How multinational high tech firms in small towns acquire non-local knowledge: The importance of firm and location characteristics

Rahel Meili, University of Bern, Institute of Geography, Economic Geography
rahel.meili@giub.unibe.ch

State-of-the-art:
Innovation outside core regions has received increased attention in the field of economic geography over the last couple of years. Innovation outside large urban agglomerations is seen as depending strongly on external linkages. Empirical studies have shown that firms in peripheral locations predominantly use non-market sources for information (Shearmur & Doloreux 2016), that the external sources compensate for the lack of local knowledge spill-overs (Grillitsch & Nilsson 2015) and that the open-mindedness of managers can influence the number and nature of collaborations and knowledge linkages (Fitjar & Rodríguez-Pose 2011).

Research gap:
The recent literature has to be criticised for not providing insights into the mechanisms, by which firms in peripheral locations gain access to the external knowledge sources and for neglecting the influence of different firm and location characteristics on the development of non-local knowledge linkages. Furthermore, the literature does not distinguish between firms with different global reaches and uses mostly broad-brushed definitions of the periphery. Hence, this paper concentrates on multinational high tech firms (MNHTs) with headquarters and R&D departments in small towns (between 5000 and 25'000 inhabitants). It asks the following research questions: Which are the main non-local knowledge sources of MNHTs located in small towns? How do MNHTs located in small towns gain access to the central non-local knowledge sources? Which firm and location characteristics are crucial to the access to non-local knowledge sources?

Theoretical argument:
How firms innovate depends on the one hand on the characteristic of the firm and on the other hand, on the possibilities firms have in their location. For a better understanding of innovation processes beyond core regions it is necessary to
gain knowledge about how specific types of firms gain access to the different knowledge sources and which firm and local characteristics support or hinder this knowledge-sourcing activities.

Method:
We used a multiple case study design with qualitative interview data (totally 28 interviews) from five MNHTs that are located in small towns in the eastern part of Switzerland. A theoretically replication by investigating two national acting, but also exporting high tech firms (NHTs), in the same region, was carried out as well. This way, differences between MNHTs and NHTs located in small towns regarding knowledge sourcing can be identified and the importance of considering different firm characteristics when talking about innovation outside core regions emphasized.

Results:
The study yields a number of interesting results. First, the multinationalism of a firm when talking about non-local sources of knowledge has to be considered, even in the context of small towns. Four main sources of non-local knowledge could be identified: recruitment of new national and international employees; clients, research institutions and universities; fairs, conferences and workshop. Compared to NHTs, MNHTs were better able to access and use information from clients through subsidiaries and hire international employees. We can assume that multinationalism is one important characteristic to have easy access to non-local knowledge sources and compensate for the lack of local knowledge in their hometowns. Second, a small town in a periurban-rural region is not completely peripheral. Firms in small towns have to cope with obstacles such as the missing local buzz, thin labour market as well as the lack of urban amenities, but still have good transportation connections to bigger cities and can draw on central place functions that include schools, medical care, restaurants, etc. The central place functions, lower cost of living and the natural amenities attract especially families and people older than 30. Hence, firms in small towns have other possibilities to access non-local knowledge sources than firms that are located completely in the periphery. These results show that the combination of firm and location characteristics influence how non-local sources of information can be accessed and which ones are used.

Key References:


1 Introduction

Innovation outside core regions has received increased attention in the field of economic geography in recent years (Fitjar and Rodríguez-Pose 2011a; Flåten, Isaksen, and Karlsen 2015; Grillitsch and Nilsson 2015; Isaksen and Karlsen 2016; Shearmur and Doloreux 2016). One common assumption is that a limited number of firms, workers and research institutions in non-core regions significantly limits the spreading of new ideas and knowledge. Studies that go beyond this assumption mainly concentrate on varying mechanisms underlying innovation outside core regions and mainly focus on the importance of external knowledge linkages. It is assumed that the combination of externally acquired knowledge with existing experience and knowledge of non-core firms should lead to innovation outside core regions (Flåten, Isaksen, and Karlsen 2015). Shearmur and Doloreux (2016) for example find that firms outside core regions rarely use marked-sourced information, such as clients or consultants. Grillitsch and Nilsson (2015) show that external knowledge sources compensate for a lack of local knowledge spillovers and Fitjar and Rodriguez-Pose (Fitjar and Rodriguez-Pose 2011a) highlight that the open-mindedness of managers can influence the number and nature of collaborations and knowledge linkages. However, research on knowledge acquisition for innovation beyond core regions is scarce and we identify three main limitations of the current literature.

First, studies do not provide insights into the specific mechanisms by which firms outside core regions gain access to external knowledge sources. For example, we do not know how firms located outside core regions collaborate with universities that are at a distance? How do non-core firms receive feedback from their clients? In particular, we do not know how firms in small towns that are outside core regions access various knowledge sources.

Second, the literature only marginally discusses the influence of different firm characteristics on the kind of non-local knowledge used. The relationship between the number and kind of non-local sources of knowledge used and the aspects such as age, technological competence and size of firms have been investigated so far (Fitjar and Rodriguez-Pose 2011a; Grillitsch and Nilsson 2015; Malecki and Poehling 1999; Shearmur and Doloreux 2016). However, existing studies tend to not differentiate between firms with varying global scopes. In general, multinational firms have other possibilities to compensate for the lack of local knowledge in their hometowns than firms with only a national location (Regnér and Zander 2011). Subsidiaries in other locations can extract local knowledge and transfer it to the
headquarters and the firm’s global network (Cantwell and Iammarino 2003; Mattes 2016). Hence, differentiating between multinational and national firms when analysing non-local sources of knowledge is crucial to understand innovation mechanisms particularly when we focus on these dynamics in non-core regions.

Third, the empirical literature on innovation beyond core regions does not differentiate between various types of non-core regions. The distinction between urban and peripheral in the innovation literature seems to be too rough. In order to understand innovation processes beyond core regions in more detail, we have to go beyond the urban-rural dichotomy. The term non-core can include small villages, only a small accumulation of houses or also towns that function as regional centres. Small towns with e.g. 25,000 inhabitants that are outside the growth poles of a national economy provide a different innovation context for firms than for example small villages with 500 inhabitants that in fact have weak transportation connections to the next urban centre. A specific local and regional context could influence the kind of external knowledge used and the ways in which knowledge is acquired.

These three research gaps are connected in various ways. One the one hand, the specific location characteristic might influence firm characteristics, it can also influence which kind of knowledge firms have to find outside their location and it might favour mechanisms to access non-local knowledge sources. Firm characteristics, on the other hand, might influence which non-local knowledge sources are used and how these sources are accessed.

This paper concentrates on multinational high tech firms (MNHTs) with headquarters and R&D departments in small towns in Switzerland. Firms within this sector have a high technological intensity and rely therefore on constant new and up to date knowledge (Eurostat, 2016). In 2012, 69 % of the Swiss manufacturing industry revenue was generated through the high tech sector. Moreover, the high tech industry has been responsible for much of the growth of the Swiss economy between 2000 – 2012 (BAK Basel Economics 2014). Nevertheless, the high salary and cost levels in Switzerland exert particular pressure on the Swiss high tech industry and the firms are forced to be technological leaders in their respective niches in order to compete globally. What is especially interesting and relevant for a study on innovation in non-core regions is the fact that high tech firms in small towns in Switzerland seem to be persistent locations of high-tech firms in the age of globalization and outsourcing. Location coefficients for the year 2008 show, that the high tech industry is predominantly concentrated in the eastern part of Switzerland close to the lake Constance and in the western part of Switzerland, in the Jura region (BFS 2008). Most high tech firms are located outside Swiss core regions, such as Zurich or Geneva. Hence, MNHTs dominate many small towns and are important economic players locally but also nationally and internationally. Small towns are defined in this paper as having between 5,000 and 25’000 inhabitants. These towns function as regional centres that provide basic supplies, education,

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1 To be defined as a town or city (in German as Stadt), each town in Switzerland has to have a continuous zone of inhabitants, jobs and equivalent for overnight stays (IJO) which sum is higher than 500 per km2 in a grid cell with
and health services and have good transportation connections to core regions (Christaller 1933). Hence, the firms in these towns are not situated in the absolute periphery but rather in a medium-interactive environment, meaning that firms do not have immediate access to innovation partners but have easy access to non-local factors of innovation (Shearmur 2012).

This paper seeks to shed light on how MNHTs gain access to extra-regional knowledge sources and which firm and location characteristics are crucial for the development of national and global pipelines. In order to do so, we use case studies of five MNHTs that are located in small towns in the eastern part of Switzerland. For each firm we were able to conduct in-depth interviews with several key persons who are responsible for ensuring the firm’s innovativeness and competitiveness. In order to understand the behavior and strategies of firms it was important to interview different people with different functions. We were able to speak to CEOs, innovation managers, production managers, human resource managers, and directors of industry organizations in these towns. Additionally, a theoretical replication of these case studies was developed. It includes two nationally acting, but also exporting high tech firms (NHTs) that are located in the same region. Choosing such a research strategy allowed us to rigorously identify differences between multinational and national high tech firms located in small towns regarding their knowledge sourcing strategies. Hence, we were able to verify or falsify our assumption about the influence of the international scope of a firm on knowledge sourcing activities.

The paper is structured as follows. In the next section, we present the literature that discusses the innovation-location relationship and non-local sources of knowledge. This section is followed by the establishment of the theoretical framework that summarises available insights about innovation outside core regions. The theoretical framework conceptualizes the role of different firm and location characteristics for acquiring non-local knowledge as well as the mechanisms that help firms gain access to non-local knowledge sources. This will help to discuss non-local knowledge sourcing processes in a more differentiated way. The empirical evidence from the multiple case study that will be presented in the fourth section augments the theoretical framework and extends the empirical and conceptual knowledge on innovation outside core regions. In the last section of the paper, we summarise the main results and draw conclusions.

2 Literature Review

In economic geography and innovation studies, scholars acknowledged that the characteristics of a location influence innovation activities. Different regions face different innovation advantages as well as constraints, such as institutional thinness in the case of peripheral regions or fragmentation in the case of core regions (Tödtling and Tripl 2005). However, cities and large urban agglomeration are generally

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an edge length of 300 m. This zone has to combine a total of at least 12’000 IJO. Moreover, the zone has to have a high density core with a IJO of more than 2,500 IJO per km2. The core zone has to have an absolute size of at least 5,000 IJO. This zone has to have more than half of the IJO of the whole town (Goebel and Kohler 2014).
seen as “innovation machines” (Florida, Adler, and Mellander 2017). Florida et al (2017, 87) argue that “innovative activities are the products of cities or regions” whereby they point out that the term region “are used throughout to refer to urban agglomerations or metropolitan areas.” In such a perspective, the geographical concentration of firms, employees, and different public and private institutions in urban areas leads to so called “local buzz” that facilitates the diffusion of knowledge and information (Jacobs 1969; Glaeser et al. 1992; Bathelt, Malmberg, and Maskell 2004). Extra-regional knowledge linkages complement local buzz (Crevoisier 2004; Camagni 1995). This perspective emphasizes the urban character of innovation. Yet, it implies at the same time that non-urban locations are non-innovative and as a result there is a strong urban bias in studies focusing on innovation (Shearmur 2017).

However, scholars started to question the innovation superiority of core regions over areas outside the core. A number of economic geographers highlight that although fewer innovative firms can be found in less urbanized regions, innovation can also occur outside large urban agglomerations (McCann 2007; Fitjar and Rodriguez-Pose 2011a; Shearmur and Doloreux 2016; Aslesen and Isaksen 1998; Keeble and Tyler 1995; Lee and Rodriguez-Pose 2013). Lee and Rodriguez-Pose (2013) for example show that firms in rural regions are not less likely to introduce completely new process or product innovations and also North and Smallbone (2000) do not find differences between the innovativeness of firms in remote and accessible rural areas. The reason for that could be that, industries relying on slowly decaying technological information or analytical knowledge are less dependent on geographical proximity for the acquisition of new scientific knowledge and chose interlocutors that are mostly not local (Martin and Moodysson 2011; Morrison and Rabellotti 2009).

Nevertheless, firms in regions with different characteristics might innovate differently. Capello (2017, 8) claims that there is a “complex interplay between phases of the innovation process and spatial context or territorial conditions.” Not every region has the same capacity to be successful in every phase of the innovation process. Capello (2017, 10) distinguishes therefore between different territorial patterns of innovation regarding the level of endogenous potential and linkages to external partners.:  

- **Endogenous innovation pattern:** local conditions can support the creation of knowledge, local diffusion and transformation into innovations. The region belongs to an international scientific network.
- **Creative application pattern:** Presence of creative actors who look for knowledge elsewhere and apply it locally to innovation needs.
- **Imitative innovation pattern:** Imitative processes and adaption of existing innovations

Characteristics of regions might therefore influence which territorial innovation pattern is dominant among local firms. The balance between the importance of local buzz and global pipelines may vary and also different forms of proximity and knowledge sources may be more important outside core regions (Shearmur and Doloreux 2015; Boschma 2005; Fitjar and Rodriguez-Pose 2011a; Tödtling and Grillitsch 2014; Lorentzen 2008). Several authors state that not all innovations require constant face-to-
face contacts and that other forms of proximity can substitute geographical proximity for certain kinds of innovations (Tödtling and Grillitsch 2014; McCann 2007; Trippi 2009). Ter Wal and Boschma (2011, 919) highlighted the fact that especially the cluster literature “overemphasize the importance of geographical proximity and underestimates the role of networks.” Torre (2008) claims that geographical proximity is only necessary through certain stages of the innovation process and that geographical proximity can selectively be organized through mobility. However, large firms are more likely to have mobile employees due to the higher number of people and monetary resources. This is especially relevant for innovative firms as they have more international collaborations than their less innovative counterparts (Fitjar and Rodriguez-Pose 2011b; Gertler and Levitte 2005; Grillitsch, Tödtling, and Höglinger 2015; Teirlinck and Spithoven 2008). Empirical evidence from Poland shows that every low- and medium-tech industry firm in non-core regions has knowledge networks on a global scale, whereas only 57% of the firms are connected on a regional scale (Lorentzen 2007). Moreover, innovative firms outside core regions are more involved in outsourcing and co-development processes than urban firms (Teirlinck and Spithoven 2008). Also empirical evidence from Sweden and Austria shows that innovative firms in non-core regions have a higher probability to use international knowledge sources and are more likely to be involved in national and international collaborations than their counterparts in core regions (Grillitsch and Nilsson 2015; Tödtling, Grillitsch, and Höglinger 2012). Hence, collaboration and networks make it possible for innovative firms in non-core regions to compensate for the lack of local knowledge spillovers (Grillitsch and Nilsson 2015; Johansson and Quigley 2003).

Given Capello’s focus on territorial patterns of innovation and Torre’s perspective on temporary geographical proximity and mechanisms to gain knowledge from non-local sources, we need to think how these components play together in the acquisition of non-local knowledge. The following framework will highlight essential elements of knowledge sourcing processes in non-core regions. Figure 1 illustrates the framework.

**Pillar 1: Non-local sources of knowledge**

In non-core region, firms can draw upon different types of non-local knowledge sources. We know little about which sources are most important for what kind of firms or how a certain firm with specific characteristics access these sources. Are multinational firms in non-core regions different from those who are nationally oriented but also located in non-core regions? Moreover, the literature on innovation outside core regions does only marginally discuss the relative importance of the various non-local knowledge sources in different non-core locations. Shearmur and Doloreux (2016) distinguish between slow and fast decaying knowledge sources. They note that firms in non-core regions make more often use of non-market sourced information (universities, community college, government run laboratory, conferences, fairs, and internet) and they thus call them ‘slow innovators’. In contrast, firms in core regions require more often frequent interactions and market-sourced information (clients, suppliers, consultants, commercial laboratories and research institutes). Shearmur and Doloreux (2016) describe
slow innovators as mostly smaller, more labour intensive firms whereas fast innovators are mostly high tech firms. The study conducted by Lorentzen (2007) discusses the frequency of the different non-local knowledge sources that are used. Lorentzen found that customers and media are the two most often used sources by low- and medium tech firms in non-core regions.

**Pillar 2: Mechanisms for acquiring non-local knowledge**

Pillar 2 discusses the ways firms acquire knowledge sources. Local or firm characteristics might complicate accessing non-local knowledge. Hence, firms have to develop mechanisms for accessing non-local knowledge sources. Relationships and networks developed in previous employments might be important for creating relative proximity to extra-regional knowledge sources. Social relationships that have been developed through geographical proximity are resilient against decay due to longer geographical distances and facilitate knowledge flows over large distances (Agrawal, Cockburn, and McHale 2006; Nilsson and Mattes 2015). Moreover, regional economic development agencies might foster exchange between different firms and might assist with building networks between firms and non-local universities. As Torre (2008) claims is the mobility of employees one of the main mechanisms for gaining access to tacit knowledge. However, no specific study in non-core regions exists on how non-core firms receive feedback from their clients, how they interact with their suppliers etc.

**Pillar 3: Firm characteristics**

Pillar 3 describes firm characteristics that are necessary to acquire external knowledge. Contrary to local buzz, acquiring extra-regional knowledge outside the core might be time intensive, costly and more difficult (Bathelt, Malmberg, and Maskell 2004). Not every firm has the same possibilities and characteristics that help to build extra-regional collaborations and networks (Malecki and Poehling 1999). Smaller firms have more difficulties developing such linkages due to the lack of financial and human resources (Torre 2008; Lorentzen 2007). Also larger firms with strong in-house capabilities, high technological intensity, a large share of foreign sales as well as more recently founded ones use non-local knowledge sources more often (Grillitsch and Nilsson 2015; Malecki and Poehling 1999). We know from Fitjar and Rodriguez-Pose (Fitjar and Rodriguez-Pose 2011a) that the open-mindedness of managers is crucial for the acquisition of external knowledge sources and this may also be relevant for firms in non-core regions. Shearmur and Doloreux (2016) found that slow (using predominantly non-market sourced information) and fast innovators (using predominantly market sourced information) do not differ regarding age or type of first-to market-innovation. However, slow innovators are overrepresented in the low-tech sectors and therefore in remote locations. In addition, the character of innovations (radical, incremental or adapted) the firm is involved in can influence what kinds of non-local knowledge sources are used. Local and national clients are for example more important for firms adapting innovations whereas R&D collaborations are more used by firms using incremental or radical innovations (Trippl 2009). However, the relationship between firm characteristics and the kind of non-local knowledge used has been little discussed in the literature on innovation in non-core regions so far.
One important firm characteristic is whether the firms is multinational or not. In this study, we pay attention to the particular situation of multinational high tech firms in non-core regions. Empirical evidence from Québec shows that accessibility does not matter for innovation in the high tech sector and that high tech firms in small towns outside core regions produce even more radical innovations (Shearmur 2010). Different knowledge demands and different innovation strategies might be the reason for that. However, we do not have information about the global scope of the high tech firms examined. Multinationals were mostly part of studies that investigated firms outside core-regions without discussing their global reaches individually. However, whether a firm is multinational or not can influence the capability to access non-local sources of knowledge. Subsidiaries in different national contexts make it possible for MNHTs to access local knowledge more easily elsewhere and to gain access to international innovation networks (Cantwell and Iammarino 2003; Iammarino and McCann 2015; Regnér and Zander 2011; Mattes 2016). Cantwell and Iammarino (2003) differentiate between three types of innovation networks for MNC. First, the intra firm network, where knowledge flows between parent and subsidiaries. The second type describes the network between subsidiaries and the indigenous firms. Finally, also knowledge exchange can occur between the parent and other firms. Regarding the innovation network between parent and subsidiaries, a shared social-firm identity is essential for exchanging knowledge (Regnér and Zander 2011). As Mattes (2016, 408) concludes are multinational firms “complicated phenomena, and even more so is innovation in these companies.” Mattes shows that in order to maintain control, multinational firms prefer to co-locate innovation activities and are therefore not always as global as we think they are. Therefore, multinational firms with headquarters and R&D departments located in small towns might be confronted with different kinds of barriers or opportunities regarding innovation networks compared to their urban counterparts.

**Pillar 4: Location characteristics**

The specific characteristics of locations as well as their distance to core regions can influence how firms are able to access non-local knowledge and how far other local firms or institutions are useful for innovation (Shearmur 2012; Capello 2017). Tödtling and Grillitsch (2014) noticed that there are geographical patterns regarding knowledge sourcing that cannot be explained by different firm characteristics and knowledge needs. For example, firms in peripheral or old industrial settings have more difficulties in finding regional and extra-regional knowledge sources and are thus less innovative compared to their urban counterparts. Nevertheless, they admit that it is difficult to separate the sectoral effects from the geographical patterns. Also Malecki and Poehling (1999) noticed that introverted behaviour of firms, meaning firms with less frequent and a smaller number of information sources, is more common outside core regions.

Shearmur (2012) characterizes regions outside of core regions according to their accessibility and the probability for local innovation interactions. He distinguishes between low- (absolute periphery),
medium- (medium sized cities, small towns or rural areas), and high-interactive environments (core regions). However, he does not claim that innovation will decrease with distance from large cities but rather that the kind of innovation will change and other mechanisms will play a role in producing innovations, comparable with Capello’s (2017) arguments.

In our study, we chose small towns in medium-interactive environments in Switzerland as local context. The literature on innovation rarely discusses small towns, as rural and/or peripheral regions were the categories used so far in the innovation studies outside core regions. Hence, by focusing on a more differentiated spatial category, we want to emphasize the diversity of non-core regions.

Small towns offer firms a specific local milieu. One the one hand, they fulfil a central place function in their region and provide jobs, healthcare, education and basic supplies (Goebel and Kohler 2014; Christaller 1933). Small towns are neither totally peripheral nor highly urbanized. As a result, they represent a category that has rarely been discussed in the literature and neglected in development policies (Bell and Jayne 2009). The economic characteristics of small towns however can be diverse and they can specialize in industry, residential economy, and knowledge intensive services. Many small towns however, especially those outside core regions, held on to their industrial heritage and also base their development strategies on it (Hamdouch, Demaziere, and Banovac 2017; Meili and Mayer 2017). Beside evolutionary processes, location factors such as cheap and available land are reasons for industries to stay in small towns. The growing need for qualified labour and specialized innovation inputs might turn into an issue for high tech firms in small towns due to the thin labour market and thin “local buzz”. Natural amenity rich environments of small towns might however attract highly educated personnel that bring along knowledge and networks to firms located in non-core regions (Keeble and Tyler 1995). Also the lower availability of capital in small towns might influence the financial possibilities of firms and therefor also their ability to access non-local knowledge sources (Cowling 1998).

Empirical evidence shows that the relative distance to other cities or towns influences the flows of people between small towns an bigger cities (Sýkora and Mulíček 2017). In Switzerland, high quality of rail and road infrastructure connects the firms and inhabitants of the small towns with the core regions of the country and airports and makes exchange and maintenance of networks possible. Hence, small towns might be able to “borrow size” from neighbouring cities and compensate their size (Alonso 1973; Meijers and Burger 2015). However, not only the geographical proximity to a bigger city can benefit a small town. Economic, cultural or social networks and accessibility to different institutions and actors can also provide small towns access to different functions and assets (Camagni, Capello, and Caragliu 2015; Phelps, Fallon, and Williams 2001; McCann and Acs 2011; Shearmur 2012). Meijers et al. (2016) even claim that “network connectivity is crucial and sometimes even more important than local size” (p. 195). In sum, pillar 1 emphasize the influence on location characteristics that influence the acquisition of non-local knowledge.

Interaction between pillars
As the literature above explained, the kind of non-local sources of knowledge used by firms can be influenced on the one hand by the location characteristics, by the firm characteristics as well as by the applied mechanisms for acquiring non-local knowledge. Location characteristics can on the other hand influence firm characteristics and how non-local knowledge is acquired (indicated by vertical arrows in Fig. 1). Firm characteristics may influence the selection of non-local sources of knowledge and the mechanisms for acquiring non-local knowledge (indicated by horizontal arrows on right in Fig. 1).

Based on the theoretical framework the following three research questions guide our study:

- Pillar 1: Which are the main non-local knowledge sources MNHTs located in small towns are using?
- Pillar 2: How do MNHTs located in small towns gain access to these main non-local knowledge sources?
- Pillar 3 and 4: Which firm and location characteristics are crucial for the access to non-local knowledge sources?
3 Research Setting and Method

To understand how Swiss MNHTs in small towns in non-core regions acquire knowledge we chose to apply a multiple case study design (Yin 2009). Beside the literal replication with five MNHTs a theoretical replication was carried out with two firms that are also located in the same regional context, but do not have international subsidiaries. This way we can increase the external validity of the study and are able to see how the specific characteristics of a firm – in this case the global scope of a firm – influences the kind of non-local knowledge used and the mechanisms of acquiring it.

The study area includes small towns in the eastern part of Switzerland that lie between 40km and 80km away from Zurich (see Figure 2). The small towns of that region are agglomerated around the city of St.Gallen and they range in size from 9,214 to 24,864 residents in 2015 (BFS 2017). The small towns are embedded in a periurban-rural region that can be characterised as a medium-interactive environment with good access to core regions of Switzerland and Europe. The region is home to the University of St.Gallen, which was founded in 1898, and which specializes today in economic and business sciences. As a result, universities specializing in technical sciences (particularly engineering) are missing in this part of Switzerland.

The presence of multinational high-technology firms in these small towns is very typical for this region as the region has a long industrial history. Around the 1860s the textile industry emerged and alongside the machine industry developed into its major suppliers. While the textile industry significantly declined and almost disappeared, some of the suppliers in the machine industry could diversify their products and gain importance in their respective niches. Today approximately one third of the employees in the eastern part of Switzerland work in the secondary sector, two third in the third sector and less than ten percent in the first sector (BFS 2015).
For this study, we use high-tech firms as units of analysis and we defined the high-tech industry according to its technology intensity\(^3\). The technology intensity is calculated as R&D expenditure relatively to the value added (Eurostat 2016). Among the high tech firms in the eastern part of Switzerland, we selected MNHTs that have their headquarters in small towns and that have a long history in their hometowns (20 or more years). This way we can ensure that the firms investigated had to gain new knowledge to further develop their products over the years and therefore have strategies to cope with the disadvantages of small towns regarding knowledge sourcing. We were able to find five firms in four different small towns that comply with these criteria and were willing to participate in the study. For the theoretical replication, we selected two high tech firms that also export their products worldwide but only have one national location for production and development. With the help of these two cases, we can test and compare the results gained from the MNHTs (Yin 2009).

Table 1 provides an overview of the firms and interview partners. Table A1 in the appendix lists the participants and the duration of the interviews in more detail. In total, we conducted 28 semi-structured interviews.

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\(^2\) Cities have more than 50'000 inhabitants, small and medium sized towns less than 50'000 inhabitants

\(^3\) High-technology: Manufacture of basic pharmaceutical products and pharmaceutical preparations, Manufacture of computer, electronic and optional products

High-medium technology: Manufacture of chemicals and chemical products, Manufacture of electrical equipment, Manufacture of machinery and equipment; Manufacture of motor vehicles, trailers and semi-trailers; Manufacture of other transport equipment
interviews. For each firm we were able to conduct 3 to 6 in-depth interviews. In order to understand the behaviour and strategies of firms it was important to interview different people with different functions. The initial request and then the first interview with the contact partner of a firm has led to access to significant people. We were able to speak to CEOs, innovation managers, production managers, and human resource managers. In addition, we also conducted a set of interviews with public officials from the small towns to ensure that we gain insight into the development context of the firms. Hence, we talked to directors of industry organizations and local authorities responsible for firms in these towns. The interviews lasted from 14 minutes to 84 minutes and were conducted between February and June 2017. We fully transcribed the interview recordings and analysed them with the MAXQDA software, using codes in order to categorize the data. Additionally, we also consulted firm brochures, webpages and corporate reports to prepare the interviews and crosscheck the information the interviewees gave us. The interviews with different key persons of the firms and the document analyses ensured data triangulation.
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<tr>
<th>Firm</th>
<th>Nr. of countries represented in with a subsidiary</th>
<th>Town</th>
<th>Nr. of Interviews</th>
<th>Function of Interviewees</th>
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<td>Literal Replication: MNHTs</td>
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<td>Firm 1</td>
<td>13 (confirmed number)</td>
<td>A</td>
<td>6</td>
<td>Head of innovation, Head human resources, Director business development, Director Operations, chairman of the town’s trade association, chairman of the town’s industry association</td>
<td>30min</td>
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<td>Firm 2</td>
<td>76 (information from the firm’s webpage)</td>
<td>B</td>
<td>4</td>
<td>Head of Human Resources, former CEO, Regional location adviser, Director of the cantonal chamber of commerce and industry</td>
<td>53min</td>
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<tr>
<td>Firm 3</td>
<td>20 (confirmed number)</td>
<td>C</td>
<td>3</td>
<td>Head Global Training, Head Product Management &amp; Development, Head Mechanics / Tool Shop</td>
<td>49min</td>
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<td>Firm 4</td>
<td>42 (information from the firm’s webpage)</td>
<td>C</td>
<td>3</td>
<td>Head of production, Head of development, Head of human resources</td>
<td>22min</td>
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<td>Firm 5</td>
<td>19 (confirmed number)</td>
<td>D</td>
<td>4</td>
<td>CEO, Plant Manager/Managing Director, head of development, director of the cantonal chamber of commerce and industry</td>
<td>31min</td>
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<td>Theoretical replication: NHTs</td>
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<td>Firm 6</td>
<td>1</td>
<td>E</td>
<td>5</td>
<td>Executive manager, Analytical development manager, Senior manager R&amp;D, Quality assurance manager, Deputy head of production</td>
<td>30min</td>
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<td>Firm 7</td>
<td>1 (+ 1 subsidiary in Germany for trading purpose)</td>
<td>C</td>
<td>3</td>
<td>Head of operations, Head of Human Resources, Director of town’s economic and local promotion department</td>
<td>28min</td>
</tr>
</tbody>
</table>

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4 In order to secure the anonymity of the firms in this study, the firms cannot be characterised in more detail
4 Results

The overarching result of our study is the fact that the small town context does not play a role for firms – regardless of being multinational or not – in terms of knowledge sourcing. In this context, this study affirms the claim that the local environment in a non-core context does not contribute to the innovativeness of high-tech firms.

In fact, MNHTs as well as NHTs gain new knowledge and information actively outside the towns or region. All interviewees told us, that they and the firms are very much aware of the importance of non-local contacts particularly when it comes to the development of international innovation-, production- and sales network, as the following citation nicely illustrates:

«From the beginning, we could not rely on local or regional markets or partners – we always had to go beyond local borders.» (Firm 3, Interviewee 11)

Referring to Capello`s (2017) territorial patterns of innovations our results show that the creative application pattern prevails. The MNHTs and NHTs interviewed could grow because they were able to hire employees who have the ability to know where and how to look for non-local knowledge and integrate it into the firm`s innovation process. If firms do not have such creative actors, innovation outside core regions would not be possible (Capello 2017). Small towns in medium-interactive environments might find themselves in an advantageous situation compared to remote towns because they are able to attract such employees with their infrastructure and transportation linkages as well as the social and cultural characteristics.

Regarding Pillar 1 of the framework, the analysis of the interview data could identify four main sources of external-knowledge used by MNHTs in small towns: Recruitment of new national and international employees, clients, research institutions and universities, fairs, conferences and workshops. The interviewed MNHTs mentioned market-sourced information, such as clients, as well as non-market sourced information, such as universities. Hence, these firms have characteristics of so called fast innovators, confirming the results of Shearmur and Doloreux (2016). Looking at the results from the theoretical replication, NHTs mentioned the same main sources except the client feedback. The reason for that will be discussed further down. Nevertheless, the finding illustrates the importance of considering different firm characteristics when studying innovation beyond core regions. How the interviewed firms acquire the main knowledge sources above (Pillar 2) and which firm and locational characteristics (Pillar 3 and 4) are important to acquire them are discussed in the following.

4.1 Recruitment of new national and international employees

Being located outside the nation`s core regions in a medium-interactive environment, the labour market is less dense and urban amenities found in big cities are not close by. Hence, fostering innovation through highly educated and suitable employees is not easy and this difficulty is aggravated by a national
shortage of skilled workers in Switzerland. Therefore, the MNHTs and NHTs we interviewed highlighted the following mechanisms, firm and location characteristics that help them to recruit new employees:

**Mechanisms**

To find employees, particularly those suitable for headquarters and corporate R&D function that are located in the small towns, MNHTs employed different strategies.

The first strategy is the intracompany transfers, meaning transferring employees from subsidiary to the headquarters for a given period. Intracompany transfer is one way to bring new knowledge to firms in small towns that has not been highlighted so far in the literature on innovation outside core-regions. Cantwell and Iammarino (2003) mentioned intra-firm networks as one type of innovation networks for multinational firms. This type of innovation network might therefore be especially important for MNHTs in small towns in order to bring new employees as creative actors from outside the region to the headquarters.

The results from the theoretical replication showed that NHTs did not mention intracompany transfers as a way to find new employees as they do not have subsidiaries. Hence, MNHTs seem to be better able to react on labour shortages than NHTs firms, due to established international intra-company networks and experience with subsidiaries abroad. Therefore we can verify our assumption that the global scope of a firm has influence on the mechanisms for acquiring non-local knowledge.

Other strategies mentioned by MNHTS as well as by NHTs are job advertisement on multiple platforms and promoting the firm at universities and colleges to raise awareness of future employees. This is especially important because the firms are mostly not well known in the general population. Approaching suitable people they know personally or from collaboration elsewhere directly is also one way to find suitable employees.

**Firm characteristics**

Operating on a global scale helps to attract employees who wish to work in a global environment. Regarding the theoretical replication, that was the only advantages MNHTs have compared to NHTs. Nevertheless, the fact that the global orientation of firms outside core regions might attract employees to small towns and therefore even foster innovation activities has not been discussed in the literature so far.

Both MNHTs and NHTS benefit from being leaders in their respective niche industry, which in turn helps them to be known among people working in the same niche. Additionally, many of the interviewees named different firm characteristics that help to attract new employees, such as being known as a reliable firm, producing high quality/high technology products, being family owned and not
stock listed. One interviewee explained his decision to move to the eastern part of Switzerland and work for a MNHT as follows:

“In a firm, which is completely independent and which can operate with a long-term and sustainable perspective, because it is not stock listed (...) the value associated with the firm, the vision that the founder had, how he has realized it (...) I have a great motivation to devote my time and passion to this firm and carry on the heritage.” (Firm 4, Interviewee 4)

From this citation, we can infer that it is especially important for firms in small towns to have specific characteristics that convince employees to move and work in a non-core region.

**Location characteristics**

Characteristics of the local environment help to convince certain kinds of employees to move to the region. Natural amenities and lower cost of living attract especially employees older than 30 or employees with children. As one interviewee said:

“You have space, you have air to breath, you easily find living space. We live close to the wood where you can go for a run. We are in the country but still connected with the world.” (Firm 1, Interviewee 23)

Natural amenities have so far been discussed in the literature regarding tourism towns or residential towns (Segessemann and Crevoisier 2015; Moss 2006). The potential of natural resources for attracting high qualified employees for high tech industries has so far not been investigated. However, natural amenities can be a location advantage and be a reason why people with professional experience might want to work in a firm located in a small town.

Also the fact, that the small towns in which the firms are located, are not in the absolute periphery, have good infrastructures, and have good access to cities, such as Zurich or Munich, helps to find employees:

“The town is nice (...). There is a harbour area with a pedestrian area with restaurants, which is important. I think, if we would be in a smaller village with only a small restaurant and nothing else, that would not seem very professional. I think that is the difference of a town to a village or even to the green field. The green field does not create positive associations, but our town does.” (Firm 6, Interviewee 2)

This citation illustrates nicely the importance of thinking more differentiated about “outside core regions” or “periphery”. Smaller towns provide an environment that is characterized by urban features such as of the presence of restaurants and cultural activities as well as rural features, such as being close to untouched nature or farming land. These characteristics evolve into a special work and innovation environment that is significantly different from core regions or the absolute periphery.

Nevertheless, the absence of a technological university in the region makes it hard for the firms to bring freshly graduated employees to the small towns. Graduates that have gained their degree from
universities in core cities do mostly not want to work straight away in the eastern part of Switzerland, even if they had grown up there:

“Our young people go to Zurich and do not come back. We have a real problem and it is a challenge”
(Firm 9, Interviewee 2)

4.2 Feedbacks and Information from clients

Feedbacks and information from clients can be considered as market-sourced knowledge that has a fast decay. Hence, for firms that are not close to their clients, it can be difficult to gain access to this kind of feedback and information. However, the firms interviewed emphasized the importance of knowing what their clients want. Efficient feedback systems and the geographical proximity to their clients have been mentioned by the MNHTs as the main strategies to receive feedbacks and information from the clients.

_Mechanisms_

In order to be close to clients, all of the MNHTs interviewed have established subsidiaries in proximity to their clients:

“If you want to work on a global basis, with Ericsson, Nokia and Siemens for example, then you have to follow them. If they go to the east, to Poland or China, then we have to be there as well. You have to have their mentality, you have to be close to them and do something local.” (Firm 3, Interviewee 19)

One interviewee said that the dialogue between the firm and the clients is more effective compared to, e.g. the contact that is merely established through distributors. Because MNHTs’ R&D departments remain within the headquarters, suitable tools for knowledge transfers have been developed, through which subsidiaries can send information to the headquarters. Also video or audio conferences are used to communicate with the subsidiaries and the clients. Nevertheless, the communication with the clients – asking the right questions, understanding the answers correctly, transmitting the information correctly to the headquarters - is not an easy task and has to be improved all the time, as stated by two firms. Here we can again refer to the inter-firm networks emphasized by Cantwell & Iammarino (2003) that should support the knowledge transfer from the clients through the subsidiary to the headquarter. From time to time, also employees working at the headquarters travel to the clients worldwide to gain a broader picture of the situation.

Looking at the results from the theoretical replication, we could see that NHTs work with license partners in other countries that do most of the marketing and the distribution of the products. Hence, information form clients mostly does not find its way to the headquarters, as one of the NHT (Firm 6) confirmed. Therefore, we can conclude that multinational firms are also in this respect better able to access non-local knowledge and bring it back to the small town.

_Firm Characteristics_
The awareness that geographical proximity to clients is important represents one crucial firm characteristic that favours the exchange and information flow between the firm and their clients. In order to facilitate information flows from subsidiaries to headquarters, the MNHTs told us, that they work on establishing a feeling of belonging together between the subsidiaries and the headquarters. As one interviewee put it:

«All over the world, we have multiplied our culture. You are always welcomed with respect in every subsidiary. Moreover, if someone comes to us – from Zurich or elsewhere – they are astonished that everyone says “Grüezi”. There is a huge feeling of shared identity.» (Firm 2, Interviewee 27)

Different activities, such as temporary exchange programs or annual get-togethers are seen to foster the exchange among employees of different subsidiaries and develop a common identity (Regnér and Zander 2011). As Nilsson and Mattes (2015) confirmed, frequent face-to-face contact can influence trust between actors and therefore foster exchange of information. This also seems to be the case for the firms we interviewed.

**Location Characteristics**

Since all of the firms we interviewed have clients all over the world, they also would have to design strategies to gain client feedback over long distances even if they are located in a core region. Hence, we do not expect a firm located in a core region that is similar to the ones interviewed to have other strategies in order to gain information from clients. Concerning the exchange with clients, we can therefore support the results of Shearmur (2010) saying that accessibility does not matter for high tech firms.

**4.3 Research institutions and universities**

Research institutions and universities are important cooperation partners for the MNHTs as well as for the NHTs we interviewed. In the eastern part of Switzerland, there is only the University of St.Gallen that is specialized in economic and management science and law. There are three technical colleges in the region. As a result, firms find mechanisms that help them connect with distant universities and partners as outlined below.

**Mechanism**

Mentors from the National Commission of Technology and Innovation help MNHTs as well as NHTs to find cooperation with their regional colleges and universities. Many of the interviewed firms also advertise master theses to cooperate with students and staff of regional colleges. However, contact to universities is mostly established by searching for research groups Europe or even worldwide by both MNHTs and NHTs. Hence, it is not important where the university or research institute is located. If the firm and the universities decide to cooperate, they meet periodically in face-to-face meetings or via

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5 Swiss German greeting
video or audio conferences. Cognitive proximity is therefore essential (Capello 2017; Fitjar and Rodríguez-Pose 2011a). The MNHTs and NHTs confirmed the claim made by Torre (2008) that temporary visits are sufficient for the cooperation. Either the innovation managers of the firms or the staff of the universities travel for meetings.

**Firm characteristics**

However, in order to establish cooperation with universities or research institutions, the managers of the firms as well as the employees have to be open for cooperation. Although many of the firms interviewed work together with universities or technical colleges, two people from different firms but the same town told us, that the solitary attitude regarding technical problems is in the DNA of the firm.

“The openness to ask an expert is limited. I saw it many times that we tried several times by ourselves instead of contacting an expert.” (Firm 3, Interviewee 18)

«We are located in a small town, and we are a little bit «eigenbrötlerisch» . I`m only allowed to spend 3% of the operation output for external development. I have to justify myself every time for external cooperation.” (Firm 4, Interviewee 7)

This result supports the finding of Fitjar and Rodriguez-Pose (2011a) who show that the open-mindedness and attitude of managers influences the range of cooperation activities. Differences between MNHTs and NHTs could not be identified regarding collaborations with universities and colleges. The reason for that could be that the R&D departments that are responsible for the collaborations are located in the small towns and not abroad. Hence, the assumption that a multinational orientation influences cooperation with universities cannot be verified.

**Location characteristics**

The absence of technological universities in the eastern part of Switzerland makes the cooperation with for example the ETH in Zurich not ordinary, as one interviewee told us:

“You always have to travel and everyone says, “Ah, he was again at the ETH!” It is nearly like a ceremonial act.” (Firm 1, Interviewee 20)

However, we do not assume that the approximately 1 hour train ride hinders firms to cooperate with the ETH and that the small town context has an influence on cooperation with universities or research institutions.

4.4 Fairs, conferences and workshops with other firms

Fairs, conferences and workshops with other firms are important meeting points for the interviewed MNHTs and NHTs with their competitors or firms from other industries to observe the market and

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6 Meaning: solitary
recognize new trends (Torre 2008). The theoretical replication showed no difference between MNHTs and NHTs.

**Mechanisms**

Workshops or conferences with other firms are mostly organized by branch organisations or economic development agencies. Also existing networks of employees can connect firms to other firms in the same or different industry. However, contact with competitors concerning technical questions is rare, as one interviewee said:

“We want to protect us. But there are committees where we have exchange, for example the Iron Link Network. We meet to symposium or something like that.” (Firm 5, Interviewee 26)

For non-local events, firm members have to travel to core regions. Hence, they rarely go to such events on the spur of the moment, as this citation shows:

“If I want to go to a seminar or speech for example in Zurich, then it takes at least half a day. I have to take the train or the car to go there, be there, and travel back. Then you think about it twice, if you want to do that.” (Firm 6, Interviewee 5)

Here we can see the importance of the willingness of the employees to be mobile. In order to attend fairs, conferences and workshops the firms have to motivate their employees to travel (Torre 2008). The accessibility of the towns might also in this respect play an important role (Shearmur 2012). Concerning Capello’s creative application pattern, the firms in small towns are highly dependent on employees who want to go beyond the local and acquire knowledge from fairs, conferences and workshops. Nevertheless, beside the study conducted by Fitjar and Rodriguez-Pose (2011a) that discusses the importance of the open-mindedness of managers, the willingness of employees has so far not been investigated in the literature focusing on non-local knowledge sources. The implication of this is that we need to focus more on the characteristics economic actors have in non-core regions since it might influence if and how non-local sources of knowledge are used.

**Firm characteristics**

As some interviewees told us, being well-known in the industry as a reliable partner for cooperation is helpful for establishing exchange with other firms. Moreover, having modern infrastructure combined with the natural amenities in the small towns, firms find themselves in suitable locations for organizing national or international workshops or meetings at their headquarter, as this citation illustrates:

“People also like to come to us. We have a nice laboratory and nice venues for meetings. We have committee meetings that are normally in Bern or Zurich. They like to come to us from time to time” (Firm 6, Interviewee 4)

**Location characteristics**
Fairs and conferences are seldom in small towns. Nevertheless, the firms interviewed organize also workshops from time to time. Fast transportation connection to core regions and the natural amenities are reasons to choose small towns as a location for workshops. Here again, accessibility considerations are eminent when talking about acquiring non-local sources of knowledge.

5 Conclusion

Non-local sources of knowledge are crucial for high tech firms in small towns that are embedded in a medium-interactive environment. However, the mechanisms behind the acquisition of non-local knowledge as well as the influence of different firm and location characteristics is still not widely discussed in the literature. This article’s aim was to extend the knowledge about non-local sources of knowledge by shedding light on how firms acquire knowledge and which firm and location characteristics are crucial. This qualitative study helped to gain detailed insights into the innovation activities of high tech firms and understand in more detail the mechanisms of innovation in small towns. Interviews with a variety of actors in each firm made it possible to trap different views inside each firm and understand the different facets of knowledge sourcing. We investigated five multinational high tech firms in small towns in the eastern part of Switzerland and compared these results to two national high tech firms in the same region. The results show that multinational firms have different opportunities for accessing non-local knowledge compared to firms with only one national location. The empirical results presented in this article lead to two main conclusions:

First, four main sources of non-local knowledge could be identified: recruitment of new national and international employees; clients, research institutions and universities; fairs, conferences and workshop. Compared to NHTs, MNHTs were more able to access and use information from clients through subsidiaries. MNHTs in the context of small towns are hence more likely to be fast innovators (Shearmur and Doloreux 2016). The global character of MNHTs as well as intracompany transfers make it easier to attract and bring new employees to the small towns. We can assume that multinational orientation is one important characteristic to have easy access to non-local knowledge sources and compensate for the lack of local knowledge. In addition, characteristics such as being a market leader, having a long industry history, or being family owned, help MNHTs and NHTs to be attractive employer and partner for research project with universities or cooperation with other firms. However, knowledge does not transfer just on its own, there need to be agents who carry knowledge as well as institutional and cultural means that help. Creative employees who know which kind of non-local knowledge is important and are willing to travel from time to time, technological solutions and a culture for exchanging knowledge are crucial (Capello 2017; Torre 2008). If these assets are available, knowledge flows between headquarters and its subsidiaries, research institutes and other firms should be possible. Such aspects have rarely been discussed when talking about knowledge linkages in the literature on innovation beyond core regions.
Second, a small town in a medium-interactive environment should not be considered as being situated in a context of complete periphery. Firms in small towns have to cope with obstacles such as the missing local buzz, thin labour market or no urban amenities, but have still good transportation connection to bigger cities and as well as central place functions that include schools, medical care, restaurants, etc. The central place functions, lower cost of living and the natural amenities attract especially families and people older than 30. Moreover, the time it takes to reach a research institute or to visit a workshop is shorter for firms in small towns than for firms that are located more peripheral. Hence, firms in small towns have other possibilities to access non-local knowledge sources than firms that are located in less accessible locations. Concerning the feedback from international clients, firms in core regions have to find ways to receive their client’s feedback over a certain geographical distance. As the interviewed firms told us, the medium-interactive environment context does not matter in that respect. Nevertheless, accessibility considerations do also in small towns matter for some kinds of non-local knowledge sources. Spontaneous exchange with employees from other firms or scientists is not possible. Hence, visits have to be planned and employees must be mobile (Torre 2008). Not having a technological university in the regions does not directly influence the innovation activity of the firms. Both MNHTs and NHTs look for research partners internationally. However, the absence of a technological university makes it more difficult for them to hire young, graduating employees. The results show the importance of emphasizing the specific advantages and disadvantages of a place outside a core region and the abilities of firms when analysing innovation beyond core regions.

These two main results show that the combination of firm and location characteristics (pillar 3 and 4 of the framework) influence how non-local sources of knowledge can be accessed (pillar 2) and which ones are finally used (pillar 1). Future research on innovation outside core regions should consider specific firm characteristics and location characteristics in more depth.

Finally, this study showed that multinationals not only bring knowledge and capital to other regions, but are also more able to gain knowledge from other locations for their R&D facilities and headquarter in their hometown compared to national firms. These processes have been discussed in the literature on multinationals (for example Iammarino and McCann (2015) or Mattes (2016)). However, this aspect has not been mentioned in the literature on innovation beyond core regions so far. Nevertheless, multinational orientation could be one of the reason why high tech firms are so persistent in the eastern part of Switzerland. They have developed knowledge networks all over the world and are able to mitigate the disadvantages of small towns. At the same time, they are able to benefit from the advantages of small towns, such as the high quality of the government, environmental amenities and social embeddedness that are worth staying in a high price country.

In policy terms, the question is how the innovativeness of MNHTs and NHTs in small towns can be supported. The firms in the small towns investigated are used to look beyond the regional context to acquire knowledge. Helping firms to establish networks abroad and at the same time creating an
attractive living and working environment to attract new employees and visitors might help improve the ability of firms to develop knowledge networks. Moreover, frequent and fast transportation connections to core regions and airports are essential to facilitate temporary face-to-face meetings.

Bibliography


———. 2017. “Statistik Der Bevölkerung Und Der Haushalte (STATPOP).” Neuchâtel.


Euro SDMX Metadata Structure (ESMS).”


doi:http://dx.doi.org/10.4337/9781784710774.


Appendix

Table A1 Anonymised list of interviewees

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<th>Interviewee Nr.</th>
<th>Firm Nr.</th>
<th>Function</th>
<th>Date</th>
<th>Duration</th>
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<td>25min 20sec</td>
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<td>14min 14sec</td>
</tr>
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<td>18.02.2017</td>
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<td>19.02.2017</td>
<td>25min</td>
</tr>
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<td>Head of Production</td>
<td>17.03.2017</td>
<td>22min 13sec</td>
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<td>4</td>
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