4). The four RIAs selected are Brainport Development located in the Brainport Region, the Netherlands, Innobasque and SPRI located in the Basque Country, Spain, and Ruta N located in Medellín, Colombia. Although SPRI is not an RIA under the new public management definition, the authors included SPRI, as the public organization could not be separated from Innobasque to explore the design and implementation of place-based innovation policies in the Basque’s innovation system. Ruta N, which is an RIA outside the EU, was selected because it is a unique case in Latin America that has received significant public funding and knowledge from international experts to structure its role in its RIS (OECD, 2015). The RIAs have been purposefully sampled for being located in three widely different RIS with three different governance structures and levels of competences, for being considered distinctive institutional arrangements in their own countries, and for being frequently cited as best-practices innovation governance structures by international organizations, such as the EU or the OECD, and/or the RIS literature.

Qualitative research implies an extensive collection of data from multiple sources of information. The data were collected with the aim to uncover the RIAs’ role in their RIS through the investigation of their governance structures, implemented programs, and overall missions. The research conducted for this article is based on three sources of data: semi-structured interviews, documents, and non-participant observations. 7 face-to-face interviews in February and March 2018 at Brainport Development, 10 face-to-face interviews in April and May 2018 at Innobasque and SPRI, and 14 face-to-face interviews in July 2017 at Ruta N Medellín were conducted. The interviews were conducted with key stakeholders or ‘super-informants’ who have direct experience with the studied RIAs to gather extensive data on key aspects of the research question (Denzin, 1989). The documents collected for this research come mainly from three sources: academic articles; articles in magazines, newspapers, and RIAs’ websites; and RIAs’ management reports. The researcher travelled to each RIS and visited each RIA to get a sense of the regional context through informal non-participant observations by paying attention to each RIA’s work environment.

The data analysis consisted of examining, categorizing, and recombining evidence to “produce empirically-based findings” to explore some of the institutional mechanisms underpinning place-based policies’ design and implementation (Yin, 2013, p. 132). The data were analysed to explore the institutional mechanisms within each regional perspective rather than through a multi-level governance perspective at the country level. The analysis relied on the researchers’ ability to analyse a large amount of data through pattern recognition, that is, “to see patterns in seemingly random information” (Boyatzis, 1998, p. 7). In particular, the analysis explores the weaknesses and strengths of each RIA to generate new insights for policymakers. Validation is achieved through prolonged engagement, persistent observation, and triangulation to ensure that “the right information and interpretations have been obtained” (Stake, 2013, p. 36). Construct validity is achieved through the use of multiple sources of evidence in a manner encouraging convergent lines of inquiry (Eisenhardt, 1989). The

description and analysis of each RIA and RIS allow the readers to make decisions regarding the transferability of the regional innovation governance structure and described institutional arrangement. Each case study comprises three parts to balance the amount of description and the amount of analysis and interpretations. The first part describes the regional and historical context, the second part describes the RIA and its range of action, and the last part analyses and interprets the role of the RIA in its RIS.

2.4. Case Studies

2.4.1. Brainport Development, Brainport Region, the Netherlands

The Brainport Region, which comprises 21 municipalities, is located around the city of Eindhoven in North Brabant in the Netherlands. In 2016, the population of the Brainport region was 756,615 inhabitants and it had a GDP per capita of €49,297, compared with 16,979,120 inhabitants and a GDP per capita of €41,258 for the Netherlands (CBS, 2018). The Brainport region is the most important technology hub in the Netherlands and one of the most important in the world. With 7,222 patents filled for the period 2011-2015, the Eindhoven region was ranked 18th in the world after Chicago but ahead of Shanghai (Bergquist, Fink, & Raffo, 2017). Philips Electronics represents, however, 84.9% of the patents filled in the Brainport region (Bergquist, Fink, & Raffo, 2017). In 2016, the national government granted the region the status of “mainport,” which facilitates access to national funding for spatial interventions and infrastructure development, along with the Port of Rotterdam (Seaport) and Schiphol (Airport) (van Duinen, 2013). The economic development of Eindhoven has largely been influenced by Philips, which was not only the largest employer in the region but has also spun-offs large companies, such as ASML (Stam et al., 2016). In the 1990s, the Eindhoven region entered a crisis due to the reorganization of Philips and the bankruptcy of the truck manufacturer DAF (Horlings, 2014; Horsten, 2016). During this regional crisis, the City of Eindhoven, under Mayor Rein Welschen, the Eindhoven University of Technology, industrial companies, and the Chamber of Commerce began to collaborate closely to promote regional economic development and to strengthen the region’s industrial and innovation base (Horlings, 2014; Horsten, 2016). This triple-helix arrangement led to the development of technological infrastructure and new institutional arrangements, namely, the High-Tech Campus Eindhoven, a technology park, the Strijp S, an innovation district, and Brainport Development, a regional innovation and investment promotion agency.

In 2005, Brainport Development, the executive organization of the Brainport Foundation, was created from a triple-helix initiative involving the local government, private companies, including Philips Electronics and ASML, and educational institutions, including the Eindhoven University of Technology (Horlings, 2014; Stam et al., 2016). Brainport Development, which combines innovation and investment promotion activities, aims to foster more aggressive approaches towards technological innovation so that the Brainport region can remain one of the top technology hubs in the world. In 2018, Brainport Development had a budget of €8,117,000, half of which was funded by the region’s 21 municipalities, and half by the national and provincial government, private companies, the European Union, and its revenues (Brainport, 2018). Brainport Development designs and implements place-based policies within multiple triple-helix arrangements. It operates five working areas: they are people, business, international, technology, and basics. “People” aims to support human capital investment to respond to new demands in skills from employers in the region. Brainport Development

addresses some labour mismatches that result from accelerating technological innovations, reduces skill shortages in high demand jobs, and promotes lifelong learning and STEM skills for schoolchildren. “Business” aims to support startups and SMEs in the Brainport region to grow faster than international and national references by providing funding, methodologies, and relevant connections. “International” aims to attract international companies and workers to the Brainport region. “Technology” aims to encourage R&D activities and to monitor emerging technologies and opportunities for companies in the Brainport region. “Basics” lobbies the national government and the European Union to fund regional amenities and infrastructures. Additionally, Brainport Development is involved in responding to major societal challenges that Brainport’s stakeholders are facing in specific sectors, which require collaboration among a wide range of actors, namely, in the health, energy, mobility, agrifood, and safety sectors (Brainport, 2018; Stam, et al., 2016).

Brainport Development is the regional innovation governance structure that supports new regional innovation dynamics. Although one might question the existence of such an agency in one of the most innovative regions of the world, the regional economic structure is dominated by few large companies, in particular Philips and its spin-offs, which pose some risks for the region’s economic stability. Indeed, the fate of the Brainport region is still largely intertwined with the ups and downs of Philips Electronics. The executive agency was created from the institutional leadership and proximity between the Mayor, the head of the Chamber of Commerce, and the Dean of the Eindhoven University of Technology to generate new innovation dynamics and a more aggressive approach towards innovation in the Brainport region after a period of regional structural crisis characterized by the bankruptcy of DAF Trucks and the reorganization of Philips Electronics. The Brainport region through Brainport Development aims to promote the diversification of its technology base by attracting international companies and workers and by supporting the creation of startups. Brainport Development has devised place-based programs to address some strategic priorities in the RIS and to take advantage of new technology trends.

“Brainport has a working area called ‘Technology’ in which we monitor technology trends and opportunities for the Brainport region” (Brainport Development, personal communication, 28 March 2018).

Brainport Development has been particularly active in supporting startups, entrepreneurs, attracting human capital and foreign direct investment (FDI), and upgrading human capital. The place-based programs are designed and implemented following multiple triple-helix arrangements. The board of directors, involving the deans of universities, mayors, and CEOs of private companies, decide on which strategic priorities to pursue. Triple-helix arrangements that involve upper-management, professors, Brainport Development’s employees, and public sector officials formulate the programs. Lastly, triple-helix arrangements evaluate the programs. The implementation of the place-based programs is coordinated with local actors in the RIS.

“Everything that we do at Brainport is done within a triple-helix strategy, from the definition of the priorities, to the implementation of the projects, to their evaluations” (Brainport Development, personal communication, 12 March 2018).

Brainport Development has three weaknesses that could lead to government failures. First, the Brabant Development Agency already has the mandate to work as a regional investment promotion agency for the Brabant region. Brainport Development is focusing on specific

technologies and countries, but this raises questions about the scope and role of the “international” department, given the existence of similar activities in the region. Second, Brainport Development is conducting evaluations at the macro-trends level through the Brainport Monitor (Brainport, 2015). More systematic evaluations and set indicators must be monitored at the program and agency levels. Third, programs to develop institutional capacities within the municipalities and other public organizations are missing. Brainport Development should think about becoming more proactive in involving the civil society and moving towards quadruple-helix institutional arrangements to design and implement the place-based policies.

2.4.2. Innobasque and SPRI, Basque Country, Spain

The Basque Country is a Spanish region located in the northeast part of Spain. The region, which covers an area of 7,234 km², has three administrative provinces, Araba, Bizkaia, and Gipuzkoa. In 2016, the population of the Basque Country was 2,175,819 and its most populated metropolitan area was, and still is, Bilbao with a population of 857,016 (Eustat, 2018). The Basque Country has historically been one of the most important industrial centres in Spain with a high degree of specialisation in the iron and steel industry, shipbuilding, and machinery manufacturing (Aranguren, Magro, Navarro, & Valdaliso, 2012). The death of Franco in 1975 led to structural economic and institutional transformations. The institutional transformations were driven by the adoption of the 1978 Spanish Constitution, which led to the 1979 Devolution Act, granting autonomy to the Basque Country (Moso & Olazarán, 2002). In 1980, the first regional Basque government was elected and formed ex-nihilo from a pragmatic government mainly coming from the private sector (Aranguren et al., 2012). Simultaneously, the end of protectionist policies and the opening up of the Spanish economy provoked a deep industrial crisis in the Basque economy leading to massive unemployment and social unrest, which was accentuated by *Euskadi Ta Askatasuna* (ETA) terrorist actions (Gómez Uranga, & Etxebarria, 2000). The first Basque government was able to implement tailored industrial policies to support the Basque industrial restructuring dubbed the “First Great Transformation”. Since 2006, the Basque government has promoted the “Second Great Transformation” of the Basque economy to enhance the innovation capabilities and competitiveness of Basque firms. In 2016, the Basque Country was, after Madrid, the second richest region in Spain with a GDP per capita of €32,621, compared with €23,970 for Spain (Eustat, 2018; INE, 2017). The Basque Country ranks as the first region in Spain and in Southern Europe in the *European Regional Innovation Scoreboard*, which is for the Basque government the most important indicator to measure the success of its innovation policies (European Commission, 2017). The Basque Country is hailed as a best practice example because of its industrial upgrading and urban transformation stemming from the Guggenheim Museum (OECD, 2011b; Plaza & Haarich, 2015). Since 2012, however, the region has experienced, both in innovation inputs and outputs, a sharp decline in various innovation indicators, such as R&D spending as a percentage of the GDP, and patent applications (Eustat, 2018; OEPM, 2018).

At the centre of each so-called “Great Transformation” is the creation of new organizations and institutional arrangements. In 1981, SPRI was created by the Department of Industry of the Basque Government to support the “First Great Transformation” (Gómez Uranga, & Etxebarria, 2000). Since 1981, SPRI’s mandate has considerably evolved from strictly focusing on industrial restructuring towards the provision of innovation-related policies to promote industrial competitiveness. SPRI is entirely funded by the Basque government, with a budget of €30,582,440 for 2016 and 66 full-time employees (Deloitte, 2017). SPRI operates three main working areas: Technology and Innovation, Business Promotion, and Internationalization.

“Technology and Innovation,” through financial instruments and public calls, supports industrial and industrially related companies and research centres to improve their innovative capabilities, to generate process innovations and to adopt organizational innovations. “International” has for its mission to support the internationalization of Basque companies. “Business Promotion” operates five different working areas: entrepreneurship, investment promotion, industrial planning, regional strategic initiatives, and clusters. In 2006, the President of the Basque Government, the Lehendakari, launched the “Second Great Transformation” to foster new innovation dynamics to respond to new challenges, such as globalization and digital transformation. In 2006, Orkestra, the Basque Institute for Competitiveness, was created to investigate regional development and competitiveness. In 2007, Ikerbasque, the Basque Foundation for Science, was created to promote scientific research and attract international researchers. In 2007, the Basque Innovation Agency, Innobasque, was created as a public-private partnership to transform the Basque Country into “The Reference” in innovation in the European Union by 2030 (Innobasque, personal communication, 23 April 2018). In 2016, Innobasque had 40 employees and a budget of approximately €4 million funded by the Basque government (70%), projects from the European Union (15%), and by its members (15%). Innobasque was first conceived as a catalyst to mobilize the entire Basque society. The organization identified and coordinated 1000 partners coming from the private sector (73%), universities and research centres (15%), and the public sector and the civil society (12%) to form working groups to identify weaknesses in the Basque innovation system regarding technological innovation, social innovation, internationalization, organizational innovation, and entrepreneurship (Innobasque, personal communication, 17 April 2018). In 2018, Innobasque reorganized its strategy to focus on SMEs, with a mission for the region to remain an innovation follower in the *European Regional Innovation Scoreboard*. As of 2018, Innobasque operates four working areas; they are Prospective, Innovation Policies, Public Innovation, and Alliances and Networks. These working areas aim to support public organizations, companies, universities, and the civil societies to adopt and implement innovation best-practices.

SPRI and Innobasque are the regional innovation governance structures that emerged to structurally transform the Basque’s economy. SPRI was created out of the pragmatic vision of the first autonomous Basque government which mainly came from the private sector and wanted to save the region’s industrial heritage. Innobasque was an initiative coming from the private and public sectors aiming to boost the region’s innovation capabilities during a period of rapid globalization and digital transformation.

“The first thing to clarify is that Innobasque is not an initiative that comes from the public sector but the private sector. It is a private association with support from the public sector” (Innobasque, personal communication, 23 March 2018).

In the Basque Country, place-based innovation policies are designed by involving multiple stakeholders at multiple levels of governance, the most important ones being Orkestra, Innobasque, SPRI, the Department of Economic Development and Competitiveness, and the provincial governments. At its creation, Innobasque had to find its role in an already complex and organizationally thick RIS. Innobasque’s role has been to create multiple quadruple helices to identify and address weaknesses facing the Basque’s innovation system. The RIA was not only involved in identifying and addressing weaknesses in the technological innovation process but also in the regional informal and formal institutions and firms’ organizational structures. Innobasque participates in the design of the place-based policies to address the weaknesses with the actors in the system but didn’t involve extra-regional actors in the process. The 2008

economic crisis and the election of the Socialist Party, in the wake government continuity coming from the Basque Nationalist Party, reoriented Innobasque's strategy towards the implementation of programs. In addition to providing financial support through loans and public calls, SPRI coordinates a wide range of actors in the implementation of the place-based policies.

“In each working group, we were doing a diagnostic. We looked at what we had and what we should have in a participative manner, many people participated. After the diagnostic in which we recommended specific measures, Innobasque delegated the operation to some other organization” (Innobasque, personal communication, 4 May 2018).

“The social innovation working area has to do with, on the one hand: public innovation, better and more transparent governance, and on the other hand: citizen participation that goes beyond governance but generates public value” (Innobasque, personal communication, 8 May 2018).

The Basque Country is frequently hailed as a best practice example, as the region ranks first in Spain and in Southern Europe in the *European Regional Innovation Scoreboard*. Since 2012, however, the Basque Country has experienced a decline in various innovation indicators, which raises questions about the Basque's model. The region is one of the most organizationally thick regions in the European Union (Morgan, 2016). The organizations have been layered one upon the other without any significant organizational restructuring due to path dependency and vested political interests, leading the system to suboptimal innovation outcomes due to coordination failures. While the number of different institutional arrangements demonstrates the regional elite's commitment to promoting innovation, it has generated confusion and unnecessary institutional complexity regarding the roles and boundaries of each organization in the RIS. One possible way to move forward is to merge Innobasque, Ikerbasque, and some responsibilities of SPRI and the provincial governments to devolve them into three regional innovation agencies in each of the three Basque provinces.

2.4.3. Ruta N, Medellín, Colombia

The city of Medellín, the second largest Colombian city, is located in the Aburrá Valley in the department of Antioquia. The Aburrá Valley, which covers an area of 7,234 km², has 11 municipalities. In 2015, Medellín had 2,464,322 inhabitants and the Aburrá Valley had 3,777,009 inhabitants (City of Medellín, 2018). In 2015, Medellín's GDP per capita was COP \$24,156,607 or USD \$7,569 compared with \$13,408,509 for Colombia (City of Medellín, 2018; DANE, 2018). In the early 1970s, Medellín was Colombia's industrial powerhouse and one of the largest industrial centres in Latin America (Caballero Argáez, 2016). In the late 1970s, the industrial sector went through a deep structural crisis leading to the emergence of the city as a cocaine production and distribution hub (Maclean, 2014). With the elections of mayors Sergio Fajardo (2004-07), Alonso Salazar (2008-11), and Aníbal Correa (2012-15) who benefitted from a wide coalition comprising the reflexive middle-class and the business elite, represented by the *Grupo Empresarial Antioqueño* (GEA) and *Proantioquia*, the city undertook structural reforms in social urbanism, infrastructure development, and programs to promote entrepreneurship, innovation, and education, leading to a significant decline in the homicide rate, income inequality and poverty rates (Maclean, 2014). Medellín is transitioning from an industrial city towards more service-based and knowledge-oriented activities. From 2001 to

2017, employment in manufacturing has relatively declined by 29,42%, while employment in the real estate, construction, and commercial activities has greatly increased (DANE GEIH, 2018). During the period 2001-2016, Medellín is outperforming the two other largest cities in Colombia, Bogotá, and Cali, in innovation indicators such as R&D spending as a percentage of the GDP, STI spending as a percentage of the GDP, the number of local patents registered, and the number of trademarks registered (OCyT, 2018; SIC, 2018). In 2016, there were 124 patents registered in Antioquia, compared with 6 in 2001 (SIC, 2018).

In 2009, Ruta N was created as a public-private initiative to support Medellín's transition from an industrial to a knowledge city through the implementation of the science, technology, and innovation (STI) plan 2011-21. In 2015, Ruta N received around COP \$31 billion from the city of Medellín and the municipally owned public utility EPM-UNE and COP \$6.5 billion from Ruta N's building rents, international agreements, tuition fees, and consulting services (Ruta N, 2016). In 2015, the RIA had a total of 70 full-time employees (Ruta N, 2016). As of 2018, Ruta N operates six working areas: Knowledge Business, the Medellín Innovation District, Organizational Innovation, Research and Development, Special Projects, and Forecasting and Prospective. "Knowledge Business" supports innovative startups and SMEs to provide access to international markets, to capital and to build the capacity to acquire external knowledge. The "Medellín Innovation District" supports the creation of an innovation district around the Ruta N innovation centre. "Organizational Innovation" aims to generate innovation capacities through organizational and process innovations in private companies, educational institutions, and the government. "Research and Development" aims to articulate the city's science, technology, and innovation system through the promotion of R&D activities in companies, universities, and research centres. "Special Projects" aims to diffuse Ruta N's programs to the widest audience possible. "Forecasting and Planning" incubates disruptive business models and supports the design of new Ruta N programs.

Ruta N is the regional innovation governance structure that was created to support the Medellín's transition from industrial to more knowledge-based and service-based activities. Ruta N emerged from the institutional proximity between the private sector, represented namely by Proantioquia and the GEA, and the municipality of Medellín. The RIA was made financially viable thanks to the support of the municipally owned multi-utility companies EPM-UNE.

"For Ruta N, which was an initiative brought by the Municipality, we [Proantioquia] wanted to incubate the initiative to support it, to support in defining the governance model, to support in defining the strategic lines and to support in structuring the project as an organization" (Proantioquia, personal communication, 8 August 2017).

Medellín is located in a region on the knowledge periphery that has been isolated from global knowledge flows due to its geographic location and violent past. The RIA has performed the activity of "*cerrar brechas*" or addressing weaknesses in the RIS. Indeed, the RIA has performed the activities of observing successful RISs around the world, identifying weaknesses in the RIS, locating the actors with the capacities to address those weaknesses, and transferring those capacities into the RIS. The RIA has relied heavily on brokering extra-regional knowledge to upgrade its RIS, which was aligned with the regional business elite's internationalization business strategies. The RIA was first conceived to create programs to strengthen existing actors in the RIS to implement programs. Ruta N has devised place-based programs not only to affect regional innovation capabilities but also to upgrade informal and formal institutions and to promote organizational innovations.

“In the beginning, Ruta N was conceived as an intermediary institution working with actors of the system, the City of Medellín, CTA, Chamber of Commerce, CREAME, Parque E to strengthen them in order for them to operate the programs” (Ruta N, personal communication, 17 July 2017).

“When I arrived at Ruta N, it was not clear if ‘Innovation Culture’ should work on culture at the level of citizens or companies. Because of my social work background, I focused on citizens since I wanted to bring innovations from the triple-helix to the quadruple helix” (Ruta N, personal communication, 24 August 2017).

Although Ruta N’s board of directors includes triple-helix actors, the RIA has mostly relied on internal capacities to identify weaknesses leading to misjudging existing innovative capacities in the RIS and firms’ absorptive capacities, reducing thus the policy effectiveness of brokering extra-regional knowledge. Ruta N has pursued a strategy of trial-and-errors in designing the place-based programs due to a lack of internal capabilities, inefficient interactions with other actors in the RIS, and lack of connections with more research-oriented organizations. The RIA has also perceived itself as a startup leading to expensive and risky programs rather than pursuing its role of identifying weaknesses, finding solutions, and transferring capacities. Ruta N must promote greater transparent decision-making and should move towards collaborating more with actors in the RIS and civil society.

2.5. Discussion

The RIAs have been created as regional innovation governance structures in widely different RISs that have diverse prior innovation capabilities, industrial bases, and institutional contexts. However, the RIAs have emerged to either overcome a structural regional economic crisis, such as SPRI and Brainport Development, or to support the leapfrogging of regional technological innovation capabilities, such as Innobasque and Ruta N. The Brainport region is one of the most innovative regions in the world located in the knowledge core. In 2017, the Basque Country ranked first in Spain and Southern Europe in the *European Regional Innovation Scoreboard*. Medellín is a city located in an upper middle-income country on the knowledge periphery. The three regions, however, have specific common features. Indeed, they are, relatively specialised with an important industrial sector, institutionally thick with a high level of social capital, and relatively organizationally thick with numerous innovative actors and support organizations.

The institutional proximity between the public and the private sectors facilitated the creation of the regional innovation governance structures. The private sectors, through various actors or groups of actors, have played the role of institutional entrepreneurs supporting the design and defining the mission of the RIAs. Although SPRI was created by the first Basque government, the government members primarily came from the private sector. Brainport Development, Innobasque, and Ruta N were heavily influenced in their creation by the private sector and are still being influenced by the same private companies in the RIAs’ boards of directors. Influenced by the new public management (NPM), Brainport Development, Innobasque, and Ruta N have legal statutes that define them as not-for-profit organizations in order to increase in autonomy and to limit political influences. The institutional arrangement has provided some flexibility in defining their roles to design and implement place-based innovation policies.

CHAPTER 2

The RIAs have designed and implemented place-based policies to address specific weaknesses in their RIS following similar institutional arrangements. The RIAs have played the role of monitoring their RIS and successful RISs around the world, identifying weaknesses in their RIS, locating the actors with the capacities to address the weaknesses, and of creating the place-based programs to generate the capacities in their RIS. The weaknesses in the RIS are identified through institutional arrangements within or coordinated by the RIAs that involve the private sector, the public sector, higher education institutions, and/or civil society (triple or quadruple helix). The RIAs have a wide mandate to affect their RIS. Indeed, the RIAs are not only designing place-based policies to upgrade regional scientific, technological, and innovative capabilities at the firm level but also promote informal and formal institutional innovations and organizational innovations. Indeed, the RIAs have devised place-based programs, for instance, to promote STEM for students, to support citizens' participation and co-creation with municipal governments, or to transfer methodologies to promote greater entrepreneurial outlook and R&D intensive projects in private companies.

Although the RIAs have put into place similar institutional arrangements to design and implement place-based programs, the programs differ depending on the three RISs showing that there is no "one-size-fits-all" innovation policy. Brainport Development is focusing its effort on generating diversification and upgrading human capital. SPRI is promoting the industrial sector to become more competitive. Innobasque is aiming to generate best practices at the level of firms and public organization levels. Ruta N is connecting local actors with innovation hubs to respond to weaknesses in the RIS. The RIA has supported actors in the RIS to acquire, absorb, and exploit extra-regional knowledge.

Regional Innovation Agency (RIA)	Brainport Development	SPRI	Innobasque	Ruta N
Region	Southeast Brabant	The Basque Country		Medellín/Aburrá Valley
Country	The Netherlands	Spain		Colombia
Regional Innovation Performance	Innovation Leader	Innovation Follower		Knowledge Periphery
Regional Innovation System (RIS)	Organizationally thick and specialized RIS	Organizationally thick and specialized RIS		Organizationally thick and specialized RIS
RIS Main Weakness	Low diversification	Institutional complexity due to organizational thickness		Remotness from knowledge core
RIA's Stakeholders	Triple Helix	Government	Public-Private Partnership	Private-Public Partnership
RIA's Institutional Arrangement	Multiple Triple-Helix	Multi-actor and multi-levels	Quadruple Helix	Triple Helix
RIA's Main Objective	Promote new innovation dynamics	Promote industrial competitiveness	Identify weaknesses	Identify weaknesses
RIA's Place-based Programs to Promote	Economic diversification	Existing industrial sector	Institutional bodies	Regional absorptive capacity

Table 2.1. Overview of the RIAs. Source: authors' design.

2.6. Conclusions

RIAs are executive agencies that design and implement place-based policies. The four case-studies examined here have five important implications for policymakers. First, the private and the public sectors must have a shared vision for the RIA. Second, the right level of governance for the RIA is the metropolitan region, as the RIA's coordination of multi-level governance will lead to institutional complexity and coordination failures. Third, the RIA must mobilize the most important actors in the RIS coming from the private sector, the public sector, academia, and the civil society. RIAs are seen as more legitimate in mobilizing a diverse range of actors than are regional governments, which might be politically motivated. Fourth, the role of the RIA is to monitor its RIS and successful RISs around the world, to identify weaknesses in its RIS, to locate the actors with the capacities to address those weaknesses, and design and support the implementation of the place-based programs to generate these capacities in their RIS. Fifth, the RIA must coordinate multiple quadruple helices at numerous decision levels from the definition of the strategic priorities and the identification of weaknesses, to the design, implementation, and evaluation of the place-based policies. The five implications are specific to regional innovation agencies and are conditional upon good governance and key principles being prescribed in new public management, such as autonomy and public accountability.

The RIAs and the RISs selected for this article are hailed as best practices. The article finds, however, that even best practices have some weaknesses. Following the implications discussed above, the four RIAs studied should adopt some recommendations to better deliver place-based policies. Brainport Development should include civil society in its multiple triple helices and support innovations at the level of local public organizations. The RIA should focus more on supporting endogenous disruptive projects and startups. The investment promotion activities being conducted at Brainport Development and at the Brabant Development Agency should be merged into one organization. The Basque Country is organizationally thick and prone to coordination failure due to the high level of institutional complexity. SPRI should focus its activities on investment promotion, internationalization, and the working area "Technology and Innovation." Other activities at SPRI and Innobasque should be merged and devolved into three regional innovation agencies in each administrative province. Ruta N has designed and implemented place-based programs following a process of trials-and-errors as a result of its lack of collaboration with actors in the RIS. Ruta N should create multiple quadruple helix committees within each of its working areas.

Typically, academics recommend place-based and place-sensitive policies without providing many insights into how these policies should be designed or implemented. Many regions, however, don't have the institutional capacities to design and/or implement place-based policies, which lead to a process of divergence between the core and peripheral regions in the European Union. The RIAs studied here have emerged in RISs that are relatively specialised, organizationally and institutionally thick from the institutional proximity between the private and the public sectors to address weaknesses in their RIS after a period of regional crisis or to face new challenges, such as globalization and the knowledge economy. RIAs are governance structures operating under specific regional institutional arrangements that design and support the implementation of place-based policies.

Following the specific implications of this paper, RIAs can be seen as "one-size-fits-many" institutional arrangements to systematically upgrade their RIS through designing and supporting the implementation of no "one-size-fits-all" policy that fits their RISs' unique

contexts. Dixit (2009) demonstrates that best practices must be recombined with contextual elements to produce the best possible outcomes. Policymakers must decide whether the suggestions presented here can be merged in their regional contexts to produce better policy outcomes. The RIAs institutional arrangements can be adapted to different regional contexts. Although the RIAs studied in this article have emerged in specific contexts, the regional innovation governance structure and subsequent institutional arrangements can offer some guidance to many different regions. Diversified, organizationally, and institutionally thick regions located in the knowledge core, however, would probably not benefit from such regional governance structure and a subsequent institutional arrangement due to the path-dependency and cumulative nature of knowledge-driven structures, and such scientific and technological knowledge, institutional and organizational structures, that lock in regions in superior technological trajectories.

The new programming period of EU Cohesion Policy 2021-27 offers the possibility to support the creation of RIAs to promote a Smarter Europe through governance and institutional capacity-building. Many regions have difficulties in designing and implementing place-based policies due to the quality of their governments (Charron, Dijkstra, & Lapuente, 2014), their capacities to absorb funds (Oughton, Landabaso, & Morgan, 2002), and their institutional capabilities (Farole, Rodríguez-Pose, & Storper, 2011). Smart Specialisation Strategies (S3), which is a place-based process to develop new transformative activities, has faced many challenges in many EU peripheral regions (Foray, 2018). This paper argues in favour of selecting a peripheral region in the European Union that has a poor quality of government, a relatively large urban centre, and an existing public organization dedicated to promoting technological innovations. The regional innovation governance structure and institutional arrangements could be based on ex-ante conditionalities, such as “a series of guidelines aimed at facilitating local capacity-building, increasing participation in the development process, increasing transparency and accountability, and minimizing corruption,” in order to obtain support from the European Regional Development Fund (ERDF) (Rodríguez-Pose, 2013, p. 1044). After 5 years, the impact of the RIA on its RIS should be carefully evaluated to decide whether to replicate the strategy in other peripheral regions in the EU.

Chapter 3

Knowledge Gatekeepers and Path Development on the Knowledge Periphery: The Case of Ruta N in Medellin, Colombia

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3.1. Introduction

The academic literature on Evolutionary Economic Geography (EEG) emphasizes the central role of firms in regional path development. New industrial path development is undertaken by agents of structural change, namely, firms and entrepreneurs, while regional policies must support path branching into more complex activities since regional path development branches out from pre-existing industries in a region (Asheim, Boschma, & Cooke, 2011; Neffke, Henning, & Boschma, 2011). This firm-centric approach pays too little attention to the role of institutional bodies in actively supporting regional path development. The regional innovation system (RIS) literature, which shows that there is no ‘one-size-fits-all’ policy approach in supporting path development, since different RISs have different conditions and thus different policy-responses, addresses this weakness of EEG (Isaksen, Tödting, & Trippel, 2018 Tödting & Trippel, 2005).

The role of the government in path development has been presented in several case studies in the European literature. Little, however, is known about the cases in which regional governments in developing countries supported path development. In the global South contextual elements have implications for potential regional development strategies that are not frequently discussed in the mainstream European and North American literature (Dunford et al., 2016). This article helps fill this gap by identifying the importance of distinguishing between regions in the knowledge core and on the knowledge periphery. In contrast to core regions, regions on the knowledge periphery are remote from some of the main sources and users of knowledge, have limited extra-regional knowledge linkages, knowledge infrastructures, and have limited capacity to absorb extra-regional knowledge (Grillitsch & Nilsson, 2015).

Regional innovation agencies (RIAs) are organizations that are in charge of delivering regional innovation policies (OECD, 2011). They are intermediary institutions that can work as knowledge brokers within their RIS (Howells, 2006). Their scopes and roles differ widely across regions, and they can be found in widely disparate countries. The role of knowledge gatekeepers in translating extra-regional knowledge is seen as an essential activity in successful innovation systems. The gatekeeper role has been applied to leader firms (Morrison, 2008), individuals within firms (Allen, 1977), and universities (Goddard & Chatterton, 1999) but not to regional government agencies.

The case selected for this article is Ruta N in Medellín, the second largest city in Colombia. In 2009, the municipal government and the public multi-utility EPM-UNE created Ruta N Medellín, an RIA with the mission of transforming the city into an innovation hub through the implementation of the Science, Technology, and Innovation (STI) plan, which identified and prioritized three regional paths development: information and communication technologies (ICTs), energy, and health.

Moving beyond a firm-centric approach, this article asks what are the strategies that the local government through Ruta N has implemented to support new industrial path development in Medellín. Ruta N was selected as a single significant, critical, and high-impact case. The research conducted for this article includes four sources of data, namely, interviews, observations, documents, and audio-visual materials. This article is relevant to policymakers, outside organizationally thick and diversified RISs located on the knowledge periphery, who aim to generate new industrial path development. This article complements the literature on knowledge gatekeepers and on path development in the context of a region that is located on

the knowledge periphery. This article finds that the RIA, Ruta N, has supported path creation and path branching by brokering extra-regional knowledge into the RIS. Additionally, Ruta N has worked as a knowledge gatekeeper that facilitates the absorption of this knowledge into the RIS. Finally, this article recommends the creation of such an RIA in specialized and organizationally thick RISs located on the knowledge periphery.

3.2. Literature Review

Regional governments are increasingly devising strategies to target strategic regional sectors with the objective to strengthen local innovative capabilities (OECD, 2011) since innovation is seen as the pathway to a higher standard of living. Regional divergence and a trend towards decentralization have contributed to convert regions into an important unit of governance. As a result, regional governments have taken a more active role in shaping regional innovation policies to strengthen regional competitiveness and entrepreneurial ecosystems. In Colombia, national governments have recognized the importance of regions in formulating regional innovation policies. Indeed, the Colombian Constitution of 1991 delegates to regions some authority in shaping and in planning Science, Technology, and Innovation (STI) policies (Sánchez Mejía, 2011). In 2011, the General System of Royalties was created to redistribute state revenues from the exploitation of non-renewable resources to finance strategic projects in Colombia. Ten percent of the General System of Royalties are distributed among the Colombian regions to finance projects in STI at the regional level through the Science, Technology and Innovation Fund (STIF) (Suárez Cepeda, 2016).

Regional industrial path development is driven in specific trajectories due to the nature of scientific and technological knowledge that is path-dependent, mutually dependent, self-reinforcing, and cumulative (Boschma & Lambooy, 1999). Regional path development consists of path creation and path branching. Path branching refers to the creation of paths based on related industries, whereas path creation involves the creation of a new industry in a region (Boschma & Frenken, 2006). Regional path development follows a branching logic since regional industries that are technologically related evolve from pre-existing regional industries (Neffke, Henning, & Boschma, 2011). New industrial path development is seen as the outcome of path-dependent processes that can be enabled by platform policies (Asheim, Boschma, & Cooke, 2011). Regions differ, however, in their capacity to branch into or create new regional industrial path development due to their institutional structures (Rodríguez-Pose, Di Cataldo, & Rainoldi 2014), their industrial varieties (Asheim, Boschma, & Cooke, 2011), their capacity to attract agents of structural change (Neffke et al., 2018), or their regional elites (Grabher, 1993). Some regions that have robust urbanization economies because of their highly diversified knowledge base are highly resilient in branching into and in creating new industrial path development (Boschma & Lambooy, 1999).

The role of the government in the creation of new path development in East Asian countries, namely, Taiwan, Singapore, and South Korea, is too important to ignore (Amsden, 1989; Rodrik, 2008; Wade, 1990). Governments have always taken an active role in not only protecting their industries but also stimulating new technologies (Mazzucato, 2015). Governments frequently intervene to support public research. Government support is so pervasive in the innovation process that Ruttan (2001) argues that governments have systematically played a central role in the development of General Purpose Technologies (GPTs). Technological revolutions such as in the computer industry, the internet, the pharmaceutical industry, and the nanotech industry would not have occurred without the leading role of the state (Mazzucato, 2015). In Latin America, the implementation of the ‘Washington

Consensus' policies did not bring the expected prosperity, which has prompted scholars such as Rodrik (2008) and Mazzucato (2015) to propose a renewed role for the state in supporting the innovation process; they call for a 'smart state', 'experimental state', and 'entrepreneurial state'. These propositions have resonated well in Colombia, and particularly in Medellín, which have followed 'a post-Washington consensus approach to local economic development' (Bateman, Duran Ortíz, & Maclean, 2010).

Regional policies that support path development depends on the types of RIS (Tödtling & Trippel 2005). Regional policies that support path development in RIS with highly diversified knowledge bases have negligible impacts due to the branching logic in related activities of path development (Boschma & Lambooy, 1999). In the regions located on the knowledge periphery, however, path development can benefit from the acquisition and absorption of extra-regional knowledge, although these regions may lack the capacity to acquire, absorb, and exploit scientific and technological knowledge. The acquisition of external knowledge is motivated by the search for capabilities, which firms in a peripheral innovation system might lack. Another motivation is the need to form alliances through which to build entirely new competences and to capture new knowledge (Belussi & Sedita, 2010). The role of external knowledge was key in the rapid economic development not only of Japan during the Meiji restoration (1869), but also of the Four Asian Tigers, and of China (Amsden, 1989; Mokyr, 1990; Rodrik, 2008; Wade, 1990). Access to and the exploitation of external knowledge also limit the risk of lock-ins since external knowledge facilitates recombination, which can lead to innovation and new industrial path development (Grabher, 1993). Asheim and Isaken (2002) highlight the importance of place-specific local knowledge combined with external world-class knowledge to strengthen local firms' competitiveness. Extra-regional knowledge can be brought into the region through the market and formal and informal networks (Trippel, Grillitsch, & Isaksen, 2017). Formal networks, such as global knowledge pipelines, can connect local firms to state-of-the-art external knowledge and to relevant innovation hubs around the globe (Bathelt, Malmberg, & Maskell, 2004).

The successful exploitation of extra-regional knowledge is contingent on the region's absorptive capacity (Keller 1996), which can be defined as the region's ability to identify, assimilate, and exploit external knowledge (Caragliu & Nijkamp, 2012). Mowery and Oxley (1995) examine how the level of national absorptive capacity has contributed to the rapid development of the Japanese and East Asian economies by taking advantage of inward technology transfer. The agents who facilitate a firm's absorptive capacity are called knowledge gatekeepers. At the firm level, exchanges of knowledge undergo a two-step process, in which certain key individuals act as bridges that link the organization's members to the outside world (Allen, 1977). Knowledge gatekeepers work as intermediaries between the creator of information and its users and can thus operate between two coding schemes (Allen & Cohen, 1969). Knowledge gatekeepers have a dual role: the acquisition of external knowledge and its translation (Allen, 1977). Graf (2011), Morrison (2008), and Giuliani (2005), among others, have used the concept of gatekeepers within innovation systems as agents who acquire external knowledge to diffuse it within the RIS. At the regional level, knowledge gatekeepers can establish linkages with innovative actors from other regions allowing knowledge to flow across separate regions (Breschi & Lenzi, 2015).

3.3. Methodology

The research methodology is based on a single significant, critical, and high-impact case study, Ruta N in Medellín, Colombia. A case study approach was selected 'out of the desire to

understand complex social phenomena' in which the researcher has no control (Yin, 2013, p. 4). Ruta N was purposefully sampled because it is recognized as a regional innovation governance structure best-practice in Latin America and because of its unique institutional arrangement in Colombia (see OECD, 2015). The selected case is significant since it provides 'a rich and deep understanding of the subject and breakthrough insights', the case is high impact since it provides 'a significant contribution' to the literature on path development, and the case is critical since it provides 'evidence that permits logical generalization' (Patton, 2015, p. 267). Purposeful sampling was used to provide an 'information-rich case' and to inform regional policymakers of novel practices, programmes and policies (Patton, 2015, p. 230). The purpose of the case study is to examine the role of an RIA in supporting new regional path development in a region that is located on the knowledge periphery.

Qualitative research implies an extensive collection of data from multiple sources of information (Creswell, 2013). The research conducted for this article is based on four sources of data: semi-structured interviews, documents, direct observation, and audio-visual materials. The researcher conducted 51 face-to-face interviews in Medellin in July and August 2017 and 2018 to gather extensive data on aspects of the research question. The expert interviews were conducted with key actors in the RIS or 'super-informants' (Denzin, 1989) who have first-hand knowledge of Ruta N, including the City of Medellin, EPM-UNE, the Chamber of Commerce, Proantioquia, the Centre for Science and Technology of Antioquia (CTA), EAFIT University, and Ruta N. The documents collected for this research came from six sources: academic articles; articles in magazines, newspapers, and websites; official documents, such as statistical data, municipal agreements, and official contracts; Ruta N external communication materials, such as management reports, and articles on Ruta N websites; Ruta N internal documents, such as consultancy reports, internal memos, and internal programmes; and other organizations' materials. In 2017 and 2018, the researcher spent 12 weeks in Medellin to conduct fieldwork. Fieldwork was a necessary means to meet the participants, to critically discuss with them the role of Ruta N in the RIS, and to 'know what they know' to gain an 'insider' perspective (Creswell, 2013; Wolcott, 2008). Finally, the majority of audio-visual materials came from Ruta N's YouTube channel.

The data analysis consisted of examining, categorizing, tabulating, testing, and recombining the evidence to 'produce empirically based findings' (Yin, 2013, p. 132). The analysis relied on the researcher's ability to analyse a large amount of data through pattern recognition, that is, 'to see patterns in seemingly random information' (Boyatzis, 1998, p. 7). Ruta N's programmes have been categorized to identify the actors that implement the programmes, the recipients of the programmes, the delivery of the programmes, and the programme goals. Ruta N's programmes were analysed to identify the strategies that were devised to induce new industrial path development. Validation is achieved through prolonged engagement, persistent observation, and triangulation to ensure that 'the right information and interpretations have been obtained' (Stake, 2013, p. 36). Construct validity is achieved through the use of multiple sources of evidence in a manner that encourages convergent lines of inquiry (Eisenhardt, 1989). The rich description allows readers to make decisions regarding the transferability of the policy strategy (Patton, 2015).

3.4. Case Study – Ruta N in Medellin, Colombia

3.4.1. The Context

The city of Medellin is located in the Aburrá Valley in the midst of the Andes. As of 2015, Medellin is the second most populous city in Colombia, with 2,464,322 inhabitants, after the capital city of Bogotá (City of Medellin, 2018). In 2016, the Antioquia Region was, and still is, the second largest region in terms of its contribution to the national GDP (13.9%), ahead of the Valle del Cauca Region (9.7%), where the city of Cali is located, but behind Bogotá D.C. (25.7%) (DANE, 2018). In 2015, the GDP per capita reached COP \$ 24,156,607 or USD \$7,569 (City of Medellin, 2018).

The city of Medellin underwent four phases of development. First, Medellin was a mining city. In the 1880s, the rapid expansion of coffee production combined with mining profits generated a strong internal demand for agricultural machinery and intermediate goods (Restrepo Santamaria, 2011). Second, Medellin branched into an industrial city. In 1904, Medellin started a process of industrialization that was fuelled by protectionist policies, a rapid growth in coffee exports, the city's entrepreneurial economic elites, and the accumulated industrial knowledge related to mining, all of which stimulated the development of light manufacturing and a durable consumer goods industry (Valencia Restrepo, 1996). In the early 1970s, Medellin was Colombia's industrial powerhouse and one of the largest industrial centres in Latin America (Caballero Argáez, 2016). Third, Medellin branched into a narcotics city in the 1980s due not only to a deep structural industrial crisis, which made the city unable to absorb the growing population, but also due to the concentration and spatial distribution of poverty in certain neighbourhoods, the city's strategic position in cocaine production and distribution, and accumulated smuggling knowledge (Maclean, 2014). Fourth, the city is now transforming into a knowledge city due to the rapid decline of violence, the social programmes led by the emblematic Mayor Sergio Fajardo (2004-2007), and innovation-led policies, which have contributed to the 'Medellin miracle' (Maclean, 2014) and 'Medellin's half a miracle' (Fukuyama & Colby, 2011). In 2013, the Wall Street Journal and Citi declared that Medellin was the 'most innovative city of the year', recognizing the city's unique makeover (Wall Street Journal, 2013). The actor at the centre of the transformation of Medellin towards a knowledge city is Ruta N. As Mayor Aníbal Gaviria (2012-2015) noted, 'an outstanding case of this model of development and transformation of the city is Ruta N' (Almirall et al., 2016, p. 144).

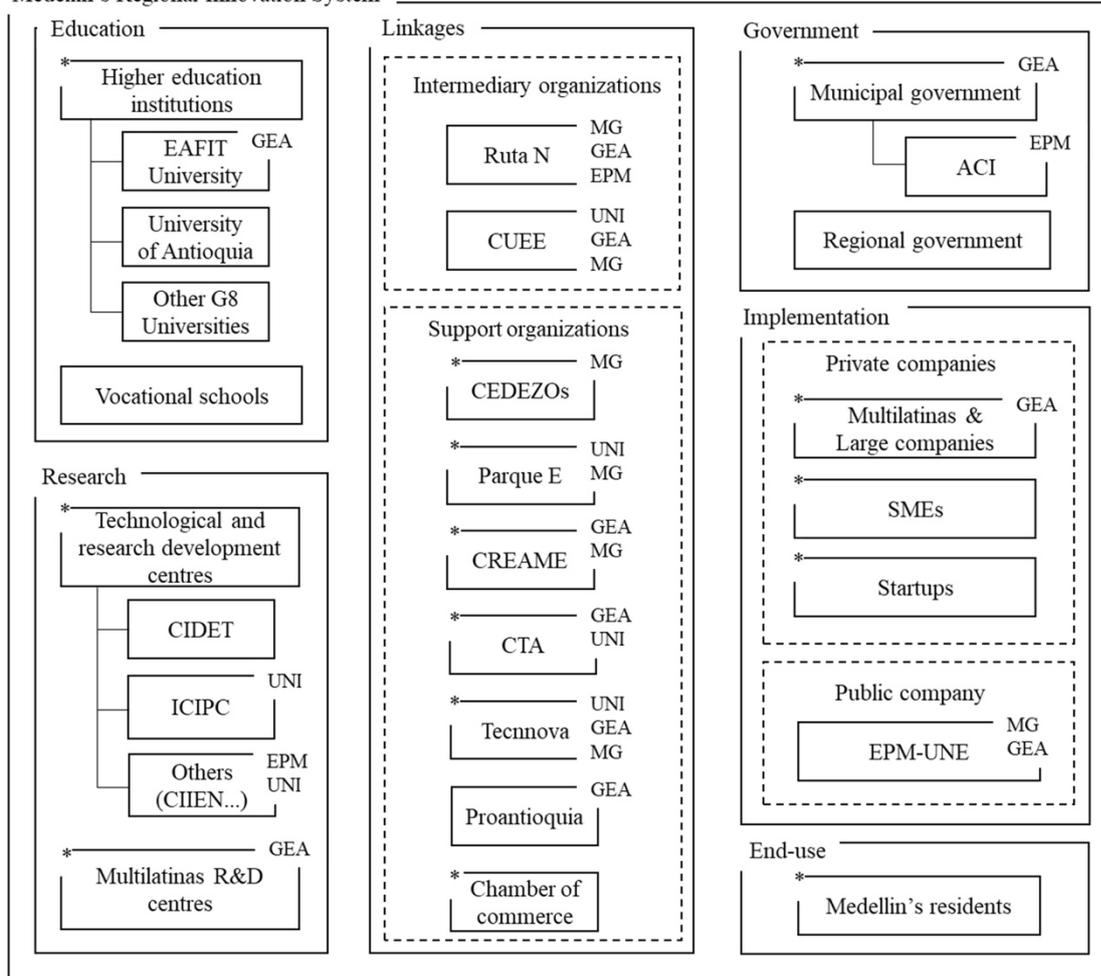
Ruta N was created out of a particular context. Indeed, Medellin has been relatively isolated from the world economy, which has greatly hindered the diffusion of extra-regional knowledge into its RIS. Medellin is located in the Aburrá Valley in the midst of the Andes. The topographical and geographical dimensions of Medellin's location have nurtured an inward-looking culture and contributed to the city's isolation from global knowledge flows. The city of Medellin also experienced a period of extreme violence from the late 1970s to the early 2000s. In 1991, at the peak of the violence, there were 381 homicides per 100,000 inhabitants, which made the city of Medellin the most dangerous in the world (Hylton, 2007). The extreme level of violence contributed to further isolating Medellin at a time in which integration in the world economy was imperative to reap the early benefits of the process of globalization. The regional industrial, business, and political elites and in particular the Grupo Empresarial Antioqueño (GEA), a Keiretsu-like conglomerate where Antioquia companies have cross-ownership dubbed 'The Other Medellin Cartel', have protected their regional interests and have

since the late 1970s consciously limited the amount of extra-regional investment in the region (Lane, 1996).

The four actors that have played a fundamental role in the creation and formulation of Ruta N are the Mayor of Medellin, the public multi-utility and communications company EPM-UNE, Proantioquia, and the CTA. Mayor Alonso Salazar (2008-2011) first suggested the project in the Municipal Development Plan. Proantioquia, the unofficial philanthropic foundation of the GEA, has played the role of an institutional incubator for Ruta N by shaping its mission and model. EPM-UNE, which is owned by the municipality of Medellin and contributes 30% of its net annual profit to the Municipality, was in charge of funding Ruta N. EPM-UNE is intimately intertwined with the politics of the city and is seen as a symbol of the extension of the power of the business elite (Botero Herrera, 1996). The CTA, a science and technology think tank that was created by Proantioquia, was in charge of defining Ruta N's programmes and structures. The regional business and industrial elites have promoted through Proantioquia and EPM-UNE the creation of Ruta N to better connect Medellin to innovation hubs around the world. Since the 1990s when the GEA started to transition towards more knowledge-based activities, Ruta N has thus become the institutional instrument that has accelerated this transition. Additionally, the business and industrial elites genuinely aim through Ruta N to transform Medellin into a more inclusive city. This commitment comes from the historical debt owed by the industrial elites to the poorest neighbourhoods due to these elites' role in contributing to the socio-economic crisis of the 1980s (Maclean, 2014).

Medellin has a specialized old industrial area and organizationally thick RIS. The industrial sector has suffered from cognitive and political lock-ins due to the city's isolation from global knowledge flows, protectionist policies, and remoteness from global trade routes, which prompted the GEA in the 1990s to support the city's transition towards more service-based and knowledge-based activities. The share of manufacturing industries in Medellin's GDP has declined from 20.8% in 2005 to 18.1% in 2015 (City of Medellin, 2018). The RIS is characterized by the strong influence of the GEA in diverse institutional arrangements with the municipal government and EPM-UNE (see Figure 1) as a means to support Medellin's transition towards more knowledge-based activities and to counteract the influence of the 'clase emergente', also known as the 'narco-elite', on the political economy of the city (Franz, 2018). Since the 2000s, the City of Medellin has supported the creation and the operations of support organizations, such as CEDEZOs in 2005 for the promotion of entrepreneurship, Parque E in 2006 for startup incubation, and the ACI in 2002 for investment promotion. G8 universities have participated with large companies in the creation of technological and research development centres, such as CIDET in 1995 to conduct energy research, ICIPC in 1987 to conduct plastic- and rubber-related research, and CIEN in 2006 to conduct energy research. The CUEE was established in 2003 to promote collaboration among the private sector, the public sector, and universities.

Medellin's Regional Innovation System



* The actors that have benefited from Ruta N's programs. Actors influenced or owned by the MG: Municipal Government, GEA: Grupo Empresarial Antioqueño, EPM: Empresas Públicas de Medellín, UNI: Universities.

Figure 3.1. Medellin's innovation system, adapted by the author from the framework proposed by Liu and White (2001).

3.4.2. Ruta N Medellin – Path Development

Ruta N was created on November 11, 2009 with funding from the city of Medellin and EPM-UNE as an intermediate institution to upgrade the RIS and actors within the RIS. The public organisation is in charge of implementing the Science, Technology, and Innovation (STI) plan of 2011-2021, which was drafted in 2010 by more than 250 regional leaders, namely, entrepreneurs, business leaders, policymakers, and academics, to identify a new industrial path. The objective of the STI plan is 'to promote and coordinate policies to support research and scientific, technological and innovative development in Medellin, with a view towards the identification and exploitation of new knowledge-based businesses', as well as to transform Medellin into the 'most innovative city in Latin America' (Pineda & Scheel, 2011). The City of Medellin adopted the STI plan as a public policy through Municipal Agreement 024 of 2012, which granted, for the period from 2011-2021, 7% of EPM ordinary profits to Ruta N to make investments and to support companies and research organisations in science, technology, and innovation. The STI plan targets three sectors, ICT, energy and health, selected for their potential growth and prior capabilities.

Ruta N's mission is to help existing industries in the three sectors to branch into more complex activities. Indeed, one of Ruta N's objectives is to foster Medellín's transition from an industrial into a knowledge city. In the 1970s, and 1980s, the city experienced a situation of industrial lock-in, which ultimately led to the worst period in the city's economic and social history. In the 1990s, the economic structure was reorganized towards the service sector on the basis of the GEA understanding that lasting economic growth and social well-being would come only from developing a strong and growing knowledge-based sector. In addition to promote path branching, Ruta N also supports path creation in nanotechnology and digital animation and gaming sectors. The pursuit of nanotechnology as a technological trajectory came from the leadership of EPM, which first considered creating a National Centre for Nanotechnology, before it transferred responsibility to Ruta N (Dinero, 2011). The pursuit of the digital animation industry as a technological trajectory was the result of chance rather than a concerted strategy, coming from the recommendations of Diego Ángel, an entrepreneur from Medellín, who worked as a consultant for Ruta N and who founded in the United States Angel Studio, a digital animation and video game publisher startup (Dinero, 2013).

The role of Ruta N in supporting new industrial path development has differed depending on whether the industries were related or unrelated to the region. In both cases, however, Ruta N has facilitated the acquisition of extra-regional knowledge. In path creation, Ruta N has extensively facilitated the acquisition of extra-regional knowledge while partnering with national partners to reduce risks in the case of path development failures. Path creation in the digital animation and gaming industry has led to a national strategy that is promoted by the Ministry of ICT and Colciencias, called Vive Digital, which aims to develop national capacities in digital industries. Ruta N operates the ViveLab, a training centre that is part of the Vive Digital strategy, which offers courses in the digital animation and gaming industry. Path creation in the digital animation and gaming industry has relied on building local capacities and attracting international companies. ViveLab Medellín has provided courses by international experts, such as the University of Southern California (Los Angeles, USA), Unity 3D (San Francisco, USA), Pipeline Studios (Canada), Paramotion (Spain), and BWStudios (Argentina) for local students in digital animation and video gaming. Ruta N has also attracted to Medellín Pipeline Studios, an animation studio from Hamilton in Canada. Path creation in nanotechnology has relied on building a partnership between Ruta N, EPM-UNE, and Purdue University. The National Centre for Nanotechnology was supposed to be modelled on the Birck Nanotechnology Centre at Purdue University with funding coming from EPM. Ruta N has developed various programmes to spur the nanotechnology sector, such as workshops with local actors, General Electric, Purdue University, Cornell University, and the University of Texas at Austin and courses in nanotechnology for high-school students that voluntarily bring international faculty from the Birck Nanotechnology Centre to Medellín. Ruta N has also encouraged local interactions among public institutions, private companies, and universities, through the Nano N Regional Innovation Initiative, and in 2015 a viable business model to be implemented by a local actor was drafted by Tecnalía (Spain) for the National Nanotechnology Centre.

Ruta N has supported path branching in the ICT, energy, and health sectors by devising programmes to respond to weaknesses in technology readiness levels (TRLs). TRLs are 'indicators of the maturity level of particular technologies' (European Commission, 2016) amongst the actors in these three sectors. Ruta N has launched the Science, Technology, and Innovation Observatory as an information system for companies, universities, and research groups to identify and screen potential opportunities, markets, and partners in ICT, energy, and health. In research and development, Ruta N operates Cooperation N to provide travel grants

to companies and research groups to conduct research abroad and thus to build networks with technological leaders. Ruta N has created programmes that target actors in the RIS, such as SMEs, startups, and research groups, to upgrade their capacities, for instance, in developing prototypes, in the commercialisation process, in the protection of intellectual property or in their internationalisation. In many cases, the programmes were implemented by various international actors from knowledge hubs to transfer knowledge to the local actors. Ruta N also provides co-financing opportunities to actors in the ICT, energy, and health sectors. To illustrate the role of Ruta N in the RIS, one project, for instance, is the Telemedicine project in the health sector initiated by the University of Antioquia. Ruta N supported the project by providing funding, screening for potential international partners that are leaders in telemedicine, facilitating the collaboration of local actors with the Open University of Catalonia (Spain), and supporting the effective absorption of extra-regional knowledge by the local actors by continuously monitoring the project.

Ruta N has supported path development by working as a knowledge broker within the RIS. As noted by Elkin Echeverri, Director of the Forecasting and Planning working area, ‘what Ruta N tries to do is: to observe the world, to determine what the RIS is missing, to find the organisations with the solution, to bring them into the system, and to inject that capacity. The organisations do not come to Medellin to give a conference but have contracts to stay 6 months, 8 months, or a year’ (Ruta N, 2015). In addition to knowledge brokering, Ruta N monitors the progress of each of its programmes, especially when it involves an extra-regional implementing actor, and it plays the role of a knowledge gatekeeper. During the course of a programme, Ruta N will ensure that knowledge is properly transferred from the implementing actor to the targeted actor. Ruta N helps the implementing actor to translate extra-regional knowledge to the local context for it to be properly transferred to the targeted actor. Ruta N provides continuous support to the implementing actor so as ‘to tropicalize’ its programme and ensure its effective absorption into the RIS. The act of ‘tropicalizing knowledge’, which was coined due to the city’s geographical location between the tropics, refers to the adaptation or customisation of extra-regional knowledge to Medellin’s context, culture, and existing capacities in order to better facilitate its absorption by the actors of the RIS. This strategy is illustrated by Juan Pablo Ortega, Ruta N Director (2010-2013), when he said that

“our [Ruta N’s] greatest effort was to ensure that the knowledge was relevant to the context of the city. That is, not doing the programme in the same way it is done in Austin, Texas. That is what we did with IC², we were super demanding with them and they were quite surprised, telling us, they always were transferring the methodology in the same way. We told them let’s check if it has meaning for the conditions of Medellin, Colombia and Latin America. We were like partners, building together the programme” (personal communication, July 7, 2017).

In 2016, Medellin outperformed Bogotá on many innovation indicators (see Table 1). From 2001 to 2016, Medellin’s innovation inputs and outputs, such as R&D and STI spending and number of patents and trademarks registered, grew at a faster rate than in Bogotá, Cali, and Colombia. In path branching, from 2007 to 2017, the number of companies in the ICT, health, and energy sectors increased rapidly (see Table 2). Concerning path creation, although the nanotechnology sector has had some moderate success, the digital animation and video game sector has thus far failed to generate notable results. In the nanotechnology sector, Ruta N opened the National Centre for Nanotechnology in March 2018 to support the mass adoption of nanotechnology. In the digital animation and video game sector, the company Pipeline Studios, which was the poster child of the digital animation and video game sector in Medellin, left the city in 2016. In 2017, there were only 35 companies with more than 10 employees in

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Medellin involved in activities that are related to the digital animation and video game sector (graphic design, software development, video postproduction, and audio-visual creation). The transformation of Medellin's RIS is the result not solely of Ruta N's programmes but also of the collective vision of the GEA and its implementation by a wide range of actors in the RIS to position Medellin as an innovation hub (see Figure 1).

Indicators	Regions	2001	2009	2016	Percentage Change (2001-2016)
R&D spending as percentage of GDP	Antioquia	0,26	0,38	0,57	119,2
	Bogotá D. C.	0,23	0,32	0,35	52,2
	Valle del Cauca	0,1	0,12	0,15	50,0
	Colombia	0,13	0,19	0,27	107,7
STI spending as percentage of GDP	Antioquia	0,47	0,74	1,24	163,8
	Bogotá D. C.	0,63	0,91	1,05	66,7
	Valle del Cauca	0,41	0,32	0,45	9,8
	Colombia	0,34	0,45	0,71	108,8
Number of local patents registered	Antioquia	6	24	124	1966,7
	Bogotá D. C.	47	63	189	302,1
	Valle del Cauca	8	7	46	475,0
	Colombia	73	126	545	646,6
Number of Trademarks registered	Antioquia	1404	2780	3143	123,9
	Bogotá D. C.	4047	6733	6639	64,0
	Valle del Cauca	883	1398	1397	58,2
	Colombia	16216	22224	27356	68,7

Table 3.1. Key innovation indicators. Source: SIC (2018) and OCyT (2018).

New Industrial Path Development	2007	2009	2011	2013	2015	2017	Percentage Change (2007-2017)
Path Branching							
ICT	2251	2090	2392	2811	3704	4257	89,12
Energy	884	818	1014	632	847	915	3,51
Health	1173	1254	1502	3082	3910	4215	259,34
Path Creation							
Digital Animation and Video Game*	–	–	–	338	522	616	
Nanotechnology+	–	–	–	28	44	60	

* The digital animation and video game sector includes: software development, video postproduction, graphic design, and audiovisual creation corresponding to ISIC 5820, 5912, 7410, and 9004.

+ Nanotechnology includes the actors participating in the regional innovation initiative in nanotechnology.

Table 3.2. Number of companies in the new industrial path development. Source: Economic Research Unit, Chamber of Commerce of Medellin for Antioquia.

3.5. Discussion

From the 1970s to 2000s, Medellín was isolated from global knowledge flows due to a period of extreme violence, as well as due to idiosyncratic cultural, social, and geographical factors. This isolation contributed to the lock-in of the industrial sector, which hindered new industrial path creation and transition towards more knowledge-based activities through path branching. The limited diffusion of extra-regional knowledge into a RIS contributes to system failures, which require, as in the case of Medellín, policy intervention. The reorganisation of the GEA's strategic priorities, the rivalry from 'narco-elites' to the GEA, and the elections of Mayor Fajardo (2004-2007) and Alonso Salazar (2008-2011), which were backed by the GEA and have led to structural reforms in education, social planning, social inclusion and innovation policies, have paved the way for Medellín's transformation which has included the development of more knowledge-based activities. The institutional proximity and shared vision of the private sector, namely, the GEA and Proantioquia, and the public sector, namely, the City of Medellín and EPM-UNE, have facilitated the creation of an institutional instrument, that is, Ruta N, to connect Medellín to innovation hubs around the world and to accelerate Medellín's transition into a knowledge city.

“In the creation of Ruta N, there were three entities that played a key role. Proantioquia, the foundation of the GEA which includes the most important companies, that started to think about the project, the future of the department and the city. The CTA, created by Proantioquia, that works on science, innovation, and competitiveness. And the third was EPM that was truly important, saying the city needs that, so let's do it! EPM then talked with Proantioquia to validate the project” (Carlos Franco, Ruta N, personal communication, July 28, 2017).

The mission of Ruta N is to facilitate the emergence of new industrial paths, selected in the STI plan as a result of collective consultation involving regional public institutions, private companies, and universities. The strategy that Ruta N has implemented to foster path branching has consisted in identifying gaps in local capacities in the ICT, health, and energy sectors, in scanning international actors to find those that have these capacities, and in transferring these capacities to local actors by contracting with international actors. This strategy aims to accelerate the growth of innovation capacities in the identified sectors by acquiring extra-regional knowledge and recombining it with local knowledge to upgrade local capabilities. The strategy that Ruta N has implemented to foster path creation has primarily consisted of relying on extra-regional actors to transfer extra-regional knowledge and building local capacities in the nanotechnology and digital animation and gaming industries. The early assessment of Ruta N's strategy to support path development (see Tables 1 and 2) is consistent with the framework developed by Balland et al. (2017) who highlight the difficulties and risks associated with support for more complex and unrelated activities compared with more complex and related activities.

“The strategy was to connect us to innovation hubs around the world. It was to not only make us relevant and visible but also to learn from the best-practices and knowledge in which they had a real expertise in” (Juan Pablo Ortega, Ruta N, personal communication, July 7, 2017).

In addition to brokering extra-regional knowledge into the RIS, Ruta N has acted as a knowledge gatekeeper that facilitates the absorption of this knowledge into the RIS. Indeed, Ruta N monitors the programmes implemented by international actors to ensure that the

knowledge is effectively transferred and is relevant to the local context. Ruta N's knowledge gatekeeper role involves supporting the 'tropicalization' of extra-regional knowledge, that is, through the hybridisation of the tacit extra-regional knowledge with the local knowledge. Different types of RIS differ in their propensity to access and absorb extra-regional knowledge. Regions on the knowledge periphery are less exposed to the knowledge from regions at the technological frontier, and, as a result, are in need of interventionist policies. The creation of Ruta N in Medellin is a type of intervention that aims to increase extra-knowledge flows and their absorption into the RIS. In contrast with other knowledge gatekeepers, such as leader firms or universities, in which a lag persists in the diffusion of knowledge, the extra-regional knowledge from public knowledge gatekeepers is directly transferred to the actors in the RIS. The public knowledge gatekeeper, Ruta N, has three roles: the acquisition of extra-regional knowledge, its 'tropicalization', and its diffusion into the RIS. Ruta N has however, faced some difficulties in 'tropicalizing' knowledge due to a lack of internal capabilities and a misunderstanding of its role as a knowledge gatekeeper. In its infancy, Ruta N also misjudged the innovative capacities of many actors in the RIS and thus their capacities to effectively absorb extra-regional knowledge, limiting the policy effectiveness of brokering extra-regional knowledge.

“Ruta N has a particularity in that we have connections with many different entities around the world. What we do is, we capture experience, we capture knowledge, and we bring it to Medellin while obviously transforming it to the Colombian context [...] so we always seek to culturize or tropicalize, to adapt in that way, all this knowledge to our realities” (Andrés Calle, Ruta N, personal communication, July 26, 2017).

“In 2015, we [Ruta N] contracted the Spanish firm TecNALIA to design a business model for the National Centre for Nanotechnology. The business model was very well done but had one important flaw in that it was very European-centred, especially in its financing structure. What we did is, to take part of the model and adapt it to our context” (Melisa Arango, Ruta N, personal communication, July 17, 2018).

“They [Ruta N] brought very skilled experts in different fields of innovation. I remember well the Israelis who came to Medellin to give a course that was so complex for us that the entrepreneurs were saying, ‘I don't understand and don't have the capacity to assimilate what they are offering’” (Rubén Cadavid, Medellin Chamber of Commerce for Antioquia, personal communication, August 3, 2018).

3.6. Conclusions

New industrial regional path development can be facilitated through the acquisition, diffusion, and absorption of extra-regional knowledge in RISs that are located on the knowledge periphery, that lack sufficient extra-regional knowledge flows and that lack the capacity to absorb this knowledge. In Medellin, the RIA has acted as a knowledge gatekeeper that has 'tropicalized' extra-regional knowledge to facilitate its absorption into the RIS. The knowledge gatekeeper is in charge of supporting new regional industrial path development by connecting local actors with international leaders, while monitoring and facilitating knowledge transfer. These findings confirm the importance of extra-regional knowledge and absorptive capacity in regions outside diversified and organisationally thick RISs for path development (Trippel,

Grillitsch, & Isaksen, 2017) while emphasising the importance of the creation of specific institutional arrangements and capacities to pursue such strategies for path development.

For the RIA, Ruta N, the brokerage of extra-regional knowledge has three objectives: first, to improve the capacity of the RIS to acquire, absorb, and diffuse extra-regional knowledge; second, to connect Medellin and Ruta N to relevant innovation hubs around the world, such as Boston, Austin, Silicon Valley, Israel, or Cambridge and to generate formal and informal networks between regional and international actors; and third, to improve the visibility of Medellin and Ruta N as a relevant innovation system in the world.

The RIS concept, which originated in the European academic literature, has been used as an influential analytical tool in different Latin American countries (Llisterri, Pietrobelli, & Larsson, 2011). However, the RIS literature should consider, when applied to Latin America, the contextual specificities that are missing from the European literature. In Latin America, one key specificity, for instance, is the weaker role of governments and the stronger role of regional elites, such as the GEA in Medellin, in their respective RISs. In Medellin, the GEA has been one of the most important actors at the centre of Medellin's transformation of its RIS.

“In 1996, the CTA led the Regional Council for Science and Technology to define the agenda for the Strategic Plan for Antioquia and Medellin. We were the first to talk about Regional Innovation Systems and themes related to innovation, such as the development of health, biotechnology and software” (Santiago Echavarría, CTA, personal communication, July 12, 2017).

This article provides policymakers in specialised and organisationally thick RISs that are located on the knowledge periphery with a policy instrument and a policy strategy to address their remoteness from knowledge cores. In regions located on the knowledge periphery, RIAs can act as regional innovation governance structures that support new industrial path development by facilitating the acquisition, diffusion, and absorption of extra-regional knowledge into the RIS. Although the institutional arrangement of a public knowledge gatekeeper offers benefits in the short-term for the regions on the knowledge periphery, it can hinder the emergence of leader firms and universities that act as knowledge gatekeepers in the RIS. The public knowledge gatekeeper should thus be a temporary policy intervention to better connect the RIS with global knowledge hubs. Future research should categorise regions in the knowledge core, on the knowledge semi-periphery, and on the knowledge periphery to provide better innovation policy-responses for regions in the global South.

Chapter 4
Institutional Entrepreneurs, Socio-Institutional
Changes, and Regional Structural Change

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Eva Panetti is the co-author of this Chapter.

4.1. Introduction

The literature on new industrial path development is increasingly concerned with explaining the evolutionary mechanisms behind structural change (Neffke, Henning, & Boschma, 2011; Tödttling & Trippel, 2018). Path development follows a branching logic into more complex activities since regional path development branches out from pre-existing industries in a region (Asheim, Boschma, & Cooke, 2011). The socio-institutional structure can enable or constrain the new industrial path development instigated by agents of structural change (Cortinovis et al., 2017; Dahlman & Nelson, 1995; Neffke et al., 2018). Due to the ontological nature of the literature on new industrial path development that investigates the causes of structural change to recommend place-based innovation policies, the consequences of structural change on the socio-institutional structure are being overlooked. Indeed, structural change in the economy implies rapid path creation and path destruction that affects the socio-institutional structure, which, in turn, through cumulative causation will affect future path development. The socio-institutional structure refers to the evolutionary structures that co-evolve with the techno-economic structure. The socio-institutional structure involves three knowledge-driven structures: (i) the social structure that refers to informal institutions, (ii) the organizational structure that refers to organizational features within private organizations, and (iii) the institutional structure that refers to the organizations that implement and/or devise formal institutions.

During structural change in the economy, such as during a Kondratieff cycle or during the introduction of disruptive innovations, the socio-institutional structure is briefly decoupled from the techno-economic structure due to its relative inertia compared to a period characterized by rapid increasing technological complexity and by the diffusion of technological disruptions (Antonelli, 2011; Freeman, 1991; North, 2005; Perez, 2004, 2010). The decoupling between the socio-institutional structure and the techno-economic structure generates inefficient systemic interactions leading to transitional failure (Perez, 2010). The transition between two distinct techno-economic paradigms implies changes in ideas, behaviors, organizations, and institutions towards better alignment with the nature of the structural change in the economy (Perez, 2010). The process of coupling and decoupling has also been supported within transition studies (Geels, 2005; Geels & Schot, 2007; Rotmans, Kemp, & Van Asselt, 2001), which have generally been concerned with explaining historical change in socio-technical structures at multiple levels without an explicit reference to the *locus* of the transition.

The neo-Schumpeterian and evolutionary economics view technological change as central in explaining the progress of countries and the divergence between regions within the same country (Aghion & Howitt, 1990). The process of regional divergence also implies socio-institutional divergence, such as in the case of Silicon Valley and Route 128 (Saxenian, 1994) or the Third Italy and the South of Italy (Putnam, Leonardi, & Nanetti, 1994). The geographical perspective to the study of structural change contributes to a better understanding of the divergence among regions and, more importantly, to learn about strategies to smoothen the gap. Scholars have focused on agents of structural change (Chlebna & Simmie, 2018) and institutional entrepreneurs (Sotarauta & Pulkkinen, 2011) to identify the actors that instigate institutional changes or transition and, in some cases, overcome lock-ins by acting as knowledge gatekeepers and promoting global linkages. This is particularly crucial for regions located on the knowledge periphery, which refers to regions that have limited knowledge linkages with the regions in the knowledge core that are significant producers and users of scientific and technological knowledge.

In light of these arguments, this paper looks at the agents aiming to provoke socio-institutional changes during a period of regional structural change. More precisely, we examine the role of Ruta N, a regional innovation agency in Medellín (Colombia) that was created from the joint-leadership of private and public actors, in accelerating the co-evolution of the socio-institutional structure with the novel techno-economic structure. The private sector, under the informal leadership of the *Grupo Empresarial Antioqueño*, has played the role of an institutional entrepreneur that aimed through Ruta N to affect socio-institutional changes. The joint action of the private and the public sectors led to a shared vision to position the city as the “most innovative city in Latin America by 2021”. The wide mandate of the state in supporting structural change in the economy has resonated well in Medellín, which has been following ‘a post-Washington consensus approach to local economic development’ (Bateman, Duran Ortíz, & Maclean, 2010).

By integrating the geographical and institutional scale to the study of structural change and focusing on the role of regional government and institutional entrepreneurs, this article contributes to the academic literature in understanding socio-institutional changes. This article argues that in period of structural change in regions located on the knowledge periphery, the socio-institutional structure lags behind changes in the techno-economic structure, regional innovation agencies can accelerate the co-evolution of the socio-institutional structure by adopting and contextualizing to the regions some elements of the socio-institutional structures from regions in the knowledge core. The paper is organized as follows. First, there is an illustration of the theoretical approach adopted to explain the dynamics underpinning new industrial path development in regions located on the knowledge periphery. Second, a methodological section outlines briefly how the original empirical data were collected and analyzed. Section three illustrates the research strategy adopted for the empirical case study of Ruta N in Medellín. Main results are reported and discussed in section four, before concluding.

4.2. Theoretical Framework

The literature on Evolutionary Economic Geography (EEG) and Regional Innovation System (RIS) is interested in understanding the causes of structural change in the regional economy (Boschma & Frenken, 2006; Isaksen & Trippl, 2014), which lead according to neo-Schumpeterian growth models to the progress of nations, regions, and their divergence (Aghion & Howitt, 1990; Cappelen, Fagerberg, & Verspagen, 1999). The consequences of structural change have been analyzed within different theoretical approaches in transition studies to understand the historical socio-technical changes as the result of the co-evolution and alignment of processes at multiple levels (Geels, 2005; Geels & Schot, 2007; Rotmans, Kemp, & Van Asselt, 2001). Perez (2004, 2010) discusses the process of coupling and decoupling of the socio-institutional structure with the techno-economic structure during periods of structural change in the economy. Conceptually, the authors emphasize the idea that new industrial path development is enabled or constrained in larger structures, but they mainly refer to “embedding” in purely technological terms and neglect to contextualize these processes in particular regional socio-institutional structures.

The socio-institutional structure refers to social, organizational, and institutional structures. First, the social structure refers to informal institutions, i.e. “the conventions and codes of behavior” (North, 1990, p. 4). More precisely, informal institutions are common law, customs, traditions, taboos, codes of conduct, work norms, norms of cooperation, conventions, practices,

and so on (Edquist & Johnson, 1997). One of the main issues concerning this type of enabler is that strong internal social structures such as technological conservatism, tradition, custom, and routine can produce economic inertia and conformism and, as a result, can be powerful obstacles to innovation and technological change (Mokyr, 1990). Informal institutions also affect incentives and behaviors as in the case of entrepreneurship due to attitudes related to risk-taking, failure, status, and prestige (Edquist & Johnson, 1997). Secondly, the organizational structure refers to organizational features through “the implementation of a new organizational method in the firm’s business practices, workplace organization or external relations” that favors technological innovations (OECD, 2005, p. 51). The exploitation of radical and disruptive innovation affects the organizational nature of a firm in a co-evolving process as for example it has happened with the introduction of ICT (Castells, 1996). Moreover, the organizational structure affects transaction costs between and within organizations and the organizations’ capacity to absorb external knowledge (Boschma, 2005). Finally, the institutional structure consists of public organizations that directly implement or devise formal institutions, such as the Municipal government, universities, high schools, linkages organizations, or research centers. Formal institutions are the “rules that humans devise”, such as laws, constitutions, government regulations, formal instructions, and property rights, that affect transaction costs (North, 1990, p. 4). Intellectual property rights, for instance, such as laws and rules concerning patents, copyrights, and trademarks affect the level of appropriability of technological innovation and thus the diffusion of knowledge (Edquist & Johnson, 1997). Institutions are “enabling or constraining mechanisms” that affect the level of knowledge transfer and interactive learning (Boschma, 2005).

The literature on economic geography emphasizes the cumulative nature of technological knowledge as path-dependent, specific, and localized (Gertler, 2004; Maskell & Malmberg, 1999). The socio-institutional structure, which shares similar evolutionary properties with technological knowledge (Hodgson, 1988; North, 1990; Setterfield, 1993), suffers from inertia in periods of structural change in the economy (Freeman, 1991; North, 2005; Perez, 2004, 2010). Structural change in the economy can also be hindered due to socio-institutional lock-ins (Grabher, 1993). In particular, path-dependency and inertia make the socio-institutional structure more resistant and slower to evolve into new technological paradigms, which as a result, create a brief decoupling during periods of rapid technological innovations, such as during the information and communication technology (ICT) revolution (North, 1990; Perez, 2004). The decoupling between the socio-institutional structure and the techno-economic structure causes inefficient systemic interactions leading to transitional failure (Perez, 2004, 2010). The complex interactions between the socio-institutional structure and the techno-economic structure enable or constrain future path development through self-reinforcing mechanisms. The recoupling between the socio-institutional structure and the techno-economic structure is, as a result, necessary for enabling future structural change in the economy (Perez, 2004, 2010).

The differential rhythm and intensity of technological diffusion across regions is generally related to the idea of *knowledge stickiness* (Von Hippel, 1994), *territorial institutional embeddedness* of socio-technical development (Coenen et al., 2012), and various types of *proximities* among the actors engaged in knowledge transfer (Boschma, 2005). Regions on the knowledge periphery suffers from a position on the global knowledge network that not only limits technological knowledge diffusion but also socio-institutional knowledge diffusion due to their limited interactions and absorptive capacity with regions in the knowledge core (Dahlman & Nelson, 1995; Mokyr, 1990). The socio-institutional structure suffers from inertia and thus co-evolve more slowly than the techno-economic structure during periods of

accelerating technological changes (North, 2005; Perez, 2004). Regional policies can promote socio-institutional changes, and ultimately, the recoupling with the techno-economic structure (see Figure 1). Agents of structural change, such as policymakers, civil society, and/or firms, to instigate and support new technological pathways (Chlebna & Simmie, 2018). Institutional entrepreneurs, actors who have a particular interest in shaping institutional arrangements, can play an important role in creating or reforming institutions (Battilana, Leca, & Boxenbaum, 2009). This leadership of the regional government and institutional entrepreneurs to influence socio-institutional changes ultimately has for objective to affect regional economic development (Sotarauta & Pulkkinen, 2011). The ongoing process of decentralization to subnational institutional levels has contributed to the increased role of the regional government in shaping innovation policies (OECD, 2011). In Colombia, the 1991 Constitution has devolved some science, technology, and innovation responsibilities to the regional institutional scale, which has been used in Medellin to experiment with ‘post-Washington consensus approach to local economic development’ (Bateman, Duran Ortíz, & Maclean, 2010; Sánchez Mejía, 2011).

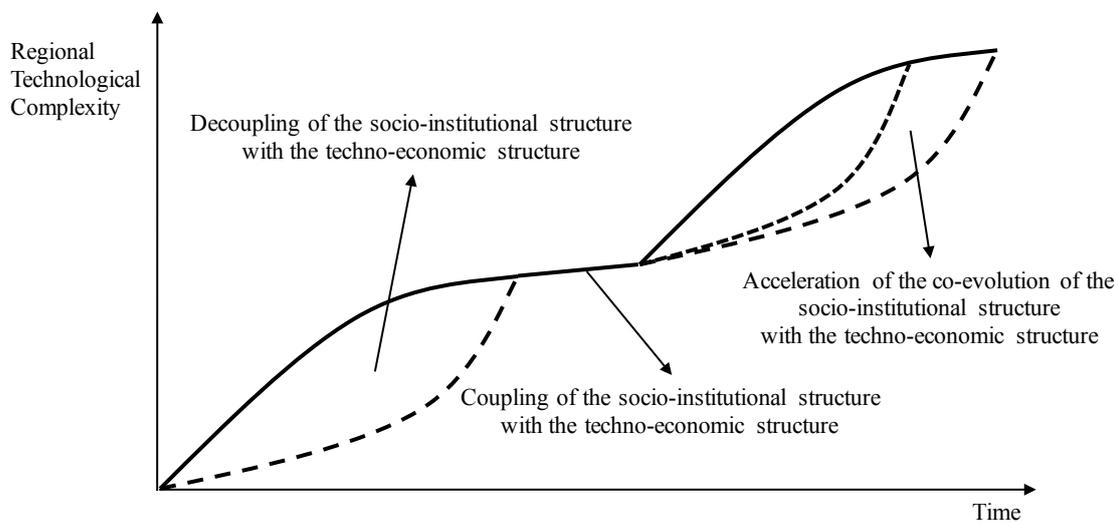


Figure 4.1. The Coupling and Decoupling of the Socio-institutional Structure with the Techno-economic Paradigm. Source: Own Design.

In light of the above discussions, the basic arguments of this paper may be summed up as follows. First, the socio-institutional structure co-evolves more slowly with the techno-economic structure in period of structural change in the economy. Second, the path dependency and cumulative nature of regional knowledge lock regional technological and socio-institutional trajectories into superior or inferior trajectories, thus requiring the adoption of a regional perspective to the study of structural change in the economy. Third, the decoupling between the socio-institutional structure and the techno-economic structure results in transitional failure that requires interventions from regional actors. Finally, the idea that the complex interactions between the socio-institutional structure and the techno-economic structure may enable or constrain future path development. The case study presented in the next sections will serve to provide some support to the above arguments. Indeed, the purpose of this article is to uncover the policies adopted by an entrepreneurial region to facilitate the recoupling of the socio-institutional structure with the novel techno-economic structure in a region on the knowledge periphery that is experiencing structural change.

4.3. Methodology

The research methodology uses a single significant, critical, and high-impact case study “out of the desire to understand complex social phenomena” to inform changes in practices, programs and policies for entrepreneurial regions located on the knowledge periphery (Patton, 2015; Yin, 2013, p. 4). The case study methodology has for benefits to achieve high conceptual validity, to generate new hypotheses, to examine causal mechanisms, and to uncover complex causal interactions making the method particularly useful for theory development (George & Bennett, 2005). The case selected is the regional innovation agency Ruta N in Medellin, which was purposefully sampled for three reasons. First, the City of Medellin has been implementing unorthodox economic policies under ‘a post-Washington consensus approach to local economic development’ within a market-based economy (Bateman, Duran Ortíz, & Maclean, 2010). Second, Ruta N and the City of Medellin have been hailed as best-practices in Latin America (OECD, 2015). Third, Medellin is a secondary city that is transitioning from an industrial into a knowledge city and is located in the global South on the knowledge periphery with limited links with regions in the knowledge core.

Case study research implies extensive collection of data from multiple sources of information, which in this study include semi-structured expert interviews, documents, direct observation, and audiovisual material (Creswell, 2013). In July and August 2017 and 2018, the researcher conducted 76 face-to-face expert interviews in Medellin with 61 different persons to gather extensive data on aspects of the research question. The interviews were conducted with the key stakeholders who have designed, implemented, or participated in Ruta N’s programs as well as with the relevant actors in the regional innovation system, such as Proantioquia, the CTA, EAFIT University, the City of Medellin, CREAME, Parque E, and EPM-UNE. The researcher spent 16 weeks in Medellin to conduct field work in order to have a sense of the specific regional context, to know the participants, to critically discuss the programs implemented, to “know what they know”, and to gain an “insider” perspective (Creswell, 2013; Wolcott, 2008). Secondary data came from audiovisual material, namely, Ruta N’s YouTube channel, and documents, namely, academic articles; articles in local magazines and newspapers, such as *Dinero*, *Semana*, *El Colombiano*, and *El Tiempo*; Ruta N’s internal and external communication materials; documents from the City of Medellin; and documents from private companies and public institutions that participated in Ruta N’s programs.

The data were triangulated in a deductive manner through “pattern recognition” to categorize Ruta N’s programs according to whether they aim to affect the techno-economic structure or the socio-institutional structure (Boyatzis, 1998, p. 7). The data analysis consisted of “examining, categorizing, tabulating, testing, and recombining evidence to produce empirically-based findings” to answer the research question (Yin, 2013, p. 132). Validation was achieved through prolonged engagement, persistent observation, and triangulation to ensure that “the right information and interpretations have been obtained” (Stake, 2013, p. 36). Construct validity was achieved through the use of multiple sources of evidence in a manner encouraging convergent lines of inquiry (Eisenhardt, 1989; Yin, 2013). The rich description allows readers to make decisions regarding the transferability of the policy strategy and specific programs to other regions on the knowledge periphery that are undergoing structural change in their economy (Patton, 2015).

4.4. Case Study – Ruta N in Medellin, Colombia

4.4.1. The context.

The city of Medellin is located in the Aburrá Valley in the Department of Antioquia in the Colombian Andes. Medellin is the second most populous city in Colombia, after the capital city Bogotá, with 2,464,322 inhabitants in Medellin and 3,777,009 inhabitants in the Aburrá Valley in 2015 (City of Medellin, 2018). In 2016, the Antioquia Region was, and still is, the second largest region in terms of its contribution to the national GDP (13.9%), ahead of the Valle del Cauca Region (9.7%) where the city of Cali is located but behind Bogota D.C. (25.7%) (DANE, 2018). Medellin has experienced a rapid decline in homicide, inequality, unemployment, and poverty rates in the past 15 years (see Table 1). The city was ranked in the *Global MetroMonitor* as the best performing city in Latin America in terms of economic performance for the period 2013-2014 (Parilla et al., 2015). Moreover, the city of Medellin has received numerous international prizes and media exposure recognizing the city's unique urban and economic makeover (see Brodzinsky, 2014; OECD, 2015; Wall Street Journal, 2013).

	2002	2009	2015	Percentage Change (2002-2015)
Population in Medellin	2 129 874	2 317 336	2 464 322	15,7
Unemployment Rate	16,7	15,7	9,0	-45,9
Poverty Rate	36,1	23,9	14,3	-60,4
GINI Index	0,55	0,53	0,49	-10,9
Homicide Rate per 100 000 inhabitants	177	94	20	-88,7

Table 4.1. Medellin Key Indicators. Sources: City of Medellin (2018) and Dane GEIH (2018).

Medellin's techno-economic structure is transitioning from traditional industrial activities towards more service-based and knowledge-based activities. In the 1970s, Medellin was the country's industrial powerhouse and one of the largest industrial centers in Latin America (Caballero Argáez, 2016). In the late 1970s, the industrial sector went through a deep structural crisis due to internal and external factors, such as increased competition from the Asian Tiger economies and the uncompetitive production model of the industrial sector due to decades of import substitution and protectionist policies (Restrepo, 1996). The Colombian internal conflict combined with the industrial crisis made the city unable to absorb the growing population that was increasingly spatially segregated, thus contributing to the emergence of the city as a cocaine production and distribution hub (Maclean, 2014). In 1991, the city of Medellin became infamous for being the most dangerous city in the world, with 381 homicides for 100,000 inhabitants (Hylton, 2007). The industrial crisis of the 1970s and the emergence of "narco-elites" in the 1980s led to a rupture between the traditional industrial elite and the political elite (Restrepo Santamaria, 2011). The elections Mayors Sergio Fajardo (2004-2007), Alonso Salazar (2008-2011), and Aníbal Gaviria (2012-2015), which were backed by the *Grupo Empresarial Antioqueño* (GEA) and have led to structural reforms in education, social urbanism, social inclusion, and innovation-led policies, have paved the way to Medellin's economic transformation into more service-based and knowledge-based activities. The GEA, which represents 80% of the city's GDP and 8% of the national GDP, is an informal Keiretsu-like conglomerate that includes *Multilatinas*, namely the investment banking and insurance

company, *Grupo Sura*, the food processing company, *Grupo Nutresa*, and the cement company, *Grupo Argos* (Calle, 2015; Franz 2018). The GEA has since the election of Sergio Fajardo (2004-2007) been involved in multiple institutional arrangements to align the political economy of the city with the Multilatinas' business strategies and to limit the influence of "narco-elites" on the regional political class (Franz, 2018). In the 1990s, the GEAs began a process of internationalization, and in the 2010s, the GEA started to set up R&D centers to promote innovation (Calle, 2015).

On November 11, 2009, the regional innovation agency, Ruta N, was officially incorporated "to lead matters related to science, technology, and innovation in the Municipality of Medellín" (Gaceta Oficial N°3730, 2010, p. 8). Ruta N emerged from the institutional proximity between the Municipality of Medellín and the GEA. Acting as an institutional entrepreneur, the GEA has influenced the creation of Ruta N through diverse actors. The City of Medellín under Mayor Alonso Salazar (2008-2011), back by the GEA, and the municipally-owned multi-utility and communications company EPM-UNE, influenced by the GEA, provided funding for the creation of Ruta N and its operations. Proantioquia, the unofficial philanthropic foundation of the GEA, and the Center for Science and Technology of Antioquia (CTA), a science and technology support organization that was created by Proantioquia in 1989, provided support in the definition of Ruta N's model and its strategy. The regional innovation agency was created from the vision led by the GEA that strategic interventions conducted by the regional government can transform Medellín into "a knowledge and more inclusive city" (Bateman, Durán, & Maclean, 2011; City of Medellín, 2008, p. 87). As Mayor Aníbal Gaviria (2012-2015) noted, "an outstanding case of this model of development and transformation of the city is Ruta N", which is the entrepreneurial instrument of the regional government (Almirall et al., 2016, p. 144). Ruta N's mission is to support Medellín's transition into a knowledge city through the generation of new industrial path development identified in the science, technology, and innovation plan 2011-2021 and the acceleration of the evolution of the socio-economic structure with the novel techno-economic paradigm.

4.4.2. Structural Change.

Since the late 1990s, Medellín's economic structure has profoundly changed. The city is transitioning from traditional industrial activities towards more service-based and knowledge-based activities in line with the GEA's strategic interests. From 2001 to 2017, the relative share in employment in manufacturing has declined by 29.5%, while employment in the tertiary activities, namely commercial and real-estate, has increased by 8.7% and 66.4% respectively (see Table 2). From 2003 and 2015, the share of manufacturing in Medellín's GDP has declined from 20.8% to 18.1% (City of Medellín, 2018). The GDP per capita has increased from COP \$11,711,996 in 2006 to COP \$ 24,156,607 in 2015, or USD \$5,236 and USD \$7,743 at current GDP per capita in 2006 and 2015 (City of Medellín, 2018). The city of Medellín (Antioquia) is also becoming more knowledge intensive and is performing better in key innovation indicators than Bogotá (Bogotá D. C.), Cali (Valle del Cauca), and Colombia as a whole (see Table 3). The city of Medellín is outperforming the cities of Bogotá and Cali in R&D spending as percentage of the GDP and Science, Technology, and Innovation spending as percentage of the GDP (see Table 3). Moreover, the city of Medellín in closing the gap with Bogotá in the number of patents registered. Indeed, the city of Medellín registered 124 patents in 2016 compared to 6 in 2001, representing an increased of 1967% (see Table 3). The number of trademarks registered is also growing at a faster rate in Medellín than in Bogotá, Cali, and Colombia as a

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whole. Trademarks can be used as an indicator for measuring innovation and industrial change and more specifically, service innovation (Flikkema, De Man, & Castaldi, 2014).

Sectors	2001	2009	2017	Absolute employment difference in percentage (2001-2017)	Relative difference in employment in percentage (2001-2017)
Commercial	318 912	444 444	519 470	62,89	8,71
Service	284 846	311 688	371 774	30,52	-12,89
Manufacturing	326 884	324 268	345 710	5,76	-29,42
Real-Estate	85 284	153 476	212 675	149,37	66,43
Transportation	84 680	116 476	159 099	87,88	25,39
Construction	58 467	81 844	130 139	122,58	48,55
Financial	28 388	25 900	41 992	47,92	-1,28
Agricultural	16 428	13 468	16 109	-1,95	-34,56
Energy	2 899	5 328	9 231	218,40	112,50
Mining	846	2 812	3 077	263,88	142,86
Other Sectors	483	296	724	49,83	0,00
Total Number of Employees	1 208 117	1 480 000	1 810 000	49,83	49,83

Table 4.2. Employment per Sector in Medellin. Source: DANE GEIH (2018).

Indicators	Regions	2001	2009	2016	Difference in percentage (2001-2016)
R&D spending as percentage of GDP	Antioquia	0,26	0,38	0,57	119,2
	Bogotá D. C.	0,23	0,32	0,35	52,2
	Valle del Cauca	0,1	0,12	0,15	50,0
	Colombia	0,13	0,19	0,27	107,7
STI spending as percentage of GDP	Antioquia	0,47	0,74	1,24	163,8
	Bogotá D. C.	0,63	0,91	1,05	66,7
	Valle del Cauca	0,41	0,32	0,45	9,8
	Colombia	0,34	0,45	0,71	108,8
Number of local patents registered	Antioquia	6	24	124	1966,7
	Bogotá D. C.	47	63	189	302,1
	Valle del Cauca	8	7	46	475,0
	Colombia	73	126	545	646,6
Number of Trademarks registered	Antioquia	1404	2780	3143	123,9
	Bogotá D. C.	4047	6733	6639	64,0
	Valle del Cauca	883	1398	1397	58,2
	Colombia	16216	22224	27356	68,7

Table 4.3. Key Innovation Indicators. Sources: OCyT (2018) and SIC (2018)

4.4.3. Co-evolution of the Socio-Institutional Structure.

The city of Medellin is transforming its economic structure from traditional industrial activities towards more service-based and knowledge-based activities. The technological transition was promoted from the GEA's understanding that lasting economic growth and social well-being would come from developing strong innovative activities in the region. Ruta N has used two strategies to support the technological transition. First, Ruta N has supported the generation of new industrial path development. Second, Ruta N has devised programs to accelerate the evolution of the socio-institutional structure. The programs were created following a three-step process. First, Ruta N observes the socio-institutional structure in regions at the technological frontier. Second, Ruta N identifies weaknesses in the socio-economic structure in the region. Third, Ruta N creates programs to address that weaknesses. The programs to affect the co-evolution of the socio-institutional structure with the novel techno-economic paradigm were created after selecting and adapting traits in global regions located in the knowledge core that have further evolved socio-institutional structure with the techno-economic paradigm. Ruta N's programs to accelerate the evolution of the socio-institutional structure aim to ultimately reduce the distance between Medellin's social, organizational, and institutional structures with the ones in regions located in the knowledge core that are at the technological frontier.

Programs to accelerate the co-evolution of the social structure with the novel techno-economic paradigm were devised by the innovation culture working area to foster in "the civil society specific attitudes towards innovation" (Angélica Jaramillo, Ruta N, personal communication, August 24, 2017). The Medellin's residents, or Paisas, are known for their inward-looking culture. As pointed out, "for the MIT faculty and students, the world is a village. For the Paisas, this village is the world" (Juan Pablo Ortega, Ruta N, personal communication, July 7, 2017). The programs have targeted residents of Medellin, university students, and middle and high school students. Some of the programs intended to affect the evolution of the social structure are, for instance, the Ruta N's Innovation Awards, Horizons, the Medellinnovation Festival, Startup Weekend, and N-Lab. The Ruta N's Innovation Awards is a program intended to reward innovators in Medellin to position them as aspiration leaders for other actors in the regions. The program Horizons exposed public middle and high school students to high-demand skills in robotics, engineering, and nanotechnology. Horizons aimed "to inspire students to form new imaginaries, which can foster new attitudes, so that the students can internalize their roles in the innovation process" (Angélica Jaramillo, Ruta N, personal communication, August 24, 2017). The program Horizons aimed to generate aspiration for middle and high school students to pursue science, technology, engineering, and mathematics (STEM) careers. The Medellinnovation Festival was a week-long event with multiple events, workshops, and conferences across the city to diffuse innovation concepts and an innovation culture to the civil society. The program Startup Weekend aims to influence university students to pursue entrepreneurship and to create their startups. The programs N-Lab or Innovation Challenge aimed to connect students with private companies to answer to specific challenges and to promote entrepreneurship. Ruta N has conducted several communication campaigns, such as "if you imagine it, it is possible" or "to innovate, it comes from people like you", around the city to diffuse an innovation culture.

Ruta N has created programs to accelerate the co-evolution of the organizational structure with the novel techno-economic paradigm. Programs have targeted of large companies, SMEs, and startups. Some of the programs intended to affect the social structure are Innovation is for Everyone, Innovation Seminars, Innovation Managers, Innovation Management, SCRUM, the

Great Pact for Innovation, Social Lab and Intellectual Property. The programs Innovation is for Everyone, Innovation Seminars, and Innovation Managers aimed to diffuse and to democratize key concepts of technological innovation to the employees of private companies. Innovation Managers targeted 221 companies and provided training in methodology, best practices, knowledge concepts, and tools for 8 months to foster innovative business strategies. The Argentine company Kleer provided training to companies to accelerate software development through the SCRUM methodology. The Swedish company Idealaboratoriet led the program Innovation Management to promote entrepreneurial culture within private companies through lateral and agile thinking methodologies. In 2014, the Great Pact for Innovation was signed by more than 1400 local actors to participate in the innovation effort for Medellin to reach 3% of its GDP in R&D spending in 2021. The pact was widely celebrated and communicated as a collective effort to achieve “a common vision of the future” (Headrik, 1988, p. 13). In the social lab program, Boston College transferred methodologies to large companies to adopt corporate social responsibility practices. Finally, the program in intellectual property, CATI, provides a methodology to identify within company potential patentable innovations and to promote a culture favorable to the protection of intellectual property. The common objective of the programs is to transform the companies’ organizational structure into a structure favorable to a culture of continuous innovation and entrepreneurial thinking.

“When we did Innovation Seminars, we were at a moment of Ruta N’s history when we wanted to democratize innovation, that is, to have everyone understands innovation. It was very large groups in which we taught face-to-face seminars about innovation, what it is, how to do it, but because our purpose was to democratize, we decided to virtualize the course with the program Innovation is for Everyone” (Catalina Carmona, Ruta N, personal communication, August 9, 2018).

“We looked at the different innovation indicators of the OECD, we saw the gap between Medellin and the different countries of the OECD. We won’t close the gap by creating a lot of programs but by giving the responsibility to others, so the Great Pact for the Innovation was like a symbol” (David Sierra, Ruta N, personal communication, July 25, 2017).

Ruta N has created programs to accelerate the co-evolution of the institutional structure with the novel techno-economic paradigm. Programs have targeted the city of Medellin, educational institutions, linkage organizations, and technological research centers. The institutional structure of the city of Medellin has been affected by programs such as Citiesfor.life, MiMedellin, MEData, the Fast-Track Institute, or the Innovation Laboratory for Government. Citiesfor.life is an event that was held in Medellin in 2015 where international urban experts and mayors were invited to exchange urban best practices. The web platform Citiesfor.life was launched to enable cities to exchange best practices for urban challenges. MiMedellin is an open innovation web platform that allows citizens to participate in co-creating urban projects responding to the city’s challenges. The program MEData aims to foster a data-driven governance strategy for the city of Medellin. The Fast-Track Institute is a spinoff from the Singular University in San Francisco and aims to find exponential solutions to urban challenges such as transportation, health, and sustainability for the city of Medellin. Educational institutions, namely, universities and high-schools, have been affected by programs such as SCRUM, Acceleration Program, Innovacampus, Spinoff Colombia, and Generation N. The Argentine company Kleer transferred the SCRUM methodology to disrupt the education sector through ICT. Cambridge University led the acceleration program to mentor local universities in developing disruptive projects. The program Innovacampus aimed to foster innovative

capacities in local universities through exchange of best practices with German universities. Through the program Spinoff Colombia, Ruta N has enabled the adoption of a national policy facilitating the creation of university spinoffs. Additionally, the program Spinoff Colombia supports university research centers through a methodology in bringing research inventions to market. The program Generation N aims to train high school teachers in project-based learning as a pedagogical tool for teaching STEM classes. Linkage institutions, such as Ruta N, have been affected through the Diagnostic for Regional Innovation Systems and the program Innovation Management for Institutions. The OECD and T2 Venture Capital provided consulting to recommend improvements in programs to build a stronger regional innovation system. Innovation Management for institutions aims to generate capacities for linkage institutions to provide consulting services. Finally, the program Encurso was led by the Monterrey Institute of Technology and provided technological research centers for health professionals, communicating a methodology to conduct efficient clinical trials.

“In the Innovation Laboratory for Government, we want to have the entities of the local government, Secretaries, and decentralized entities, to start thinking about innovation. Citizens often perceive the government as a very archaic and massive thing. We went there to motivate the Secretaries to start implementing innovative processes, connecting them with citizens to listen to them and to prioritize goals, and most importantly to find solutions” (José Willington, Ruta N, personal communication, August 3, 2018).

4.5. Discussion

The city of Medellin is undergoing structural change in its economy (see Tables 2 and 3). As pointed out by Federico Gutiérrez, Mayor of Medellin 2016-2019, “we were the industrial capital of Colombia in the 20th century, but due to new global dynamics, we reinvented our economic calling. Today, thanks to Ruta N, we are stimulating our innovation ecosystem, to move towards a knowledge economy” (Ruta N, 2018, p. 4). The *Grupo Empresarial Antioqueño* (GEA), playing the role of an institutional entrepreneurs, has instigated socio-institutional changes and this technological transformation from their understanding that lasting economic growth and social well-being in Medellin would come from moving away the industrial sector and developing strong knowledge-based and service-based activities. The GEA together with its philanthropic organization Proantioquia have participated in the creation of multiple public-private partnerships to align their business strategic goals with their vision for the city (Franz, 2018). The institutional proximity between the GEA and the consecutive municipal governments of Sergio Fajardo (2004-2007), Alonso Salazar (2008-2011), and Aníbal Gaviria (2012-2015) led to the creation of Ruta N, the most ambitious organization and institutional change to technologically transform the city.

“There wasn’t an institution promoting innovation and entrepreneurship that we [Proantioquia] think has to be a permanent objective for a city like ours if we want to become more connected in the new competitive realities of Latin America and the world” (Rafael Aubad, Proantioquia, personal communication, 8 August 2017).

“We have some targets year by year until 2021 to give you an idea of science and technology activities, it started at 0.75 in 2014, today we are at around 1.8 and in three years the goal is to reach 3% of the GDP in 2021. If you reach 3% in 2021, you are far ahead of other regions in Latin America and you begin to be ahead of

many regions in Europe” (Elkin Echeverr , Ruta N, personal communication, 27 July 2017).

Ruta N was created as an entrepreneurial regional innovation agency with significant funding, a wide mandate, and a high flexibility. Ruta N has created programs to support new industrial path development and to accelerate the co-evolution of the socio-institutional structure with the novel techno-economic paradigm. The organization created programs to accelerate the evolution of the social, organizational, and institutional structures. Ruta N’s strategy has relied on observing the already co-evolved socio-institutional elements in regions at the technological frontier and on creating programs relevant to the local context to support some of these transformations in the region. Ruta N has participated in supporting the evolution of the socio-institutional change in the region. The organization has however, suffered from a lack of internal capacities and a lack of collaboration with other actors in the region to effectively create the most appropriate programs to support the evolution of the social, organizational, and institutional structures. Moreover, the creation of programs has relied on trials-and-errors to address weaknesses rather than a clear theoretical understanding of the socio-institutional structure.

The socio-institutional structure has considerably evolved in the past decade (see Table 4). From the interviews conducted with expert stakeholders in the regional innovation system, the role of Ruta N in supporting socio-institutional change has been positive. Ruta N has been more successful in transforming the socio-organizational structure than the institutional structure. In the past decade, the socio-organizational structure has evolved towards more positive perception of innovation and entrepreneurship, as pointed out: “Ruta N has been successful in generating in a short period a critical mass of persons and companies interested in topics related to innovation and entrepreneurship” (Alejandro Mazo, Parque E, personal communication, 22 August, 2018). The organizational structure has evolved to more entrepreneurial and investment to innovations thanks to the successful transfer from Ruta N of methodologies to private companies. For the institutional structure, while “Ruta N is an institutional innovation”, Ruta N has failed to collaborate with institutional actors in the RIS due to its strong paternalistic vision towards other actors in the RIS. Moreover, the non-alignment of some public organizations with the GEA’s interests led to resistance to changes promoted by Ruta N, which is seen by those public organizations as too aligned with the GEA. Ruta N has however, been successful in generating more citizens’ participation and co-creation with the program MiMedellin and more recently with the Innovation Laboratory for Government.

Socio-Institutional Changes		
	2009	2018
Social Structure	“There were mental barriers in Medellin for the innovation process to take place, such as risk aversion, status quo, and norms hindering the creation of startups and research and development projects”.	“The residents of Medellin have started to understand the power of innovation, the strategic importance of innovation. It has allowed to internally position the topic of innovation”.
Organizational Structure	“Private companies are now willing to take risks with entrepreneurs, which was not the case 10 years ago. When we were doing courses in business models 10 years ago, the entrepreneurs came with very traditional business models” .	“In 2009 and 2010, these large companies [from the GEA] didn’t have a department in charge of innovation but today all of them have one”.
Institutional Structure	“In the beginning, Ruta N was conceived as an intermediary institution working with actors of the system, the City of Medellin, CTA, Chamber of Commerce, CREAME, Parque E to strengthen them in order for them to operate the programs”.	“Ruta N generated a lot of conflicts between the different actors, nothing alarming, but a lack of coordination and a lot of rivalities between the different actors in the innovation ecosystem”.

Table 4.4. Selected Quotes from Interviews to Illustrate Socio-Institutional Changes.

4.6. Conclusions

Regions on the knowledge periphery that are undergoing structural change in their economies should support the acceleration of the co-evolution of the socio-institutional structure with the techno-economic structure to limit instabilities and inefficiencies resulting from structural change. The decoupling between the socio-institutional and the techno-economic structure causes a specific type of system failure, transitional failure, that result from the inertia of the socio-institutional structure due to their path-dependent evolutionary nature and their lack of efficient systemic interactions. In Medellin, the agents of structural change that have been identified are the GEA, the policymakers, and the institutional proximity between the two groups of agents. The GEA has played the role of institutional entrepreneurs to influence and to guide socio-institutional changes in the RIS. The GEA was motivated to act as institutional entrepreneurs to reinforce their leaderships in the region’s political economy, to limit the influence of competing elite groups, such as narco-elites, and to promote regional economic development from their paternalistic regional vision. The pragmatic vision of the regional government and the business elites has led to the creation of Ruta N as the institutional instrument to support the city’s transition from traditional industrial activities towards more service-based and knowledge-based activities. The region has promoted socio-institutional changes to limit instabilities and inefficiencies from structural change in the regional economy.

CHAPTER 4

Ruta N has been more successful in accelerating changes in the social and organizational structure than in the institutional structure. The programs to induce changes were devised by learning from regions in the knowledge core that already gone through structural change in their regional economies. The role of the region government in affecting socio-institutional change is, as a result, conditional on the public sector's capabilities, the regional actors' willingness, the organization's legitimacy, and the resources to carry out programs to reduce transitional failure.

These findings are relevant for the academic literature on the multifaceted issue of structural and institutional changes in regions on the knowledge periphery. This article adds to the literature on institutional entrepreneurs and innovation systems illustrating that institutional entrepreneurs can indirectly influence socio-institutional changes through the creation of specific institutional arrangements. The regional government can participate in socio-institutional changes during structural change. This article is relevant for policymakers in regions on the knowledge periphery when drafting relevant policies and programs to affect socio-institutional changes. The paper argues that structural change in the economy implies rapid path creation and path destruction that affects the socio-institutional structure, which, in turn, through self-reinforcing mechanisms and cumulative causation will affect future path development. The socio-institutional structure are thus enablers of structural change. Future research should investigate the role of enablers of structural change in supporting new industrial path development.

Chapter 5

Balancing Gentrification in the Knowledge Economy: The Case of Chattanooga's Innovation District

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5.1. Introduction

Innovation districts are being adopted in cities around the world as local economic development strategies. Barcelona (Spain), Boston (Massachusetts), Chattanooga (Tennessee), Detroit (Michigan), Medellín (Colombia), Montréal (Canada), Philadelphia (Pennsylvania), Rotterdam (the Netherlands), San Diego (California), and Sydney (Australia) are some examples of cities that are building their own version of an innovation district. The concept of the innovation district is the policy response to the increasingly spatial and urban dimensions of the knowledge economy (Carrillo et al., 2014; Yigitcanlar & Velibeyoglu, 2008). An innovation district is a place-based urban development strategy that aims to regenerate an under-performing downtown neighborhood into a desirable location for knowledge and creative companies and workers (Pancholi, Yigitcanlar, & Guaralda, 2015; Yigitcanlar, Baum, & Horton, 2007). The main objective of innovation districts is to accelerate the technological innovation process by clustering knowledge companies and workers (Katz & Wagner, 2014). In 2015, Mayor Berke announced the creation of an innovation district in downtown Chattanooga. The innovation district aims to leverage opportunities from the ‘Gig’ economy that was initiated in 2010 when the Electric Power Board (EPB), a public utility company owned by the City of Chattanooga, launched the fastest fiber-optic Internet network in the United States, providing clients with one gigabit speed Internet (Motoyama et al., 2016).

The knowledge economy is criticized for contributing to gentrification and economic, social, and racial polarization (Edlund, Machado, & Sviatschi, 2015; Florida, 2017; Glaeser, Resseger, & Tobio, 2009; Stehlin, 2016). The development of innovation districts is also criticized for being non-participative and undemocratic in which local governments are pushing a neoliberal agenda favoring the middle and upper classes (Moulaert, 2000; Shin & Stevens, 2013; Swyngedouw, Moulaert, & Rodriguez, 2002). This paper contributes to the literature on gentrification studies, innovation districts, and knowledge-based urban development (KBUD) by providing policy responses and strategies to better distribute the benefits when pursuing place-based, knowledge-based urban redevelopments. Indeed, the academic literature has widely assessed the negative impacts of the knowledge economy on the urban fabric but has not provided policy responses to build more inclusive innovation districts (see Florida, 2017; Glaeser, Resseger, & Tobio, 2009; Stehlin, 2016).

This paper asks the following question: what are the policy responses to mitigate the negative externalities of adopting a place-based, knowledge-based urban development strategy such as that of an innovation district? The innovation district of Chattanooga is selected as a single exploratory case study. The research conducted for this paper is based on three sources of data: semi-structured interviews, secondary data, and direct observation. The paper is highly relevant for urban policymakers who wish to mitigate the negative externalities from the creation of an innovation district in their cities and for academics who wish to investigate the impact of such policies. The paper finds that the programs that are being implemented in Chattanooga can be regrouped into three categories: socioeconomic, urban, and housing.

5.2. Literature review

5.2.1. The knowledge economy and innovation districts

In the 1990s, capitalist countries started to undergo an economic transition towards post-

Fordism, or knowledge-based economies (Amin, 1994; Drucker, 1998). In the knowledge economy, technological innovation is a precondition for higher standards of living and economic prosperity (OECD, 1996; 2015). The knowledge economy is, however, criticized for polarizing the workforce and hollowing out the middle class (Acemoglu & Autor, 2011; Autor, Levy, & Murnane, 2003; Goos & Manning, 2007). Technological innovations are concentrated in large urban centers, favoring the emergence of ‘superstar cities’ (Edlund, Machado, & Sviatschi, 2015; Gyourko, Mayer, & Sinai, 2013). Superstar cities concentrate economic wealth and are also highly unequal (Glaeser, Resseger, & Tobio, 2009). In superstar cities, the middle and upper-middle classes are being priced out due to rising rents and costs of living (Kuper, 2013). Superstar cities are thus becoming cities that only multi-millionaires and billionaires can afford to live in (Florida, 2017). The innovation economy has fostered this type of economic polarization in some cities, such as San Francisco, leading to demonstrations against knowledge companies and knowledge workers (Carroll, 2014).

The concept of an innovation district has emerged as cities harness the transformative power of technological innovations to become knowledge cities. Indeed, cities are increasingly seen as the key administrative unit to spur technological innovations (Florida, Adler, & Mellander, 2017). The concept of an innovation district is the policy response to the increasingly spatial and urban dimensions of the knowledge economy (Bevilacqua & Pizzimenti, 2016; Carrillo et al., 2014), combining innovation theories with socioeconomic trends that have emerged in the knowledge economy (Morisson, 2014). Innovation districts are using placemaking to lure and retain knowledge workers, who are seen as the most important element in building a successful knowledge economy (Esmailpoorabi, Yigitcanlar, & Guaralda, 2016; Florida, 2002; Pancholi, Yigitcanlar, & Guaralda, 2015). Using conceptual elements from knowledge-based urban development (KBUD), innovation districts can be created through market forces or through public interventions (Morisson, 2014; Pancholi, Yigitcanlar, & Guaralda, 2015). Market-driven innovation districts, however, have proven to greatly contribute to gentrification (Mirabal, 2009).

5.2.2. Innovation districts and gentrification

Among the criticisms of innovation districts, one of the most recurrent is the issue of gentrification, leading the Brookings Institution to write an article around the question ‘Do innovation (districts) equal gentrification?’ (Vey, 2017). As a place-based strategy to foster the knowledge economy, innovation districts also, as a result, emphasize the significant role of real estate development companies in satisfying the strong demand for urban transformations (Bevilacqua, Pizzimenti, & Maione 2017), thus deviating from the original aim of building an inclusive and community-led knowledge economy towards more exclusion and polarization resulting from market forces.

Innovation districts are criticized for being no less than gentrification programs (Moulaert, 2000; Smith, 2002; Swyngedouw, Moulaert, & Rodriguez, 2002). The term gentrification was coined by Glass (1964) to describe changes in London neighborhoods in the late 1950s and the 1960s. Lees, Slater, and Wyly (2013) define gentrification as ‘the transformation of a working-class or vacant area of the central city into middle-class residential and/or commercial use’ (p. xv). Gentrification is a process that involves ‘the transition of inner-city neighborhoods from a status of relative poverty and limited property investment to a state of commodification and reinvestment’ (Ley 2003, p. 2527). In gentrified neighborhoods, the population structure changes from working class to upper-middle class and, most often, from black to white (Ehrenhalt, 2012; Harvey, 2012). In San Francisco, the knowledge economy also implied a

political-economic restructuring to accommodate the urban milieu to the new demands of the knowledge economy (Stehlin, 2016).

For many, the concept of an innovation district is a strategy that echoes renewal programs, which were implemented in the 1950s and 1960s to redevelop downtown areas in cities around the United States (Hartman, 1964). Renewal programs were extremely controversial since they involved displacement, that is, the ‘forced involuntary dislocation’ of disadvantaged households (Palen & London, 1984, p. 12). Forms of displacement include: direct displacement, indirect displacement, exclusionary displacement, displacement pressure, and social exclusion (Lees, Morales, & Shin 2015). The fear of displacement is the primary concern behind community activism against gentrification (Freeman, 2005). Jane Jacobs, the leading figure against urban renewal programs, was fiercely opposed to Robert Moses’ urban renewal plans, which replaced well-functioning neighborhoods with immense towers that were isolated from the streets that surrounded them (Jacobs, 1961). In the 1980s, local and regional governments in the United States stepped out from implementing urban renewal programs, leaving gentrification as the outcome of market forces solely (Harvey, 2012). The academic literature on gentrification provides us with both its positive and negative aspects (Atkinson, 2004). The negative effects of gentrification are numerous, the most severe effects range from displacement to the ‘destruction of community, the increased squeeze on housing availability, and higher rents’ (Smith & LeFavre, 1984, p. 58). For municipal governments, however, gentrification increases property values and, ultimately, expected property tax revenues (DeGiovanni, 1984). Some authors have hypothesized that the process of gentrification could trickle down to the poorest residents of the neighborhoods (Lowry, 1960; Smith, 1964). There is, however, poor evidence that such positive gentrification would increase social mix, social capital, and social cohesion (Lees, 2008).

In the academic literature, gentrification is seen as the outcome of urban reinvasion, which is a global phenomenon (see Atkinson & Bridge, 2005; Palen & London, 1984). Urban reinvasion has been mostly explained in the literature as ‘demographic-ecological’, ‘sociocultural’, and ‘political-economic’ consequences (Palen & London, 1984). The ‘demographic-ecological’ explanation refers to the changes in both the population composition and basic demographic processes (Palen & London, 1984). Indeed, relatively affluent, young, child-free couples are more likely to choose to live in the city, close to places of work and leisure (Palen & London, 1984). The sociocultural explanation refers to values, attitudes, ideas, choices, and beliefs as factors determining human behaviors (Palen & London, 1984). The ‘young affluent white residents’ perceive themselves as pioneers, rediscovering downtowns, bringing with them liberal utopian ideals while also looking for safe diversity (Allen, 1984). Florida (2002) notes that the creative class seeks to live in downtown areas in search of tolerance, diversity, and urban amenities. The ‘political-economic’ explanation refers to the disagreement between the traditional and Marxist approaches. The traditional neo-classical view emphasizes competition, supply and demand, market efficiency, and the impersonality of the liberal state, while the Marxist view focuses on ‘intergroup power relationships and uneven costs and benefits of neighborhood change’ (Palen & London, 1984, 17).

5.3. Methodology

The research methodology is based on a single exploratory case study using primary and secondary data. The author uses the case study approach ‘out of the desire to understand complex social phenomena’ over which the researcher has no control (Eisenhardt, 1989; Yin,

1994, p. 4). The purpose of the case study is to uncover the policy responses that are being implemented in order to mitigate the negative externalities of place-based, knowledge-based urban development strategies, such as those associated with innovation districts. Chattanooga's innovation district was purposefully sampled to provide an 'information-rich case' (Patton, 2015, p. 230) since in contrast with many innovation districts that have heavily relied on public interventions or real estate companies for their development (see Pancholi, Yigitcanlar, & Guaralda, 2015), Chattanooga's innovation district has involved the participation of a wide range of actors, such as foundations, 501(c)3 organizations, the local government, real estate companies, the local university, the municipally owned utility company, startups, and private companies, thus allowing for more inclusive considerations. As a result, the case was selected for the purpose of generating findings to inform changes in practices, programs and policies (Patton, 2015). Moreover, the investigation of programs to mitigate the negative externalities of innovation districts has not been fully examined. Thus, a qualitative approach is the most appropriate method (Creswell, 2013; Eisenhardt, 1989).

The research conducted for this paper is based on three sources of data: semi-structured interviews, secondary data, and direct observation. The in-depth semi-structured interviews were conducted in Chattanooga with key informants with extensive knowledge on the innovation district and the programs that are being implemented to mitigate some of the negative externalities of this strategy. In total, 17 in-depth interviews were conducted in Chattanooga. The actors interviewed in Chattanooga were: the Mayor's Office Chief of Staff, The Enterprise Center, the Lyndhurst and Benwood Foundations, the power company EPB, the River City Company, the Urban League of Greater Chattanooga, Green Spaces, Chattanooga Design Studio, CO.LAB, Launch Chattanooga, TechTown, and the Chattanooga-Hamilton County Regional Planning Agency. The stakeholders were selected according to their strong knowledge and diverse perspectives on the phenomena studied (Eisenhardt & Graebner, 2007). The research used but was not limited to the following secondary data: the different actors' websites; planning documents; articles in academic journals, news websites, newspapers, and magazines, such as *Chattanooga Times Free Press*, *Nooga.com*, *The Guardian*, *The New York Times*; and annual reports. The direct observations involved non-participatory observations in Chattanooga's innovation district. The researcher traveled to Chattanooga for ten days to conduct field work in November 2017, during which he conducted approximately 22 hours of formal and informal observations in Chattanooga's innovation district and its immediate surroundings. The observations refer to situations in which the researcher 'gathered field notes by spending more time as an observer than as a participant' and recorded 'experiences for scientific purposes' (Creswell, 2013, p. 160). The observations were conducted during the event, 1Table, a Thanksgiving potluck on Martin Luther King Boulevard, at the Edney Innovation Center, and at different public and social spaces in the Chattanooga's innovation district to uncover the extent to which the district is diverse and inclusive. Informal field notes and informal conversations with residents and during interviews were conducted to reduce the observer's own biases.

This case study aims to categorize the strategies that have been adopted in Chattanooga to build a more inclusive innovation district. The data are analyzed in an inductive manner to uncover patterns in the programs implemented and to create 'categories that divide some aspect of the world into parts along a continuum' (Patton, 2015, p. 457). Reliability, that is, the stability of the categories developed following the same procedures, is achieved through convergence across multiple data sources and through congruence between the research question and the research design phase (Creswell, 2013; Patton, 2015; Yin, 1994). The categories are internally homogenous and externally heterogeneous in that they 'hold together in a meaningful way' and have clear boundaries (Patton, 2015, p. 467). Validation is achieved through prolonged

engagement, persistent observation, and triangulation to ‘assure that the right information and interpretations have been obtained’ encouraging convergent lines of inquiry (Eisenhardt, 1989; Stake, 2013, p. 36). The rich descriptions and the categories presented allows the readers to make decisions regarding transferability of the policy strategies and specific programs to build more inclusive innovation districts (Patton, 2015).

5.4. Chattanooga’s innovation district

5.4.1. Background

Chattanooga is a mid-sized city located in Hamilton county, southeastern Tennessee, between Nashville and Atlanta. The Tennessee river goes through the city, which lies topographically between the Appalachian Mountains and the Cumberland Plateau. As of 2016, the city has a population of 177,571 inhabitants and a metropolitan population of 551,632, making it the fourth largest and most populated city in Tennessee following Nashville, Memphis, and Knoxville (U.S. Census, 2017). As of 2015, the median household income in Chattanooga is \$40,177 and the unemployment rate is 6.2% compared to \$53,889 and 5.2%, respectively, in the United States (U.S. Census, 2017).

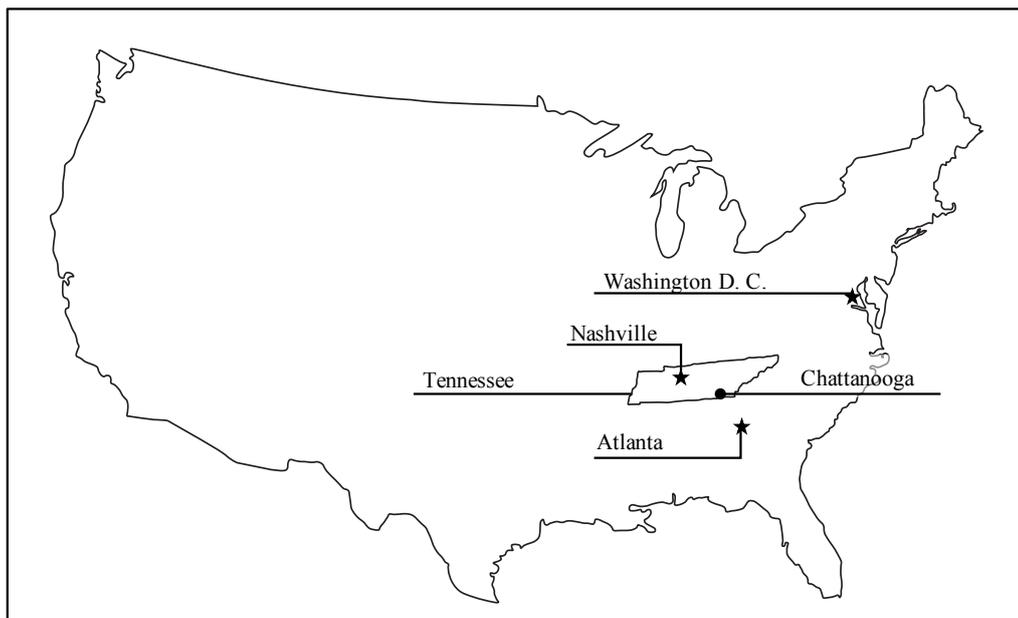


Figure 5.1. Map of the United States and location of Chattanooga. Source: authors’ design.

In first half of the 20th century, Chattanooga experienced an industrial boom and was dubbed the ‘Dynamo of Dixie’, a nickname principally derived from the city’s iron foundries and machine works (Eichenthal & Windeknech, 2008, p. 8). In 1899, Benjamin F. Thomas, Joseph B. Whitehead, and later John T. Lupton obtained exclusive rights to bottle Coca-Cola in the United States, bringing prosperity to the city (Eichenthal & Windeknech, 2008). The negative externalities of this industrial success were the deterioration of air quality and urban white flight (Eichenthal & Windeknech, 2008). In 1967, the Chattanooga Chamber of Commerce formed a task force to combat air pollution, which recommended the imposition of stricter regulations. The industrialists in Chattanooga first resisted changes to clean up the air. There was a sense that Chattanooga was doing well when heavy smoke was coming out of the

smokestacks (Roberts, 2010). In 1968, however, the federal government withdrew federal funding until the city came up with ‘stronger regulations and better enforcement plans’ (Roberts, 2010, p. 30). In 1969, the Department of Health, Education, and Welfare released a report that ranked Chattanooga as having the worst air quality in the United States and urged the city to take immediate actions to combat air pollution (Roberts, 2010, p. 31).

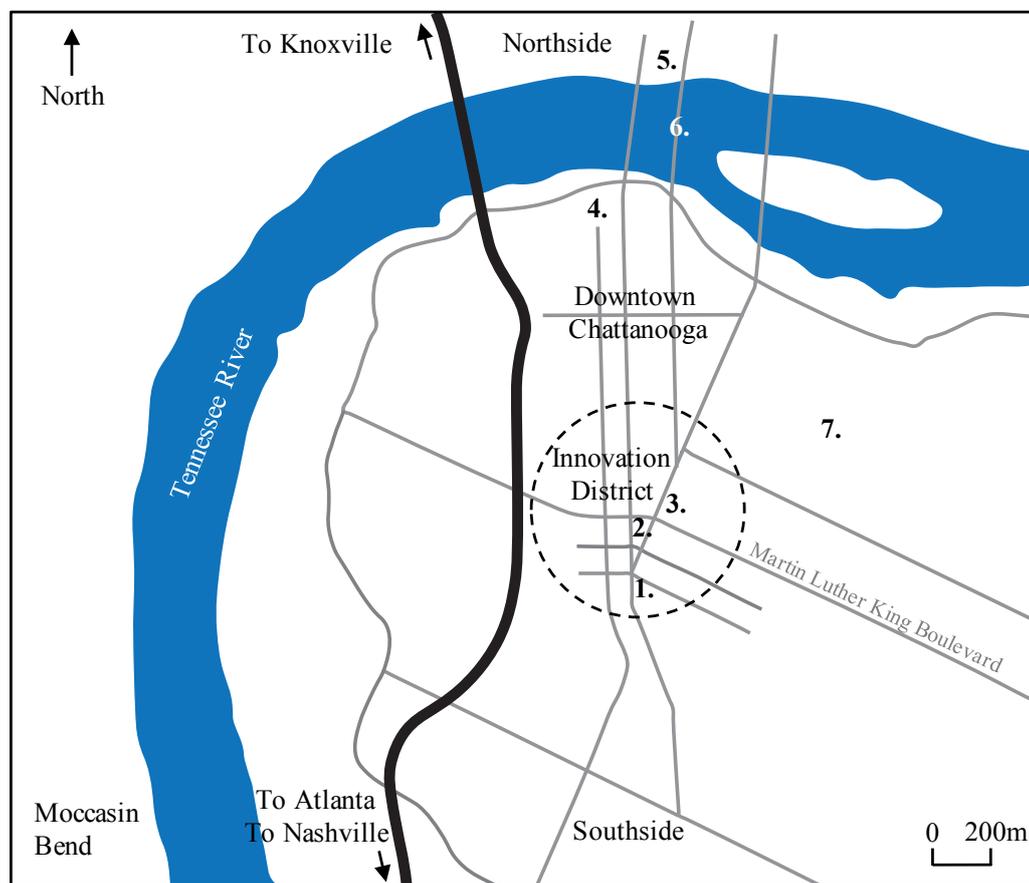
In the 1970s, Chattanooga cleaned up its air partly due to more stringent environmental regulations and partly due to deindustrialization (Roberts, 2010). With manufacturing companies leaving the city to go overseas, unemployment and underemployment increased. The suburbanization and deindustrialization transformed downtown Chattanooga into a district of abandoned factories and empty warehouses (Youtie, 1999). From 1950 to 1990, the population in downtown Chattanooga underwent a 10-fold reduction, from approximately 10,000 to 1,000 inhabitants (U.S. Census, 2017). In the late 1970s and 1980s, the city experienced racial tensions, which culminated when, in 1980, members of the Ku Klux Klan shot five African American women on 9th Street, later renamed Martin Luther King Jr. Boulevard (Roberts, 2010). The industrialists encouraged the status quo, hindering the emergence of genuine civic movements, which led the local population to compare the Mountain City Club, an invitation-only private club, as the real Mayor of Chattanooga (Roberts, 2010).

The transformation of Chattanooga and its downtown began when Jack Lupton took over the family foundation, the Lyndhurst Foundation, a legacy endowed from bottling Coca-Cola in Chattanooga. The city of Chattanooga has many foundations thanks to its rich industrial past and its Coca-Cola legacy, such as the Lyndhurst Foundation, the Benwood Foundation, the Footprint Foundation, the Maclellan Foundation, the Tonya Foundation, and the Tucker Foundation. Jack Lupton remarked ‘no city this size in the world has the kind of foundation dollars that this city has’ (as cited in Dedman, 1986, p. 8). In the early 1980s, the mission of the Lyndhurst Foundation shifted when Jack Lupton took over the foundation to support the transformation of downtown Chattanooga and promote local economic development. In 1981, the Lyndhurst Foundation funded ‘Chattanooga in Motion’, an initiative where local leaders visited other cities that had transformed their downtown areas (Eichenthal & Windeknech, 2008). In 1982, the Moccasin Bend Task Force was formed to investigate riverfront development alternatives on the Tennessee River and across from downtown Chattanooga (Eichenthal & Windeknech, 2008; Youtie, 1999). The Lyndhurst Foundation provided more than \$1 million a year for *Chattanooga Venture*, a not-for-profit organization that was created in 1983 to help the community shape a new vision for the city, *Vision 2000* (Times Free Press, 2011). The community-based goal-setting process, *Vision 2000*, involved over 1,700 people and resulted in more than 40 goals to improve the quality of life in Chattanooga, leading, for instance, not only to the creation of not-for-profit organizations, such as Chattanooga Neighborhood Enterprise (CNE) in 1986, Public Education Foundation in 1988, and River City Company in 1986, but also to the creation of public spaces, such as the Tennessee Aquarium in 1992, the Walnut Street Bridge in 1993, and the 21st Century Waterfront in 2005 (Eichenthal & Windeknech, 2008; Times Free Press, 2009; Youtie, 1999).

5.4.2. The knowledge turn and the launch of the innovation district

In 2010, the municipal utility company, the Electric Power Board of Chattanooga (EPB), launched the ‘Gig’, thus becoming the first company to offer a 1 gigabit-per-second fiber-optic Internet network in the United States (Lobo, 2015; Rushe, 2014). The Gig provided considerable media exposure. For *The Guardian*, the Gig ‘is driving a tech boom’ (Rushe,

2014). For *The New York Times*, the Gig is ‘Chattanooga’s new locomotive’ (Wyatt, 2014). In 2013, the newly elected Mayor, Andy Berke, formed the Technology, Gig, and Entrepreneurship Task Force in order to leverage opportunities from the Gig (Technology, Gig, and Entrepreneurship Task Force, 2014). The Task Force recommended the creation of an innovation district in downtown Chattanooga. In 2015, Mayor Berke officially launched Chattanooga’s Innovation District in order to build on the momentum from the Gig and newly established startups and venture capital companies in downtown Chattanooga, thus becoming the first mid-sized city in the United States to have an innovation district (Morton, 2015). The innovation district spans a circular 140 acres (approximately 56 hectares) in downtown Chattanooga (Malek, 2015). The actors that are located in the innovation district include but are not limited to: EPB; the Lamp Post Group, a venture capital company; Chattanooga Chamber of Commerce; Causeway, a not-for-profit organization; the Public Library; the Public Education Foundation; the Benwood Foundation; the City Hall; the River City Company; the ArtsBuild; and the Edney Innovation Center, which houses some important anchors, including The Enterprise Center, TechTown, CO.LAB, and Launch Chattanooga.



1. Edney Innovation Center, 2. Miller Park, 3. Patten Parkway, 4. Tennessee Aquarium, 5. Renaissance Park, 6. Walnut Street Bridge, 7. University of Tennessee at Chattanooga.

Figure 5.2. Stylized map of downtown Chattanooga and innovation district. Source: authors’ design.

The Enterprise Center, a not-for-profit organization, was chosen to pilot the transformation of the district into an innovation district (Malek, 2015). The Enterprise Center’s mission is ‘to establish Chattanooga as a hub of innovation, improving people’s lives by leveraging the city’s digital technology to create, demonstrate, test, and apply solutions for the 21st century’ (The Enterprise Center, 2016, p. 3). The Enterprise Center is a public-private partnership financed

by the City of Chattanooga, Federal Grants, and Foundations (The Enterprise Center, 2015). The Enterprise Center works on three strategic areas: the innovation district, research and application development, and digital equity. In 2015, the Enterprise Center piloted the creation of the Edney Innovation Center, a 90,000-square-foot building that has diverse functions and tenants, within the innovation district, serving as an anchor for the district. Indeed, not-for-profit organizations such as The Enterprise Center, Tech Goes Home, CO.LAB, TechTown, co-working spaces, startups, and private companies are located in the Edney Innovation Center, which serves as a collision space with public and private events. In digital equity, the Enterprise Center operates the program Tech Goes Home.

The City of Chattanooga has actively branded itself to external investors; the Gig, the innovation district, the city's electric buses, and the transformation of its downtown area are all part of this marketing strategy (Lambe & de Zeeuw, 2016). The transformation of Chattanooga's downtown began in the 1990s thanks to the *Chattanooga Venture* and its brainchild not-for-profit organizations, such as the River City Company, and to diverse actors from the private and public sectors coming together to form public-private partnerships. Following the launch of the innovation district, the city's downtown experienced large project redevelopments, which amounted to almost \$1 billion in private investment (River City Company, 2017). Chattanooga's downtown will receive 2,649 new apartment units, 274 new townhomes, 1,461 student beds, and 698,035-square-feet of commercial spaces (River City Company, 2017). Since the 1990s, the redevelopment of downtown Chattanooga has contributed to its gentrification. Indeed, the Southside district and the district around the University of Tennessee at Chattanooga have been ranked in the list of the 25 fastest-gentrifying neighborhoods between 2000 and 2010 in the United States, along with neighborhoods in cities such as Portland, Oregon, or Brooklyn, New York (Petrilli, 2012).

In the downtown area, Census Tract 31, Hamilton County, home to the innovation district, the population has increased from 1,346 in 2000 to 1,658 in 2015. The number of households with an income above \$75,000 has increased rapidly from 28 in 2000 to 200 in 2015, representing 4.9% and 24.5% of the total number of households, respectively (see Table 1). In contrast, households with an income inferior to \$20,000 have strongly decreased from 357 in 2000 to 300 in 2015, representing 61.9% and 36.8% of the total number of households, respectively. However, the number of households with an income less than \$10,000 has remained stable thanks to the presence of Patten Tower. Located in front of the Edney Innovation Center and as part of the section 8 subsidized housing program, Patten Tower houses 241 residents (Smith, 2013). The number of households with an income between \$20,000 and \$40,000 has increased quite substantially thanks to payment-in-lieu-of-taxes (PILOT) agreements to attract middle-class families to the downtown area (Leach, 2016). The racial makeup of the district has shifted from 63.3% White and 34.2% African American in 2000 to 71.1% White and 25.6% African American in 2015. The median household income has increased from \$14,271 in 2000 to \$29,837 in 2015, a 109.1% increase compared to 23.9% for the City of Chattanooga. Downtown Chattanooga is, as a result, a neighborhood undergoing what can be described as light gentrification. Indeed, households living in the neighborhood have shifted from lower class to lower-middle class and upper-middle class.

CHAPTER 5

Household Income	2000		2010		2015		Gain or Loss from 2000 to 2015	Gain or Loss from 2000 to 2015 (in Percentage)
	Number of Households	Percentage	Number of Households	Percentage	Number of Households	Percentage		
Less than \$10,000	210	36,40	239	32,65	207	25,40	-3	-1,43
\$10,000-20,000	147	25,48	107	14,62	93	11,41	-54	-36,73
\$20,000-30,000	64	11,09	115	15,71	109	13,37	45	70,31
\$30,000-40,000	49	8,49	15	2,05	94	11,53	45	91,84
\$40,000-50,000	21	3,64	71	9,70	22	2,70	1	4,76
\$50,000-75,000	58	10,05	32	4,37	90	11,04	32	55,17
\$75,000-100,000	17	2,95	51	6,97	43	5,28	26	152,94
\$100,000-150,000	11	1,91	89	12,16	80	9,82	69	627,27
More than \$150,000	0	0,00	13	1,78	77	9,45	77	N/A
Total Households	577	100,00	732	100,00	815	100,00	238	41,25

Table 5.1. Household income in census tract 31 Hamilton county in 2000, 2010, and 2015. Source: U.S. Census (2017).

5.4.3. The strategies adopted to limit the negative externalities of the knowledge economy

Since the mid-1980s, Chattanooga’s leaders have transformed their city and their downtown areas through ‘public-private partnerships, strong planning, bold implementation, and constant input from the public’, an approach dubbed as the ‘Chattanooga Way’ (Eichenthal & Windeknech 2008, p. 23). In 2013, Mayor Berke launched *Chattanooga Forward*, a collective goal-setting and recommendation process involving six different Task Forces—Sports & Outdoors; Entertainment & Attractions; Housing; Downtown; Technology, Gig & Entrepreneurship; and Arts. The goal was to ‘write the next chapter in Chattanooga’s story’ by leveraging the city’s ‘long history forging public and private partnerships and engaging citizens to help us reach our common goals’ (City of Chattanooga, 2014). The \$14 million redevelopment of Miller Park that is scheduled for July 2018 in the heart of the innovation district is an example of a public-private partnership in the city. The redevelopment of Miller Park came from a community-led plan—the 2014 City Center Plan—promoted by the River City Company. Working closely with the City of Chattanooga, the River City Company was in charge of collecting \$7.5 million in donations for the overall project (Leach, 2017). Foundations, namely, the Benwood and Lyndhurst Foundations, private companies, EPB, and the city contributed to the redevelopment of the Miller Park. EPB has offered \$2 million through a mix of in-kind and financial support (Leach, 2017).

Foundations, most notably two place-based foundations, the Benwood and the Lyndhurst Foundations, have fostered many of the public-private partnerships that have emerged in Chattanooga. Since the 1990s, Benwood, Tonya, Lyndhurst and other foundations and individual donors have pumped more than \$200 million into the redevelopment of downtown

Chattanooga (Times Free Press, 2009). Since the mid-2000s, the Benwood and the Lyndhurst Foundations have adopted a proactive entrepreneurial mindset in promoting local economic development and the knowledge economy in Chattanooga. The Benwood Foundation has focused on supporting public education and the creation of places in the city's downtown, such as the Patten Parkway, Miller Park, and the Tomorrow Building, the first co-living space in Chattanooga, through funding not-for-profit organizations such as the River City Company and the Chattanooga Neighborhood Enterprise (CNE). The Lyndhurst Foundation has been a catalyst in innovative local economic development strategies focusing on entrepreneurship, planning with the Chattanooga Design Studio, and civic engagement. The foundation was the catalyst in the creation of the not-for-profit organization CreateHere in 2007, a five-year initiative which helped entrepreneurs to establish more than 110 local businesses and facilitated the relocation of artists in the Southside district (Smith, 2012). Following the idea of the creative class, the goal of CreateHere was to revitalize Main Street and MLK Boulevard to attract and retain talent in Chattanooga, which suffered from brain drain (Smith, 2012).

Chattanooga's leaders have recognized the potential negative externalities—such as income, social, and racial polarizations, and gentrification—that would come from adopting a place-based, knowledge-based urban development strategy. The Technology, Gig, and Entrepreneurship Task Force emphasizes that 'equity and inclusion must be hallmarks of our work' (Technology, Gig, and Entrepreneurship Task Force 2014, p. 3). The Task Force stresses the importance for *Digital Inclusion* by claiming 'Chattanooga will only be successful in this new economy if we focus effective efforts on increasing digital inclusion among all citizens and offering everyone the benefits of an increasingly computer and web based world' (Technology, Gig, and Entrepreneurship Task Force 2014, p. 3). Chattanooga's leaders have adopted three types of strategies to limit the negative externalities of the knowledge economy in the downtown area: first, promoting digital equity and fostering entrepreneurial opportunities for underrepresented groups; second, programming the downtown area as a place for everyone; and third, building affordable housings. The strategies are implemented by a wide range of actors, such as the City of Chattanooga, the Electric Power Board (EPB), and not-for-profit organizations, and are funded by place-based foundations, grants, and corporate sponsors. The actors are intrinsically intertwined, a specificity characterizing the Chattanooga Way, building public-private partnerships to reach positive outcomes in the strategies adopted.

Digital equity is promoted by organizations, such as Tech Goes Home, TechTown, and the Urban League of Greater Chattanooga. Tech Goes Home, which is part of the Enterprise Center, was established in 2015 with the goal of offering 15-hour courses on basic computer and Internet skills to low-income residents, namely, early childhood, school children, and the workforce. Upon completion, participants have the possibility to purchase a new computer for \$50 and have low-cost Internet options. Tech Goes Home has also partnered with the coding school Covalence to offer scholarships for low-income Chattanooga residents with the Industrial Development Board of the City of Chattanooga. TechTown was established in 2014 as a technology learning center focusing on Science, Technology, Engineering, Art, and Math (STEAM) education for 7- to 17-year-old children. TechTown provides financial help, such as transportation and scholarships, to low-income children and schoolchildren from Title-1 schools. TechTown also created the Tech Workforce program that provides coding skills for unemployed and underemployed adults with incomes under \$35,000 a year. The Tech Workforce program received various grants from corporate sponsors and one from the City of Chattanooga. The Urban League of Greater Chattanooga was founded in 1982 as an affiliate of the National Urban League, focusing on the empowerment of the African American community in Chattanooga. The organization launched the STEM academy, an after-school program,

servicing minorities and low-income populations. Hamilton County aims to reach 75% postsecondary educational attainment by 2025 under the umbrella program Chattanooga 2.0 led by the Benwood Foundation, the Chattanooga Area Chamber of Commerce, the Hamilton County Department of Education, and the Public Education Foundation (PEF).

The promotion of entrepreneurship to underrepresented groups is led by organizations such as Launch Chattanooga, the Company Lab (CO.LAB), the Urban League of Greater Chattanooga, and the Jump Fund. Launch Chattanooga is a not-for-profit organization that was created in 2011 as a micro-business training and coaching center. The organization promotes entrepreneurial skills to underrepresented groups in the entrepreneurial sector, such as minorities, low-income residents, women, and persons 50 and older. CO.LAB is a not-for-profit startup accelerator that was created in 2010 as a spinoff from the not-for-profit CreateHere. CO.LAB serves as Chattanooga's 'front door' for entrepreneurs with its acceleration programs for startups and high-growth startups. CO.LAB aims to attract underrepresented groups in the entrepreneurial community through programs that reach out to the entire Chattanooga community. In 2016, 30% of the participants were from minority groups and 64% of the participants were female (The Company Lab, 2017). Causeway promotes Co.Starters for Causes, an acceleration program to train community leaders to become social and civic entrepreneurs. The Urban League of Greater Chattanooga is promoting the program Next Level, dedicated to small business owners who want to scale up their operations. The Jump Fund is a private organization that was launched in 2013 to provide women entrepreneurs with seed capital.

The promotion of the city's downtown and its innovation district as a place for everyone is a collective effort involving not-for-profit organizations, such as the organizations working toward digital equity and entrepreneurship, the River City Company, Chattanooga Design Studio, CO.LAB, Causeway, the Enterprise Center, the City of Chattanooga, and the Chattanooga-Hamilton County Regional Planning Agency. The strategies to transform the innovation district into a place for everyone is done through organizing events and placemaking. The 5th floor of the Edney Innovation Center hosts many public events organized by CO.LAB, such as Will This Float, 48Hour Launch, Talk Shop Tuesday, Chadev, and 1 Million Cups; by Tech Goes Home with Tech Tune-up Tuesday; by Launch Chattanooga with seminars and the creative morning; and by The Enterprise Center. There are approximately 150 events organized on the 5th floor of the Edney Innovation Center every month; these events are programmed to be welcoming and interesting to everyone. Launch Chattanooga and Tech Goes Home organizes their graduation ceremonies on the 5th floor of the Edney Innovation Center to give a sense of ownership to the participants. The River City Company has promoted events, such as Startup Week Chattanooga and concerts, that are open to the public at Miller Plaza, a space located in the innovation district. Causeway organizes every year in the innovation district, Spark, an event to celebrate Chattanooga's change-makers, and 1TABLE.

The River City Company has actively promoted placemaking in downtown Chattanooga and its innovation district with the passageways, a program to transform alleyway into art installation. For instance, the River City Company and Chattanooga Design Studio have recommended through community-led planning process the 2014 City Center Plan, the creation of high-quality places, parks, and parkways as to enhance the experience of being in the innovation district. The redevelopment of Miller Park and Patten Parkways developed from these recommendations. In 2016, the Chattanooga-Hamilton County Regional Planning Agency adopted a form-based code for downtown Chattanooga and its immediate surroundings to promote housing stock diversity, density, mixed-use developments, and walkability. In 2017,

the Enterprise Center, Causeway, PK Management, and the YMCA have collaborated to open a healthy and affordable grocery store in Patten Towers, Bingo's Market, to alleviate a downtown food desert for its most deprived residents. Finally, the City of Chattanooga aims to further connect the innovation district to the Martin Luther King Boulevard, the historical African American neighborhood, and the University of Tennessee at Chattanooga.

The River City Company has been an advocate of payment-in-lieu-of-taxes program, or PILOT, in order to build affordable housing in downtown Chattanooga. PILOT programs are property tax breaks that were traditionally used to attract large companies, such as Amazon, Coca-Cola, and Volkswagen among others, to Chattanooga. The housing PILOT program, which was first introduced in 2002 and ended in 2012, provided real estate developers with an incentive to build apartments in downtown Chattanooga (Brogdon, 2015). In 2014, the City of Chattanooga introduced a PILOT program that offers a 10-year tax break for real estate developers under the condition of renting 20 percent of the units to renters who earn less than 80 percent of the area median income (Smith and Smith 2014). In 2016, the Chattanooga City Council approved a new tax break plan to encourage private developers to create more affordable housing (Leach, 2016). The tax incentive plan, a payment-in-lieu-of-taxes program, targets private developers, encouraging them to offer 50 percent of their rental units at below market rate to renters who earn less than 80 percent of the area median income (Chattanooga City Council, 2016). In return, real estate developers receive property tax freezes for up to 10 years for new construction or 14 years for rehabilitation of existing sites (Chattanooga City Council, 2016). Chattanooga Neighborhood Enterprise (CNE), a not-for-profit organization that is partially funded by the City of Chattanooga and foundations, has built affordable housing in downtown Chattanooga, such as the Grand Hotel. The organization also provides financial assistance, such as loans and mortgages, as well as assistance in case of foreclosure.

5.5. Discussion

The fear of displacement, which is dominating the debate about gentrification, is hindering the discussion about genuine progressive approaches to distribute the benefits of urban redevelopment strategies. Freeman (2005, p. 487) argues that 'neighborhoods are dynamic entities, and who moves in can be just as important as who moves out in determining neighborhood change'. Indeed, displacement often plays a minor role in the process of gentrification (Freeman, 2005; Freeman & Braconi, 2004). Place-based, knowledge-based urban development strategies, such as of an innovation district, can, in contrast to traditional capital-led urban renewal programs, bring additional benefits, such as enhanced innovation capacities and branding, to local stakeholders that can be more progressively distributed. It requires, as in the case of Chattanooga, a variety of public and private actors to join efforts to pursue a common vision.

The strategies that have been implemented in Chattanooga to limit the negative externalities of the knowledge economy can be regrouped into three main categories: socioeconomic, urban, and housing strategies (see Table 2 for an overview). The socioeconomic strategy refers to the promotion of entrepreneurship among underrepresented groups in the entrepreneurial community through programs such as mentoring, coaching, seed capital access, and entrepreneurial assistance. The socioeconomic strategy also involves digital training and STEAM education in an effort to bridge the digital and technological divides within the city's residents through programs targeting young children, low-income communities, unemployed and underemployed persons. The urban strategy refers to a plan of action to make the downtown

area a place that is interesting and welcoming to everyone through placemaking, the creation of park and parkways, and events. More importantly, it aims to consciously shape programs to give to the most underrepresented groups, a sense of ownership of the innovation district. The housing strategy refers to the creation of affordable housing. In the case of Chattanooga, it is pursued through property tax breaks to real estate developers and through the not-for-profit organization Chattanooga Neighborhood Enterprise (CNE).

Category	Strategy	Actors	Targets	Interviews Quote
Socio-economic	Digital Equity	Tech Goes Home, TechTown, Urban League of Greater Chattanooga, Public Education Foundation	Low-income residents, schoolchildren, minorities, African American community, unemployed adults	"TechTown saw the need that every kid should be exposed to coding, when we say every kid, we mean from every zip code, every neighborhood. We make sure that we have programs for the kids living in the mountains and for the kids living in the city." (Chris Ramsey, TechTown, personal communication, November 16, 2017).
	The Promotion of Entrepreneurship	Launch Chattanooga, CO.LAB, Urban League of Greater Chattanooga, Jump Fund	Underrepresented groups in entrepreneurship, such as minorities, low-income residents, women, older adults (50+)	"We look at who is not in the room and our job is to help them launch a dream and get it off the ground and bring them into the room so they are welcome in the conversation about entrepreneurship." (Marco Pérez, Launch Chattanooga, personal communication, November 17, 2017).
Urban	Events	Causeway, The Enterprise Center, Launch Chattanooga, Tech Goes Home, CO.LAB, River City Company	Everyone	"We are consciously and deliberately programming events and places so they are welcoming and interesting to everybody, all ages, all races, all income levels" (Ann Coulter, The Enterprise Center, personal communication, November 16, 2017). "We bring the participants into the innovation district. First, to give them some ownership, this building (Edney Innovation Center) is a resource they can utilize." (Sammy Lowdermilk, Tech Goes Home, personal communication, November 16, 2017).
	Placemaking	River City Company, Chattanooga Design Studio, Chattanooga-Hamilton County Regional Planning Agency	Everyone	"We know that innovation districts need great public spaces so that people can congregate. That is what we are trying to create with the redevelopment of Miller Park and Patten Parkway." (Amy Donahue, River City Company, November 17, 2017).
Housing	Affordable Housing	River City Company, Mayor's Office, Chattanooga Neighborhood Enterprise (CNE)	Renters earning less than 80 percent of the area median income	"The things that we fund are designed to make it more equitable. We try not to play in the same lane as the private market so a lot of the things that we put our support behind would not have happened without us" (Stacy Richardson, Mayor's Office, November 20, 2017).

Table 5.2. Summary of strategies adopted in Chattanooga to distribute the benefits of the knowledge economy. Source: Authors' Design.

If the strategies adopted in Chattanooga are successfully implemented, especially the urban dimension, then the ongoing gentrification of the downtown area can be seen as an evolution of the district. In the 1980s and 1990s, downtown Chattanooga, like many other downtowns in the United States, was predominantly a low-income residential area and an area where more affluent persons worked. In the knowledge economy, the transformation of downtown Chattanooga can be seen as a case showing how the controversial aspects of gentrification can find a synthesis in combining a higher social mix with increased knowledge spillovers under the condition of successfully implementing the strategies discussed in this paper. The ongoing gentrification shifting the share of low-income households towards middle- and high-income households in the district can serve to reduce the 'cognitive distance' among groups of residents while at the same time fostering the needed diversity of information between different social groups, thus fostering knowledge spillovers that can be absorbed. The continuous process of information diversity that is offered and demanded in a mixed community can be seen as a sort

of knowledge spillover lifecycle. Nooteboom (1999) shows that knowledge diffusion is constrained by the ‘cognitive distance’ between actors. This cognitive distance should not be too wide or too similar. Indeed, knowledge that is already known is just as useless as knowledge that cannot be understood (Boschma, 2005). By contrast, the effects of gentrification in downtown Chattanooga, combined with the implementation of the discussed strategies, may reduce the cognitive distance between residents while simultaneously fostering novelty and diversity of information through an increased social mix.

5.6. Conclusions

Place-based, knowledge-based urban development strategies, such as of innovation districts, can contribute to some of the negative externalities of the knowledge economy such as gentrification, and income, social, and racial polarization. At the urban level, gentrification is one of the most visible outcomes of building a successful knowledge economy (Florida, 2017; Mirabal, 2009; Stehlin, 2016). The strategies that have been implemented in Chattanooga to limit the negative externalities of the knowledge economy have socioeconomic, urban, and housing components. The solutions are especially relevant for mid-sized cities in developed countries that are adopting place-based, knowledge-based development strategies. For policy-makers, the case of Chattanooga invites them to draft mitigation policies while planning knowledge-based development strategies. For academics, the case of Chattanooga invites them to rethink the issue of gentrification as an evolution of downtown areas in the United States, especially in the context of the knowledge economy, where gentrification can facilitate knowledge spillovers as long as gentrification encourages an optimal cognitive distance between different socioeconomic groups in the district.

The strategies adopted to limit the negative externalities, such as those adopted in Chattanooga’s innovation district, highlight the role of local governments and place-based actors in designing and implementing policies to ensure that the benefits from innovation districts are distributed to as many people as possible while limiting displacement and other negative externalities arising from such urban redevelopment. In Chattanooga, many progressive projects would not have happened without the innovation district strategy, such as the Bingo’s Market in the section 8 subsidized housing, Patten Tower, and the renegotiation of the PILOT program to include more affordable housing. The strategies must, however, be constantly revisited to provide as many benefits as possible to an audience as wide as possible. The socioeconomic strategy should involve formative and summative evaluations of the programs to measure their impacts on residents and the city. The urban strategy should involve low-cost transportation options to come in and out of the downtown area, especially for low-income residents, as well as places, events, bars, restaurants, and shops that are affordable and interesting for diverse ethnic and socioeconomic groups. The housing strategy should involve the creation of a relatively high percentage of affordable housing in order for it to be relevant.

The Benwood and Lyndhurst Foundations have been the catalysts in the early transformation of the City of Chattanooga through placemaking and innovative local development strategies. Moreover, thanks to the presence of the place-based foundations, a strong ecosystem of not-for-profits working toward local economic development and social inclusion have been created. The launching of the ‘Gig’ in 2010 by EPB and of the innovation district in 2015 by Mayor Berke marked a strong knowledge-based urban development strategy. The common strategy and vision between a wide range of public, private, and not-for-profits actors that is the hallmark of the ‘Chattanooga Way’ has adopted innovation mitigation

CHAPTER 5

strategies to limit income, social, and racial polarization. The future will tell us if these strategies were successful in making the city more inclusive or just in transforming the city's downtown and its innovation district into a playground for the affluent, innovative, and creative.

Chapter 6

Conclusions

6.1. Main Findings

This PhD thesis is policy-oriented and thus has important implications for regional innovation policies, as the objective of each chapter is to come up with specific policy recommendations. The implications are also important for the literature on EEG and RIS that have recently been more and more concerned on providing policymakers with tailored policy recommendations (see Asheim, Boschma, & Cooke, 2011; Balland et al., 2018; Isaksen, Tödting, & Trippl, 2018; Lambooy & Boschma, 2001). To do so, the four main chapters have investigated more deeply four different research questions to address four specific gaps identified in the academic literature. The structure of each chapter's findings is divided as followed: (1) the research gap in the academic literature and how it was addressed empirically, (2) the main findings and the policy weaknesses, and (3) the main policy recommendation.

The Role of Institutional Contexts

The first gap that this PhD thesis addresses is to investigate the design and implementation of regional innovation policies in different regional institutional contexts, and to explore to what extent they are similar and different. To address this gap, four different regional innovation agencies (RIAs) in three different regional innovation systems (RISs) were selected, namely Brainport Development in the Brainport region (the Netherlands), Innobasque and SPRI in the Basque Country (Spain), and Ruta N in Medellín (Colombia). The institutional contexts were purposefully selected to be as wide as possible, a metropolitan-region in the Dutch institutional context characterized by a coordinated market economy, an autonomous region in the Spanish institutional context characterized by its “collective entrepreneurship” model of innovation, and a metropolitan-region in the Colombian institutional context characterized by a strong role of regional elites and weak role of the government. The data collected from a multiple case study approach, come from 31 interviews, desk research, and non-participant observation.

The cases were similar in their approaches to design and implement place-based policies. Influenced by the new public management (NPM), Brainport Development, Innobasque, and Ruta N have legal statutes that define them as not-for-profit organizations—in order to increase their autonomy, flexibility, and to limit political influences due to the role of the private sector in the definition of their model. The RIAs have designed and implemented place-based policies to address specific weaknesses in their RIS through monitoring their RIS and successful RISs around the world, identifying weaknesses in their RIS through coordinating multiple actors, locating the actors with the capacities to address the weaknesses, and of creating the place-based programs to generate the capacities in their RIS.

The cases were different in their capacities to address weaknesses in their RIS through coordinating triple or quadruple helix. The RIAs have coordinated diverse stakeholders to identify and address weaknesses in their RISs. In the case of Brainport Development, the coordination has involved the creation of multi-level triple-helices to define the strategic

priorities and to evaluate of the strategy. In the case of Innobasque, the coordination consisted of the creation of advisory boards to identify weaknesses in the RIS. In the case of Ruta N, the coordination involved the creation of a triple-helix board of directors. The RIA's level of coordination reflects the specificities of each institutional context. Although Brainport Development was successful in coordinating multiple triple helices to address weaknesses in its RIS, Innobasque and SPRI have suffered from coordination failures due to multi-level governance. Ruta N has suffered from a process of trial-and-error as a result of its lack of collaboration with other innovative actors in the RIS. Moreover, the weaknesses that were identified differed depending on the three RISs showing that there is no "one-size-fits-all" innovation policy.

Independently of the institutional contexts, Chapter 2 provides five policy implications for policymakers in creating regional innovation agencies (RIAs) to design and the support the implementation of place-based policies. First, the private and public sectors must have a shared vision for the RIA. Second, the right level of governance for the RIA is the metropolitan region, as the RIA's coordination of multi-level governance will lead to institutional complexity and coordination failures. Third, the RIA must mobilize the most important actors in the RIS coming from the private sector, the public sector, academia, and the civil society. RIAs are seen as more legitimate in mobilizing a diverse range of actors than are regional governments, which might be politically motivated. Fourth, the role of the RIA is to monitor its RIS and successful RISs around the world, to identify weaknesses in its RIS, to locate the actors with the capacities to address those weaknesses, and to design and support the implementation of the place-based programs to generate these capacities in their RIS. Fifth, the RIA must coordinate multiple quadruple helices at many decision levels, from the definition of the strategic priorities and the identification of weaknesses, to the design, implementation, and evaluation of the place-based policies.

The Importance of Extra-Regional Linkages

The second gap that this PhD thesis addresses is to explore an ambitious policy strategy implemented in a peripheral region to foster extra-regional knowledge linkages. To answer this research question, Ruta N, the regional innovation agency (RIA) of Medellín in Colombia was selected. Medellín has suffered from its isolation from global knowledge flows due to a period of violence, its culture, its protectionist elites, and its geography. The RIA was purposefully selected for being an ambitious policy experiment in a region in the global South to connect the region to global knowledge hubs. The data collected for the in-depth case-study came from 51 face-to-face semi structured interviews, desk research, observation, and audio-visual materials.

Chapter 3 finds that Ruta N has contracted many extra-regional actors to address weaknesses within its RIS. The RIA has facilitated extra-regional linkages through acting as a knowledge gatekeeper that has "tropicalized" extra-regional knowledge to facilitate its absorption into the RIS. The extra-regional knowledge linkages were supported through knowledge tropicalization, that is, the contextualization of the extra-regional knowledge to the specific regional institutional contexts through the co-creation process between the RIA and the extra-regional actors. The knowledge gatekeeper strategy to connect local actors with extra-regional linkages offers the benefits of generating visibility of the RIS to other RISs around the world, of creating networks, and of leaking extra-regional knowledge more rapidly.

The policy strategy to incorporate extra-regional linkages into regional innovation policies can have downsides. First, it requires strong internal capabilities to successfully "tropicalize"

extra-regional knowledge. Ruta N has faced some difficulties in “tropicalizing” knowledge due to a lack of internal capabilities. Second, it requires correctly assessing the capabilities of the actors in the RIS. In its infancy, Ruta N misjudged the innovative capacities of many actors in the RIS—and thus their capacities to effectively absorb extra-regional knowledge—limiting the policy effectiveness of brokering extra-regional knowledge due to a lack of collaboration with the existing actors in the RIS. Third, the creation of a public knowledge gatekeeper can offer benefits in the short-term for the regions on the knowledge periphery to develop extra-regional linkages but could hinder the emergence of leader firms and universities that act as knowledge gatekeepers in the RIS.

From this chapter, the main policy recommendation is for regions located on the knowledge periphery, which have been isolated from global knowledge flows and which possess the critical mass of innovative actors and support organizations to strengthen, to create regional public knowledge gatekeepers. Especially, regions that have been isolated due to wars, embargoes, or extreme levels of violence would most benefit from a policy strategy to connect the regional actors with innovation hubs around the world. The public knowledge gatekeeper must have an acceptable level of internal capacities to accurately assess the weaknesses in the RIS and contextualize the extra-regional knowledge to facilitate its absorption into the RIS. Lastly, the policy must be temporary to create the critical threshold of international linkages and favor the emergence of regional leader firms and universities acting as knowledge gatekeepers.

The Role of Institutional Entrepreneurs

The third gap that this PhD thesis addresses is how institutional entrepreneurs have aimed to accelerate institutional changes during regional structural change through specific actors within their RIS. The chapter empirically investigates institutional entrepreneurs and institutional changes at the regional level. To address this gap, the metropolitan-region of Medellín and its regional innovation agency (RIA), Ruta N, were selected. The data collected for the in-depth case-study came from 76 interviews, desk research, observation, and audio-visual materials.

The chapter finds that the private sector, under the informal leadership of the *Grupo Empresarial Antioqueño* (GEA), has played the role of institutional entrepreneurs to indirectly influence socio-institutional changes through participating in the creation of Ruta N. The GEA was motivated to act as institutional entrepreneurs to reinforce their leaderships in the region’s political economy, to capture policies to support its restructuring towards more knowledge based activities, to limit instabilities from regional structural change—learning from past regional structural changes in the 1980s that led to the worst economic and social period in Medellín’s history—to limit the influence of competing elite groups—such as narco-elites—and to promote regional economic development from their paternalistic regional vision.

The chapter finds that during regional structural change, the decoupling between the socio-institutional and the techno-economic structures creates a system failure, called transitional failure. This system failure, which results from suboptimal systemic interactions, provides a new rationale for government intervention. During regional structural change, regional governments must provoke socio-institutional changes to reduce this transitional failure. The regional innovation agency, Ruta N, has been devising programs to support socio-institutional changes by learning and contextualizing place-based policies from regions on the knowledge frontier that already have transitioned into the novel techno-economic paradigm. The chapter

finds that Ruta N has been more successful in accelerating social and organizational changes, and in fostering new entrepreneurial values and practices for the residents and firms, than it has been at producing institutional changes, or promoting public sector innovations.

The chapter finds that Ruta N, which is part of a long-term process to reduce transitional failure, has encountered many difficulties in accelerating socio-institutional changes. First, Ruta N has suffered from a lack of internal capacities and a lack of collaboration with other actors in the region to effectively create the most appropriate programs to support the evolution of the social, organizational, and institutional structures. Moreover, the creation of programs has relied on trial-and-error to address weaknesses rather than a clear theoretical understanding of the socio-institutional structure. Second, Ruta N has failed to collaborate with institutional actors in the RIS due to its strong paternalistic vision towards other actors in the RIS. Moreover, the non-alignment of some public organizations with the GEA's interests led to resistance to changes promoted by Ruta N, which is seen by those public organizations as too aligned with the GEA.

From this chapter, the policy recommendation is for regional policymakers to empower regional business elites to act as institutional entrepreneurs and to encourage the alignment of interests between political and business place-based actors. In contrast to transnational elites, or place-less actors—people or organizations “who are not expected to care about the consequences of their decisions for particular places and communities” (Hambleton, 2015, p. 167)—regional business elites—like the GEA—in second-tier cities have place-based vested interests, a strong sense of regional pride, and have thus a stronger incentive to participate in regional economic development. Regional policymakers could, for instance, empower regional business elites in participating in the design of regional innovation policies. Although regional policymakers should empower regional business elites to act as institutional entrepreneurs, strong safeguards and oversights must be put in place to avoid the risks of policy capture, rent-seeking, and political lock-ins (Friedrichs, 1993; Grabher, 1993). The safeguards could, for instance, be a more participatory empowerment of the civil society in the oversight of the regional political economy.

Towards Inclusive Innovation Policies

The fourth gap that this PhD thesis addresses is how to combine innovation policies with social policies to recommend more inclusive innovation policies at the urban level. To do so, the chapter explores potential policy responses to build more inclusive place-based, knowledge-based urban redevelopments. To address this gap, the City of Chattanooga was selected as an exploratory case study because of its public-led knowledge-based strategy and multiplicity of place-based actors involved in that strategy. The data collected for the in-depth single exploratory case study came from 17 interviews, desk research, and non-participant observation.

The chapter finds a positive aspect to gentrification when social policies are combined with innovation policies. The chapter argues that gentrification can stimulate knowledge spillovers when the benefits of place-based, knowledge-based urban redevelopment strategies are distributed to promote a higher social mix and a lower cognitive distance among the residents. That is, programs to promote a better access to new technologies, to entrepreneurship, and to housing can be conducive to fostering the critical threshold of novelty and diversity of information through an increased social mix thus—leading to the spread of knowledge spillovers within the knowledge-based urban redevelopment program.

The chapter finds that public-led knowledge-based urban redevelopments can combine innovation policies with social policies to promote more inclusive innovation policies. Indeed, the City of Chattanooga and place-based actors have aimed, through place-based policies to ensure that the benefits from the knowledge-based strategy are distributed to as many people as possible while limiting displacement. The chapter categorizes the policy strategies that have been implemented in Chattanooga to limit gentrification into three main categories: socio-economic, urban, and housing. In Chattanooga, the strategies have required the coordination of multiple public-private partnerships between the City of Chattanooga and place-based actors to deliver social benefits. As a result, the strategy's weakness is its dependence on the alignment of interests between public and private actors, which can be precarious during political changes.

The main policy recommendation derived from this chapter is for regional policymakers in the United States to encourage the creation and the coordination of multiple public-private partnerships when promoting knowledge-based urban development. The public-private partnerships must address, through incorporating social policies, key urban challenges that may result from the development of more knowledge-based activities. It requires a socio-economic strategy to bridge the digital divide and promote entrepreneurship, an urban strategy to be as inclusive as possible, and a housing strategy to build affordable housing. Due to the institutional context in the United States that favors market-based solutions, policymakers have to partner with and rally multiple actors—such as place-based foundations, not-for-profit organizations, the local university, real-estate companies, and private companies—around a common vision. The public-private partnerships must have enough autonomy and independence to endure political changes and shifting private actor's interests.

6.2. Limitations and Future Research

The exercise of writing a PhD thesis is prone to limitations. The following paragraphs explore the theoretical and methodological issues, future research directions from those limitations.

Theoretical Issues

The concepts of related and unrelated variety and of a taxonomy of regions in the Global South were not explored in building the theoretical frameworks to analyze the cases and to recommend tailored innovation policies.

First, the academic literature on EEG is investigating the concepts of related variety (Frenken, Van Oort, & Verburg, 2007) and of relatedness (Hidalgo et al., 2018) to provide targeted policy recommendations to encourage new industrial path development (Asheim, Boschma, & Cooke, 2011; Balland et al., 2018). The EEG argues that policies must support new industrial path development in related regional industries as new regional industries branch out from pre-existing regional industries (see Balland et al., 2018). Policies must be tailored to their regional contexts to be successful (Lambooy & Boschma, 2001). While the conceptual approaches offer interesting research avenues for regional innovation policy recommendations, the concepts were not included into the theoretical frameworks because the regions investigated were not referring to these relatively new concepts for the policy world.

This theoretical issue and the literature on smart specialization strategy (S3) has brought to the forefront the concepts of EEG and RIS to provide conceptual tools to investigate new industrial path development. There is, however, a debate whether regions must not only design and implement innovation policies based on their existing capabilities but also favor technological jumps. This is an open question and its response might differ depending on each regional institutional context. In looking at major technological jumps, it would be interesting for the EEG and RIS literature to explore ambitious regional innovation policies that have been implemented to break evolutionary path-dependent regional processes. This research direction will need the EEG and RIS literature to incorporate in their conceptual frameworks, the literature on new industrial policies (see Mazzucato, 2015; Rodrik, 2008), on paying attention to outlier cases that have successfully branched into or created unrelated industries—namely the regions that have been able to break path-dependent evolutionary mechanisms (Zhu, He, & Zhou, 2017). Moreover, the EEG and RIS literature must continue to incorporate insights from transition studies, political economy, and the sociological perspective (Boschma, Coenen, Frenken, & Truffer, 2017; Mackinnon, Dawley, Pike, & Cumbers, 2019), while being more open to qualitative method—namely the case study approach—to provide additional insights on regional outliers and the complex process of regional economic change (Hassink, Isaksen, & Trippel, 2019).

Second, the RIS literature tends to be Euro-centric and the existing categorization of old-industrial areas, metropolitan regions, and peripheral regions (Tödtling & Trippel, 2005), was not fully appropriate for a region in the Global South, like Medellín in Colombia. The concepts of regions in the knowledge core versus regions on the knowledge periphery was thus added to the existing categories to better analyze the case of Medellín. Additionally, the four main chapters, which explore different institutional contexts to recommend regional innovation policies, do not consider the work of Hall and Sockice (2001) on the varieties of capitalism. The institutional framework, which categorizes different types of political economies—namely liberal market economies, coordinated market economies, and Mediterranean economies—offers an interesting research avenue for the RIS literature, as the types of political economies affect the institutional frameworks in which companies operate and what types of innovation are promoted. The current categorizations in Hall and Sockice's (2001) institutional frameworks and in the RIS literature are not wide enough to encompass countries in the Global South.

From this theoretical issue, it would be useful to create a taxonomy of regions to empirically categorize regions in the knowledge core, on the knowledge semi-periphery, and on the knowledge periphery to provide better innovation policy-responses for regions in the Global South. This taxonomy could include Hall and Sockice's (2001) institutional framework to categorize political economies. Although recent articles have included into Hall and Sockice's (2001) institutional framework, such as the Chinese's institutional context (Peck & Zhang, 2013), a systematic and global institutional taxonomy should be devised. The RIS literature has categorized regions, namely European regions, and their specific system failures (Tödtling & Trippel, 2005). More recently, Eder (2018) provides a method to categorize regions in Austria along a continuum between peripheral and core regions. However, these categories are ill-adapted to regions in the Global South. A region that is peripheral at the level of a country might not be peripheral at the level of the world (i.e. the peripheral regions in Austria). As a result, it would be useful to provide more robust taxonomies along the institutional frameworks developed by Hall and Sockice (2001) and regions according to their positions in the knowledge network to recommend tailored regional innovation policies in a variety of institutional contexts around the world.

Methodological issues

There is a lot of quantitative research that has provided groundbreaking insights to better understanding the process of regional economic transformations. A qualitative approach is extremely useful in understanding regional economic transformations from a more micro-perspective and in offering a deeper understanding of outlier cases. For this PhD thesis main research question, *how to better design and implement regional innovation policies in different institutional contexts?* qualitative research, using a case study methodology, was the most appropriate research method to adopt. Indeed, qualitative research is the best method to investigate the institutional contexts, institutional changes, institutional entrepreneurs, and the institutional arrangements leading to better designed and implemented innovation and social place-based policies. Moreover, this PhD thesis is policy-oriented, and as pointed out by Schramm (1971), the case study method's intent is primarily to contribute to policy and decision-making rather than to science. In conducting qualitative research, I encountered five major difficulties that I have tried to address accordingly.

First, I had to critically analyze the empirical materials and remove myself from the context in which I was embedded in during the fieldwork. I had to consider that in Colombia, for instance, the Colombian culture tends to be overly optimistic and to negate failures. Additionally, the cases involved some sensitive political dimensions that were not openly shared and were even purposefully omitted. This limitation was dealt with by conducting rigorous triangulation of the primary and secondary data to ensure that the right interpretations were attained.

Second, I have conducted research and fieldwork in different cultural contexts. I, as anyone in new social and cultural situations, needed to deal with my own impressions as well as those of others. It is thus important to be sure to not oversimplify the context and the situation. This limitation was dealt with by learning about the specific culture beforehand conducting fieldworks, by having informal conversations about the cultural contexts with the residents, and by directly observing through being embedded into the cultural context. Moreover, I already had some familiarity with the cultural contexts of the countries studied, having lived in Colombia, the Netherlands, Spain and the United States.

Third, the face-to-face interviews I have conducted have not included many stakeholders from the private sector. This was done purposefully to avoid selection bias and due to time constraints. The private companies that would have agreed to meet me for an interview would have been the ones more prone to be positive about the policy strategy. Moreover, I was unable to reach the private companies that existed in the regions despite being subsidized by the place-based policies. I found out that it is much more difficult to have access to high-quality interviews with private companies than with public institutions.

Fourth, the case study approach does not allow for definite answers on the causal relationships between place-based policies and the improved or reduced regional innovative capacities. The place-based policies and institutional arrangements were the outcome of complex interactions between many stakeholders over an extended period of time. In Chapters 2, 3, 4, and 5, the institutional arrangements that were created to design and implement the place-based policies appeared in the middle of a long-term process to respond to specific contextual issues. As a result, rather than establishing causal relationships and delivering generalizations, the chapters provide policy implications to different contexts and explore

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interesting institutional arrangements to deal with the design and implementation of place-based policies.

Fifth, the qualitative method, especially when dealing with the regional institutional contexts, can feel too descriptive. Although I have tried to respect Merriam's (1988) suggestion to balance between the amount of description (two-thirds) in the case study versus the amount of analysis and interpretation (one-third), the chapters can feel too descriptive for many readers coming from a more quantitative background. In the PhD thesis, I have tried to convey a thorough case description to provide to the audience what I know to better ground my analyses.

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Nederlandse Samenvatting

Beleidsmakers plaatsen regionaal innovatiebeleid steeds vaker bovenaan hun agenda. Innovatie wordt als een wondermiddel gezien dat "de basis legt voor nieuwe bedrijven, nieuwe banen en productiviteitsgroei, waardoor het dus een belangrijke motor voor economische groei en ontwikkeling is" (OESO, 2015b, blz. 13). In de Europese Unie (EU) bijvoorbeeld wordt in de toekomstige programmering van het EU-Cohesiebeleid 2021-2027 het grootste deel van de begroting bestemd voor het bevorderen van een *Smarter Europe* via 'smart specialization' beleid (Europese Commissie, 2018). 'Smart specialization' is een beleidsconcept dat tot doel heeft om tot prioritering te komen van kansrijke sectoren, kennisdomeinen of technologieën, op basis van bestaande ontwikkelingspotenties in een regio. Dit gebeurt door middel van het zogenaamde 'self-discovery' proces door ondernemers en andere actoren in de regio. Het is een 'bottom-up' benadering die identificeert waarin een regio de beste ontwikkelingskansen heeft op technologisch en economisch gebied (Foray, David, & Hall, 2009).

Dit proefschrift bestaat uit vier hoofdstukken, die zich richten op vier lacunes in de academische literatuur. De eerste lacune die in dit proefschrift wordt onderzocht is een vergelijking van regionaal innovatiebeleid qua ontwerp en implementatie in verschillende regionale institutionele contexten. Er wordt onderzocht in hoeverre regionaal innovatiebeleid wordt beïnvloed door de specifieke institutionele context, en in welke mate kenmerken van beleid overeenkomsten dan wel verschillen laten zien tussen verschillende institutionele contexten. De tweede lacune die in dit proefschrift wordt behandeld, is het bestuderen van een beleidsstrategie voor perifere regio's die tot doel heeft om kennisrelaties met activiteiten en organisaties buiten de eigen regio te bevorderen. De derde lacune die in dit proefschrift wordt behandeld is onderzoek naar de manier waarop institutionele ondernemers gericht zijn op het versnellen van institutionele veranderingen, om structurele economische verandering binnen hun regionale innovatiesysteem (RIS) te realiseren. De vierde lacune die in dit proefschrift wordt behandeld is hoe innovatiebeleid met sociaal beleid kan worden gecombineerd, om tot een inclusiever innovatiebeleid op stedelijk niveau te komen.

Dit proefschrift is beleidsgericht en heeft als doel beleidsaanbevelingen te doen ten behoeve van een effectiever regionaal innovatiebeleid. De vier hoofdstukken onderzoeken de institutionele contexten die leiden tot een beter regionaal innovatiebeleid, de contexten waarin beleid ontstaat en wordt vormgegeven, de actoren die nodig zijn voor institutionele veranderingen, en hun dynamische interacties. De hoofdstukken hebben betrekking op vier zeer verschillende institutionele contexten, namelijk Medellín in Colombia, Eindhoven in Nederland, Baskenland in Spanje, en Chattanooga in de Verenigde Staten. De institutionele context in Medellín (Colombia) wordt gekenmerkt door een relatief zwakke rol van overheden en een sterke invloed van regionale elites. De institutionele context in Eindhoven (Nederland) kan worden bestempeld als een gecoördineerde markteconomie (Hall & Soskice, 2001). De institutionele context in Baskenland (Spanje) wordt gekenmerkt door regionale autonomie, een sterke coördinatie vanuit de publieke sector, en 'collectief ondernemerschap' door publieke en private actoren (Morgan, 2016). De institutionele context van Chattanooga (Verenigde Staten) wordt daarentegen gekenmerkt door een liberale markteconomie (Hall & Soskice, 2001).

De rol van institutionele contexten

De eerste lancune die in dit proefschrift wordt beschreven, betreft een comparatief onderzoek naar de invloed van verschillende regionale institutionele contexten op het ontwerp en de implementatie van regionaal innovatiebeleid. Het onderzoek richtte zich met name op de vraag in hoeverre beleid vergelijkbaar dan wel verschillend is. Er werden vier regionale innovatiebureaus (RIA's) in drie verschillende regionale innovatiesystemen (RIS's) geselecteerd, namelijk Brainport Development in de Brainport-regio (Nederland), Innobasque en SPRI in Baskenland (Spanje), en Ruta N in Medellín (Colombia). De institutionele contexten werden zo gekozen om een zo breed mogelijke variatie te krijgen:

- een grootstedelijke regio in de Nederlandse institutionele context, die wordt gekenmerkt door een gecoördineerde markteconomie.
- een autonome regio in de Spaanse institutionele context, die wordt gekenmerkt door een 'collectief ondernemerschapmodel' van innovatie.
- een grootstedelijk gebied in de institutionele context van Colombia, gekenmerkt door een sterke rol van regionale elites en een zwakke rol van de overheid.

In deze meervoudige case study zijn gegevens verzameld op basis van 31 interviews, bureauonderzoek, en via niet-participerende observatie.

Een belangrijke uitkomst van onderzoek was dat de cases vergelijkbaar zijn in hun aanpak en implementatie van plaatsgebonden beleid. Beïnvloed door het zogenaamde 'nieuwe openbare management'-denken hebben Brainport Development, Innobasque en Ruta N wettelijke statuten, die hen definiëren als non-profit organisaties die een hoge mate van autonomie en flexibiliteit kennen. Politieke invloeden kunnen buiten de deur worden gehouden doordat een belangrijke rol is weggelegd voor de private sector. De RIA's hebben plaatsgebonden beleid ontwikkeld en geïmplementeerd om knelpunten in hun RIS op te sporen en aan te pakken. Zij doen dit door hun RIS en succesvolle RIS's in de hele wereld te monitoren. Ook brengen ze coördinatie tussen meerdere actoren tot stand om knelpunten in hun RIS te identificeren. Bovendien lokaliseren ze actoren die het vermogen hebben om deze knelpunten aan te pakken, en geven deze actoren een actieve rol in de uitvoering van beleid. En ze creëren plaatsgebonden programma's om de capaciteit in hun RIS te verhogen.

De cases bleken verschillend te zijn in hun mogelijkheden om knelpunten in hun RIS aan te pakken door middel van het coördineren van drievoudige of viervoudige helices. De RIA's hebben op verschillende wijze coördinatie tussen verschillende belanghebbenden tot stand gebracht om de knelpunten in hun RIS te identificeren en aan te pakken. In het geval van Brainport Development omvatte de coördinatie de creatie van driedelige helices op meerdere niveaus om strategische prioriteiten te bepalen en om de strategie te kunnen evalueren. In het geval van Innobasque bestond de coördinatie uit het instellen van adviesraden om de tekortkomingen in de RIS te kunnen identificeren. Bij Ruta N bestond de coördinatie uit de oprichting van een raad van bestuur met een drievoudige helix. Het coördinatie-niveau van de RIA weerspiegelt de specifieke kenmerken van elke institutionele context. Brainport Development was succesvol in het coördineren van meerdere drievoudige helices om knelpunten in zijn RIS aan te pakken. Innobasque en SPRI hebben als gevolg van hun meerlagige structuur te kampen gehad met coördinatieproblemen. Ruta N heeft te lijden gehad onder een proces van vallen en opstaan als gevolg van gebrek aan samenwerking met andere innovatieve actoren in de RIS. Bovendien verschilden de knelpunten die werden geïdentificeerd tussen de cases omdat deze zijn ingebed in verschillende RIS's. Ook op dit punt bestond er geen uniform beleid.

Het belang van banden buiten de regio

De tweede lacune, die in dit proefschrift wordt beschreven, is het verkennen van een beleidsstrategie die in een perifere regio is geïmplementeerd om toegang tot kennis buiten de regio te bevorderen. Om deze onderzoeksvraag te kunnen beantwoorden, werd Ruta N, het regionale innovatiebureau (RIA) van Medellín in Colombia, geselecteerd. Medellín is een bijzondere case omdat het lange tijd afgesneden is geweest van wereldwijde kennisstromen als gevolg van een langdurige periode van geweld, een naar binnen gekeerde cultuur, de aanwezigheid van protectionistische elites, en zijn geïsoleerde geografische ligging. De RIA is als een ambitieus beleidsexperiment bewust ingezet om deze regio in de Global South te verbinden met wereldwijde kennishubs. De data voor deze casestudy zijn afkomstig van 51 face-to-face semi-gestructureerde interviews, bureauonderzoek, observatie, en van audiovisueel materiaal.

De belangrijkste conclusies uit hoofdstuk 3 kunnen als volgt worden samengevat. Ruta N heeft tal van actoren buiten de regio gecontracteerd om knelpunten binnen het RIS aan te pakken. De RIA heeft door te handelen als kennis-portaal relaties met activiteiten buiten de regio mogelijk gemaakt, en heeft externe kennis ‘getropicaliseerd’ om de opname ervan in het RIS te vergemakkelijken. Dat wil zeggen dat de contextualisering van de externe kennis naar de specifieke regionale institutionele context tot stand kwam door middel van een co-creatieproces tussen de RIA en actoren van buiten de regio. De informatiestrategie om lokale actoren te verbinden met actoren van buiten de regio bood een aantal voordelen. Het leidde onder andere tot vergroting van de zichtbaarheid van de RIS voor andere RIS's over de hele wereld, snelle toegang tot kennis van buiten de regio, en creatie van netwerken.

De rol van institutionele ondernemers

De derde lacune die in dit proefschrift wordt behandeld is onderzoek naar de manier waarop institutionele ondernemers gericht zijn op het versnellen van institutionele veranderingen, om structurele economische verandering binnen hun RIS te realiseren. In het hoofdstuk worden de institutionele ondernemers en de institutionele veranderingen op regionaal niveau onderzocht. Voor deze studie is de metropool Medellín en zijn regionale innovatie-bureau (RIA), Ruta N, geselecteerd. De data voor deze casestudy zijn verzameld op basis van 76 interviews, bureauonderzoek, observatie en audiovisueel materiaal.

In het hoofdstuk wordt geconstateerd dat de private sector, onder de informele leiding van de Grupo Empresarial Antioqueño (GEA), de rol van institutionele ondernemers op zich heeft genomen door deel te nemen aan de oprichting van Ruta N, en zodoende op indirecte wijze sociaal-institutionele veranderingen heeft doorgevoerd. De GEA trad op namens de institutionele ondernemers om hun leiderspositie in de politieke economie van de regio te versterken. Zij deden dit ook om het beleid ter ondersteuning van de herstructurering van meer op kennis gebaseerde activiteiten te versterken en om de instabiliteit van structurele veranderingen in de regio uit de jaren tachtig van de vorige eeuw te beperken. Deze periode luidde de meest beroerde economische en sociale periode uit de geschiedenis van Medellín in. Verder waren zij ook gemotiveerd om de invloed van concurrerende elitegroepen, zoals bijvoorbeeld de narco-elites, te beperken, en de economische ontwikkeling van de regio via hun paternalistische regionale visie te bevorderen.

Op weg naar inclusief innovatiebeleid

De vierde lacune, die in dit proefschrift wordt beschreven, is hoe innovatiebeleid met sociaal beleid kan worden gecombineerd, om tot een inclusiever innovatiebeleid op stedelijk niveau te komen. Er worden in het hoofdstuk beleidsreacties onderzocht om meer inclusieve, plaatsgebonden, op kennis gebaseerde stedelijke herontwikkelingen te realiseren. De stad Chattanooga werd als casestudy gekozen, voornamelijk vanwege haar publiekgestuurde, op kennis gebaseerde strategie, en de veelvoud aan plaatsgebonden actoren die bij die strategie betrokken waren. De verzamelde data voor de enkelvoudige verkennende casestudy waren afkomstig van 17 interviews, bureauonderzoek, en niet-participerende observatie.

Het hoofdstuk vindt een positief aspect van gentrificatie wanneer sociaal beleid wordt gecombineerd met innovatiebeleid. Het hoofdstuk beargumenteert dat gentrificatie de spillover-effecten van kennis kan stimuleren wanneer de voordelen van plaatsgebonden, op kennis gebaseerde stedelijke herontwikkelingsstrategieën worden verspreid om een betere sociale mix en een lagere cognitieve afstand onder de bewoners te bevorderen. Dat wil zeggen dat programma's die een betere toegang tot nieuwe technologieën, ondernemerschap en huisvesting bevorderen, stimulerend kunnen zijn voor het aanmoedigen van vernieuwing en diversiteit van informatie. Dit kan bewerkstelligd worden door middel van een grotere sociale mix, wat leidt tot verspreiding van kennis spillover-effecten binnen de op kennis gebaseerde stedelijke herontwikkelingsprogramma's.

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Curriculum vitae

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