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# **The Contribution of Family Business Groups to the Local Innovation Environment**

Suvi Konsti-Laakso, Jussi Heikkilä, Marita Rautiainen, Satu Rinkinen and Naveed Akhter

## **Introduction**

Business groups are a prominent part of modern economies but little is known about the role and importance of business groups in facilitating innovation in their surroundings. In particular, knowledge is limited about family business groups' role in their surroundings (that is, the region in which they are located) and their interrelations with their surroundings in developed economies. In this context, a family business group is simply defined as a family business that consists of multiple firms. Researchers (Stough et al. 2015; Bird and Wennberg 2014; Block and Spiegel 2013) acknowledge the importance of family businesses' impact on certain regions and regions development. However, research on this matter has been rather scant. In particular, the effect and the role of family business groups on the regional innovation environment remains unexplored territory. This study of family business groups in the Lahti region aims to narrow this research gap by regarding the role of family business groups in a regional context and examining their role in the regional innovation environment in developed economies.

This study takes a regional innovation system (RIS) as a theoretical framework. The scope of this paper covers RISs and particularly how family firms and family business groups are embedded in an RIS. We provide a descriptive case study, focusing on one region – the Lahti region – that is located in southern Finland. In this region, we identify the innovators based on patent, design rights and trademark register data.

This study sheds new light on the firm characteristics in an RIS and provides a better understanding of a family business group's role in an RIS. We make three main contributions: first, our descriptive findings suggest that family business groups play an important role in an RIS. Second, we extend the analysis of regional innovation activity from patents to complementary innovation indicators,

utility models (UMs), design rights and trademarks. Third, our case study emphasizes the methodological challenges related to studying family business groups. According to our findings, we argue that family business groups are important for regional innovativeness and its development and have a key role in an RIS.

### **Family Business Groups and Innovation**

There has been a lot of interest in research innovation within a family business context (for example, Laforet 2012; 2013; Nordqvist and Melin 2010; De Massis et al. 2013; Nieto et al. 2015). However, prior studies have been contradictory in their results. On one hand, some studies find the family context to support innovation (for example, Bresciani et al. 2013) and generally many positive aspects of family business are linked to innovation activities, that is to say, they are linked to entrepreneurial innovative firm culture (Craig et al., 2014), long term commitment (Zellweger et al. 2011; Lumpkin et al. 2010; Gómez-Mejía et al. 2007) and agility in activities (Hausman 2005). On the other hand, some inertial issues are pointed out, like unwillingness for renewal (Gómez-Mejía et al. 2007), limited resources and skills (Gray 2006), and conflict and risk avoidance (Hausman 2005; Gómez-Mejía et al. 2007). Family firms have been described to be stable and conservative, as well as to show slower firm growth (Gallo 2004; Ward 1997). Gudmundson et al. (2003) compared non-family and family businesses and found no significant difference in the level of innovation output. Beck et al. (2011) noticed that market orientation diminishes in later generation family firms and this can be detrimental to such firms' innovation success. Liang et al. (2013) suggested that innovation and innovativeness could be supported by various organization levels and through different types of structures related to family governance.

Research findings on innovation and family firms are, to some extent, contradictory and have primarily focused on internal mechanisms, dynamics and characteristics through family and firm levels of analysis (Gomez-Mejia et al. 2007; Bird and Wennberg 2014). In contrast, less has been studied about family firms' role in their surroundings (that is, the region in which they are located) and interrelations with their surroundings. Basco (2015) highlighted their importance to the region and Block et al. (2013) showed that regions with a higher family firm density also show higher levels of

innovation output, as measured by the number of successful patent applications. Chang et al. (2006) noticed that the economic development of a region seems to influence the prevalence of family firms, and studies of the development of the Gnosjö region in Sweden (see Bjuggren and Sund 2002; Johannisson and Wigren 2006) suggested that the relationship between family businesses, local culture and the development of the regional business environment were closely intertwined. In many regions, family firms are the central element of regional economic development. They are the engine of growth and creating new jobs and thus contribute to the overall wellbeing and development of the local community. So far, research has focused on the family firm as a single corporation and left family business groups and their role in the local business community as largely unexplored territory.

Business groups are common and critically important in developing countries (Leff 1978) and late-industrializing countries (Holmes et al. 2016), as well as having a strong presence in some developed economies (Belenzon et al. 2013). The business group is often defined as ‘a set of firms which, though legally independent, are bound together by a constellation of formal and informal ties and are accustomed to taking coordinated action’ (Khanna and Rivkin 2001). Carney and Gedajlovich (2000) state that in Southeast Asian industrialization, Chinese family business groups have been the engine behind the region’s rapid economic growth in the post-WWII period. Families run most emerging market business groups (Khanna and Palepu 2000). The importance of family business groups in these economies indicates that their business models are an important subject for analysis (Carney and Gedajlovich 2000). He et al. (2013) stated that business groups allow the formation of internal capital markets as an alternative financing channel and this can partially replace the capital allocation function of external markets. Belenzon and Berkowitz (2010) suggested that business groups foster innovation, particularly via internal capital markets. They found that business group’s internal capital is more efficient for innovation than the conglomerates’ internal capital because of its different structure.

Business groups tend to be large and well diversified so there are several reasons to expect business groups to foster innovation. R&D processes are usually associated with uncertainties; diversification allows business groups to better insure themselves against the uncertainty (Khanna and Yafeh 2007). Cost spreading, economies of scale and scope, and resources facilitate the innovative

efforts of business groups (Cohen and Levin 1989; Cohen and Klepper 1996). Diversified business groups can internally finance new investment and innovation opportunities with lower costs than standalone companies (Duchin, 2010; Chang et al. 2006). Innovation can be understood as a cycle involving interactions between tacit and codified knowledge (Nonaka and Takeuchi, 1995; Muller and Zenker 2001). This knowledge enhances innovation activities through the availability of resources and R&D results from the broader network of organizations (that is, from business groups) (Leiponen 2005). Research has stated that there is a positive effect of knowledge spillovers on innovation (Griliches 1979; Scherer 1982; Chang et al. 2006; Audretsch and Feldman 1996) and this is a benefit for business groups. Group affiliation is particularly important for innovation in industries that rely more on external funding and in groups with more diversified capital sources.

More attention is paid to entrepreneurs who are using their position as the owners of several businesses (that is, their position in a business group) (Iacobucci and Rosa 2010; Sieger et al. 2011; Zellweger et al. 2011) and how such dynamic groups work in terms of the innovation aspects, while innovations influence back upon the group structures by triggering further innovations. Families have a long-term presence in family-owned firms and are able to exert increased influence because of cross holdings by affiliated firms within the business group (Purkayastha et al. 2016). A family business group contains smaller pieces, such as private businesses owned together with the family and businesses owned by individual family members. The long-term ownership perspective, wherein ownership is stabilized through generations, represents steady growth regardless of economic cycles. Family ownership plays an important role in a family business group as it confers advantages regarding the use of resources, which allow the R&D efforts to be translated into innovation activity efficiently. Family members may be interested in continuing the family business in some other sector, for example an industry more familiar to a successor because of his or her interests. In such cases, the same family may own several firms in several industries, thus family members are both the owners of the original family business and investors in the new businesses.

## **Family businesses in an regional innovation system**

Recent innovation discussion has shifted towards the systemic nature of innovation (Berkhout et al. 2010; Bessant and Tidd 2011) among the entrepreneurial and organizational challenges related to the interwoven relationships of actors, activities and resources. In these systems, knowledge and learning are important: ‘a system of innovation is constituted by elements and relationships which interact in the production, diffusion and use of new, and economically useful, knowledge’ (Lundvall, 1992 p. 2).

RIS literature presents the RIS as a system consisting of firms, universities and other research and educational organisations, technology and workforce mediating institutions, consultants, funding organisations and non-firm organisations involved in innovation (Cooke et al. 1997; Autio 1998). Even though regional institutions and actors are the key elements of an RIS, the focus and the main contribution of RIS theory is more on the linkages and interaction between these elements and the regional processes. One of the most important linkages are flows of information and knowledge; knowledge is emphasized as the fundamental resource and learning as the most important process in an RIS (Kautonen 2006). Therefore, processes related to knowledge generation, diffusion, application and exploitation are key processes in an RIS. Autio (1998) identified the main building blocks of an RIS to be the knowledge generation and diffusion subsystem, and the knowledge application and exploitation subsystem. The knowledge generation and diffusion subsystem include, for example, universities and other public and private educational and research organizations, technology transfer organizations and workforce mediating institutions, whereas the knowledge application and exploitation subsystem mainly consists of firms and industrial clusters (Cooke et al. 1998; Autio 1998; Asheim and Coenen 2005). For an RIS to factually exist, interactive learning – engaging and connecting these two subsystems – is needed (Cooke et al. 1997; Uotila and Ahlqvist 2008).

Although firms are the key actors in knowledge exploitation and innovation, in an RIS they are mainly dealt with as groups of heterogeneous actors or groups based on firm size (large firms versus SMEs) or industry (industrial clusters) (Cooke et al. 1997; Asheim and Coenen 2005; Agrawal and Cockburn 2003; Asheim and Isaksen 2002; Muller and Zenker 2001). Recently studies have begun to

dig deeper into firm heterogeneities and their role in an RIS (for example, Rinkinen et al. 2016). The most commonly used indicators of the regional innovation outputs of firms are patent statistics, which highlight the role of industrial and technological product innovations rather than the actual wide range of different types of innovations, including product innovations, also process, service, marketing, organizational and social innovations (Tidd and Bessant 2014; Armbruster et al. 2008; Koschatzky 2005; Schumpeter 1934). In a regional context, another challenge for measuring innovation is multiplant firms and the outsourcing of R&D that can sometimes lead to under- or overestimating the 'real innovativeness' of a region (Evangelista et al. 2001; Kleinknecht et al. 2002; Makkonen 2012).

As Basco (2015) notes, research on family firms in a regional context has thus far been rather scant (with some exceptions: Stough et al. 2015; Bird and Wennberg 2014; Block and Spiegel 2013). Block and Spiegel (2013) studied the family firm density and regional innovation output (measured through successful patent applications) in 326 German regions and found support for their hypothesis that the number of family firms in a region is positively linked to regional innovation output. Block and Spiegel (2013) explain this positive effect by the long-term business orientation of family firms and their embeddedness in the local productive structures, gained through their local roots. Family firm owners tend to have a long-term orientation in their businesses, as they often aim to transfer ownership from one generation to the next generation (Block and Spiegel 2013; James 1999; Le Breton-Miller and Miller 2006). Due to this dedication to the long-term success of the firms, family firm owners also seek long-term cooperation with other local firms and organizations (Block and Spiegel 2013). Block and Spiegel (2013) also argue that family firm concentration favours the development of an RIS, and thus has a positive effect on regional innovation activity.

The influence of firms on their local environments could be either an individual or a collective response to perceived threats and opportunities (Nielsen 1988) or the product of unintended or emergent processes (Mintzberg and Waters 1985). Family business groups can have multiple effects on regional economic activity, not only because of their large share of all firms but also because of their characteristics and family ownership, which have an effect on regional networks, social capital and motivations to innovate and cooperate (Block and Spiegel 2013). In this sense, family business groups should be viewed as special types of businesses in the region, embedded in the regional productive

structures. From the RIS and regional innovation policy viewpoint, family firms form a group of partly fragmented firms (for example, in terms of industry and size) with special characteristics and a strong connection to the region, strong social ties and active participants in regional innovation platforms (Rautiainen and Konsti-Laakso 2015).

To summarize, it seems that family businesses' and family business groups' roles in an RIS need clarification. The scope of this study is presented in Figure 11.1.

<Insert Figure 11.1 here>

*Figure 11.1, Scope of the study (adapted and modified from Autio, 1998)*

## **Methodology and data**

Block and Spiegel (2013) bring forward the challenges of regional-level analysis of family firms due to difficulties in matching between patent and firm data, and the definition of *family firms*. In order to tackle some of these methodological challenges and to illustrate the theoretical points raised, we provide a descriptive case study. A case study methodology is a suitable approach when previous knowledge is limited (Yin 2009).

We chose to focus on one region and its family businesses and family business groups, and we utilize a wider range of innovation indicators than only using patent data. We decided to focus on one region and selected the Lahti region in Finland for our closer examination. This region was chosen because the Lahti region has been an empirical context for RIS development, particularly regarding the ways in which knowledge flows and interaction can be enhanced (see for example, Melkas et al. 2016; Kallio et al. 2010; Aula and Harmaakorpi 2008), which offered data for this study. As a region Lahti is also interesting as it does not have a university and so the regional innovation activity is, presumably, less science-based in comparison to innovation activity in cities with universities.

While patent statistics have traditionally been used as a proxy for innovation activity and innovation output (Griliches 1990; Block and Spiegel 2013), other intellectual property rights (IPRs)



have received much less attention as complementary innovation measures until recently. Patents provide the rights to exclude others from commercially using the protected technical invention. In contrast, UMs are typically a protection method for incremental technical inventions (Beneito 2006; Heikkilä and Lorenz 2018) and design rights (design patents in the US) protect the aesthetic aspects of products (Filitz et al. 2015). Trademarks protect firms' brands and can also be used as innovation indicators, particularly for SMEs (Mendonca et al. 2004; Flikkema et al. 2014; Block et al. 2013).

Data for this study were collected from multiple information sources, as indicated in Table 11.1. The register data of Finnish patents and UMs was retrieved from the European Patent Office's Worldwide Patent Statistical Database (PATSTAT; 2016, April edition) and design rights and trademark register data was provided by the Finnish Patent and Registration Office (PRH). Information on the industries of family business groups were collected from a trade register. In addition, we also collected and utilized archival records, consisting of written strategy reports and academic papers, webpages and publicly available lists of innovation funding.

*Table 11.1, Data sources*

<Insert Table 11.1 here>

We identified the location of applicants from IPR data sets. For trademarks, the register data contained the postal codes of applicants, which enabled us to identify firms that were located in the 15 largest cities in Finland. We utilized here the current regions (last updated 2017), which are provided by Statistics Finland. In the case of patents and UMs, the PATSTAT data contained the addresses of applicants and we used this information to identify applicants located in Lahti. For design rights this task was more straightforward as the register data contained the city of the applicant.

Next, we identified the types of applicants in IPR filings. We classified the applicants into three categories: 1) individuals, 2) firms and 3) family business groups. All the applicants who were not part of firms, universities or other organisations, were classified as *individual*. Family businesses were identified according to following criteria: (1) the firm is generally known as a family business, and/or

(2) the firm indicates itself as a family business and/or (3) family members actively participate in the management and/or ownership of the company.

Family business groups were identified using multiple information sources. We used the trade register of the PRH, Fonecta's Finder database and companies' websites<sup>1</sup> in order to review the company structures of these firms. We classified family firms which consisted of multiple legal entities as *family business groups*. The following 16 firms were classified as family business groups: Isku, Kemppe, the L-Fashion Group, Koskisen, the Peikko Group, Oilon, Polttimo, Raute, Eurokangas, Stala, Mediatalo Esa, Teerenpeli, Teknoware, Laulumaa and Wihuri.<sup>2</sup> The applied classification is conservative and it is likely that we have excluded smaller family business groups. Therefore, we underestimate, rather than overestimate, the share of family businesses in regional innovation activity. All the firms which were not family business groups were classified as *firms*.

Older IPR data has less reliable and more incomplete information on applicants' addresses and locations, and therefore we focused on the time period 2000–2010 when describing IPR activity in Lahti, according to above-described applicant categories. When identifying the most active applicants for IPRs in Lahti, we used the whole available data. All the reported figures are for applications instead of grants.

## **Case Lahti: Description and empirical findings**

### ***The characteristics of the Lahti region***

The Lahti region is located in southern Finland. This region possesses some interesting characteristics: (1) the region has a strong industrial history, (2) its location is close to major metropolises (St. Petersburg and Helsinki), (3) it is one of the most important industrial areas in Finland and (4) it acknowledges family firms in its regional competitiveness strategy. The absence of a university and very low research inputs in the region also make the region particularly interesting (Kallio et al., 2010;

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<sup>1</sup> Furthermore, we reviewed the webpages of Lahti Industrial Association (Lahden Teollisuusseura ry) and the Family Business Association (Perheyrittäjien Liitto ry) in order to crosscheck our classifications.

<sup>2</sup> A more detailed list, including the subsidiaries of the listed family business groups, is available from the authors upon request.

Aula and Harmaakorpi, 2008). Lahti is the eighth largest city in Finland and has approximately 120 000 inhabitants.

According to Regional Competitiveness Strategy 2016–2020, there are approximately 10 000 firms in the Lahti region. In Lahti city there are circa 6000 firms. Besides Lahti's strong industrial background, it has historically been an important design city in Finland and the location for several furniture and textile firms. Lahti Arts College was founded in 1971. It has transformed into the Institute of Design, which has been part of Lahti University of Applied Science since 1991.<sup>3</sup> The degree programmes of Institute of Design include Furniture Design, Interior Architecture, Industrial Design, Packaging and Brand Design, Vehicle Design and Wearable Design.

Table 11.2 reports descriptive statistics for the 15 largest cities in Finland and shows how Lahti is positioned relative to the other largest cities. Clearly, Lahti ranks relatively poorly in terms of human capital and R&D investments. In 2010, 27.7 per cent of the inhabitants older than 15 had obtained some level of tertiary education. This reflects the lack of university in Lahti. Among the 15 largest cities, 11 are university cities while Lahti, Kouvola, Pori and Hämeenlinna do not have their own universities. Lahti ranks twelfth in terms of R&D investments, with 597 million euros of investments (constant with year 2000 prices) in total over the period 2000–2010.

*Table 11.2. Descriptive statistics for 15 largest cities in Finland*

<Insert Table 11.2 here >

### ***Measuring innovation activity of family business groups in Lahti***

We analyse what is the role of local family business groups in innovation activity in Lahti. We identified 751 patent and UM filings, 87 design rights filings and 543 trademark filings at the Finnish patent office by applicants located in Lahti during 2000–2010. Thus, in absolute terms, applicants located in Lahti applied most frequently for patents and UMs to protect technical inventions.

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<sup>3</sup> Source: <http://www.lamk.fi/english/design/about/Sivut/default.aspx> (accessed on 1 March 2018).

Trademarks are the second most often applied for IPR and design rights are the least often applied for IPR. Figures 11.2–11.4 show the share of IPR filings by family business groups in Lahti 2000–2010. The black bars in the figures indicate that local family business groups are constantly active in the filing of IPRs but the filings activity fluctuates considerably over time. The average annual share of all filings in Lahti by family business groups between 2000 and 2010 is approximately 15 per cent for patents and UMs, 20 per cent for design rights and 21 per cent for trademarks. The changes in filing patterns from year to year are the most volatile in the case of design rights, which is explained by the overall low design rights filing activity. The observation that design rights are a less important IPR in comparison to patents and trademarks is consistent with previous studies (for example, Thomä and Bizer, 2013). Overall, it seems that family business groups are not constant performers in their innovation activity. Further analysis could confirm whether there is collaborative R&D between the family business groups, which could explain this volatility.

Interestingly, based on Figure 11.2, patent and UM activity between family business groups and individuals seem to correlate negatively. One reason might be knowledge spillovers from family business groups' R&D, but this is purely speculative. More detailed analysis is needed to find out the reason for this tendency.

<Insert Figure 11.2 here >

*Figure 11.2. Patent and UM filings by applicants located in Lahti*

<Insert Figure 11.3 here>

*Figure 11.3. Design rights filings by applicants located in Lahti*

<Insert Figure 11.4 here>

*Figure 11.4. Trademark filings by applicants located in Lahti*

Table 11.3 lists the 10 most active applicants for Finnish patents and UMs between 1971 and 2014. It shows that in Lahti the technical inventions have focused on specific industries, namely, the paper and paper products industry, the fabricated metal products industry, and the machinery and equipment industry. Interestingly, six out of the ten most active applicants for patents and UMs are family business groups, suggesting that family business groups play a major role in regional innovation activity in Lahti.

*Table 11.3. The most active applicants of patents and UMs*

<Insert Table 11.3 here>

Table 11.4 reports the top applicants for design rights in Lahti during 1971–2014. The list of applicants shows that design rights are a particularly appropriate protection method in the furniture industry as four of the companies operate (or have operated) in that sector. Four of the firms are family business groups. Interestingly, Isku, Stala, the Peikko Group and Raute are among the 10 most active applicants of both design rights, and patents and UMs. This indicates that family business groups have IPR strategies which utilize IPR systems extensively in protecting their innovations. The list of top design rights applicants differs from the list of the top patent and UM applicants in Table 11.3, suggesting that the use of design rights as a complementary innovation proxy provides a more comprehensive picture of regional innovation activity.

*Table 11.4 the most active applicants for design rights*

<Insert Table 11.4 here>

Trademark filings in Table 11.5 show that applicants in Lahti have been particularly active in filing trademarks in the following industries: the clothing industry, the beverage industry and the furniture industry. Clothing manufacturer the L-fashion Group is by far the most active applicant for

trademark filings. Six of the ten most active applicants for trademarks are family firms. Furniture manufacturer Isku Oy is again among the top applicants, indicating that all types of IPRs are important in the furniture industry. Although trademarks can be particularly suitable for protecting service innovations (Flikkema et al. 2014), in the Lahti sample, most of the top trademark applicants are manufacturing firms by their industry classification. The list of top trademark applicants differs from the list of the top patent and UM applicants in Table 11.3, further emphasizing the point that the use of trademarks and design rights as complementary innovation measures provide a more comprehensive picture of regional innovation activity. For instance, the innovation activity in the beverage industry in Lahti is not visible in patent, UM and design statistics but requires the use of trademark statistics to become visible.

*Table 11.5 the most active applicants for trademarks*

<Insert Table 11.5 here>

To summarize, family business groups seem to play major roles in innovation activity in Lahti. Lahti has traditionally been a local furniture industry cluster, which can be seen in design rights filings. Isku, a local furniture company with over 90 years of history, has been by far the most active applicant for design rights. Interestingly, design rights are not so frequently used by textile firms, although design rights could be an appropriate method for their innovations. Instead, the local apparel company, the L-Fashion Group, has been the most active applicant for trademarks. Foremost, our findings demonstrate that patent statistics alone may lead to an incomplete and narrow picture of the regional innovation activities. Extending the analysis to other IPRs, namely design rights and trademarks, provides additional information and a more comprehensive view.

## **Discussion and conclusions**

The chapter investigates the role of family business groups in the local innovation environment. Based on the literature review and descriptive case study, some conclusions and further research needs can be drawn.

First, it seems that family business groups in particular can be regarded as key players in local innovation environments. This study is one of the first attempts to investigate this matter and therefore there are few points of reference. In the Lahti region, several family business groups are specialized in fabricated metal products and long tradition of manufacture of furniture is evident in IPR statistics.

Second, our findings demonstrate that patent statistics alone may lead to an incomplete and narrow picture of the regional innovation activities. Extending the analysis from patents to design rights and trademarks provides a more comprehensive view of local innovation activity. Different IPRs capture innovation activity in different industries. In the case of Lahti, trademarks revealed innovation activity in the clothing industry while analysis of design rights provided a more comprehensive picture of innovation activity in the local furniture industry.

Third, while studying our case from the Lahti region, we acknowledge the challenges of studying family firms from the methodological viewpoint (Handler 1989; Daily and Dollinger 1993). As noted by Ward (1987 p. 253), 'Gaining access to data about family businesses will always be difficult. Not surprisingly, such companies want to keep information on strategy, financial performance, and family relations private and confidential.'

The current quantitative efforts (such as those by Block and Spiegel 2013) merely separate family-owned businesses from non-family-owned businesses. Changing the unit of analysis to ownership instead of company (see Fellman and Leino-Kaukiainen 2006) might yield interesting results. Although firm ownership data is becoming increasingly available (Maliranta and Nurmi 2018), data collection remains challenging and complex, as indicated in this study. The methodological challenge is also linked to the identification and definition of a family business and, in the case of this study, family business groups in particular. As for the definition of *family business group*, we stick to the classic understanding of it as a family that owns multiple businesses simultaneously. Within that, there are issues of ownership and control, which help us distinguish family business groups from family and non-family businesses.

As the research on the family firms' role in regional aspects, more in-depth qualitative studies are needed. For example, in the context of an RIS, this study says little about the interactions taking place in an RIS. Family firms and family firm groups have strong historical and social connections to their location, which can have an effect, for example, on the decision-making within these firms. However, it is not yet known how family firms influence the processes within an RIS (see Basco 2015) and how they could be perceived from the innovation policy perspective.

Finally, scholars have acknowledged that gaining access to the data about family firms is always a challenge (Handler 1989; Ward 1987). Thus, for reliability reasons, in this study, we relied on multiple data sources, ranging from statistics to the archival data from the Lahti region about family business groups involved in innovation. In our study we have tried to follow and dig up information about family business groups in the Lahti region through archival records, as typically, family firms are studied through survey methods. Thus, incorporating family ownership, innovation, business groups and the region led us to a multilevel analysis that furthers this interesting and important area of research. We believe our research will lead other works to reveal new possibilities for unfolding family business groups and innovation, with a focus on the regional aspects.

### ***Limitations***

The present analysis shed light on the role of family business groups in a local innovation environment. We identified family business groups from IPR databases. A significant limitation is that the information on company structure of local family business groups is challenging to obtain (see Ciaramella et al., 2017). Moreover, the IPR data is typically incomplete and contains misspellings of firm names, addresses etc. Thus, it is likely that our calculations of the share of family business groups in IPR filing activity are downward biased. It is common that larger firms diversify their activities into subsidiaries. Furthermore, if firms have diversified their R&D activities regionally, but the IPR filings are filed by a subsidiary located in Helsinki (the capital city of Finland), then this gives a downward bias to the estimates for regional IPR filing activity in Lahti.



The empirical analysis of IPRs focused on the IPRs applied for at the Finnish patent office and did not consider international IPR filings, including European patent filings at the European Patent Office, European Union Trade Marks (EUTMs) and registered Community designs (RCDs) at the European Union Intellectual Property Office (EUIPO) and international filings at the World Intellectual Property Organization WIPO (the Madrid system and Hague system). The general trend in Europe has been that applicants have increasingly shifted to apply for IPRs via these international filing routes instead filing for a national patent. As a consequence, the statistics of the IPR activity of companies operating in international markets are downward biased.

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Figure 1.

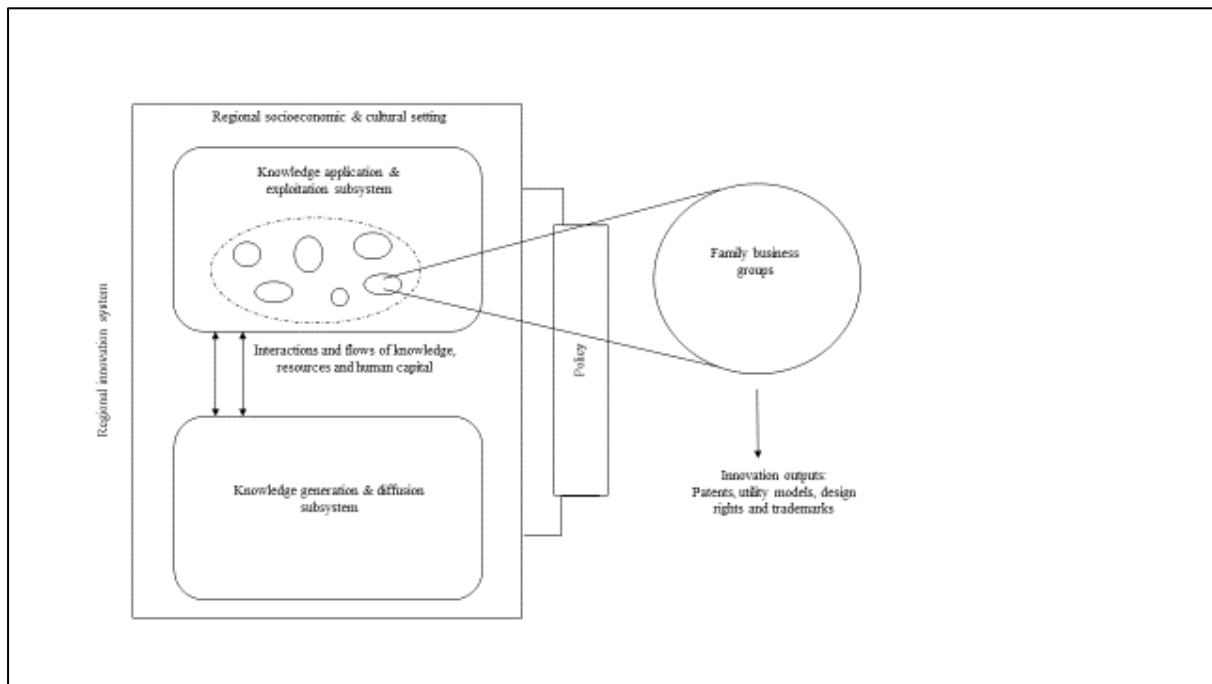


Figure 2

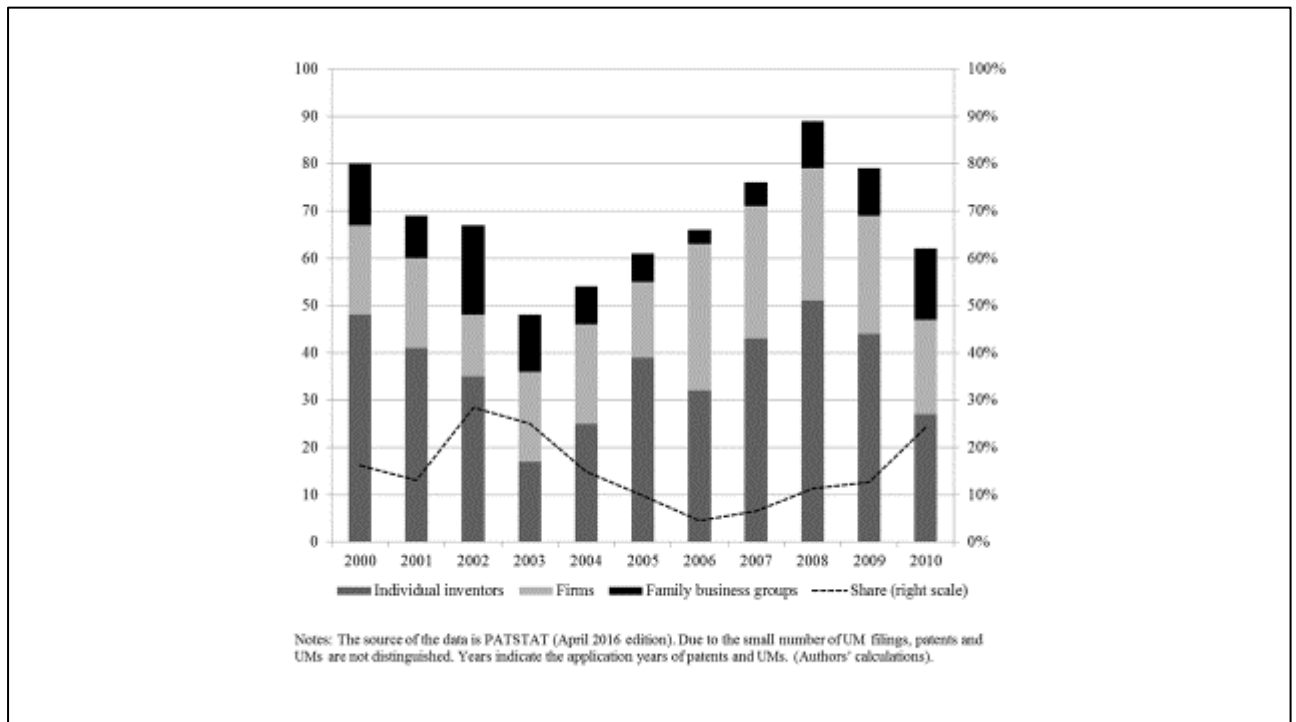


Figure 3

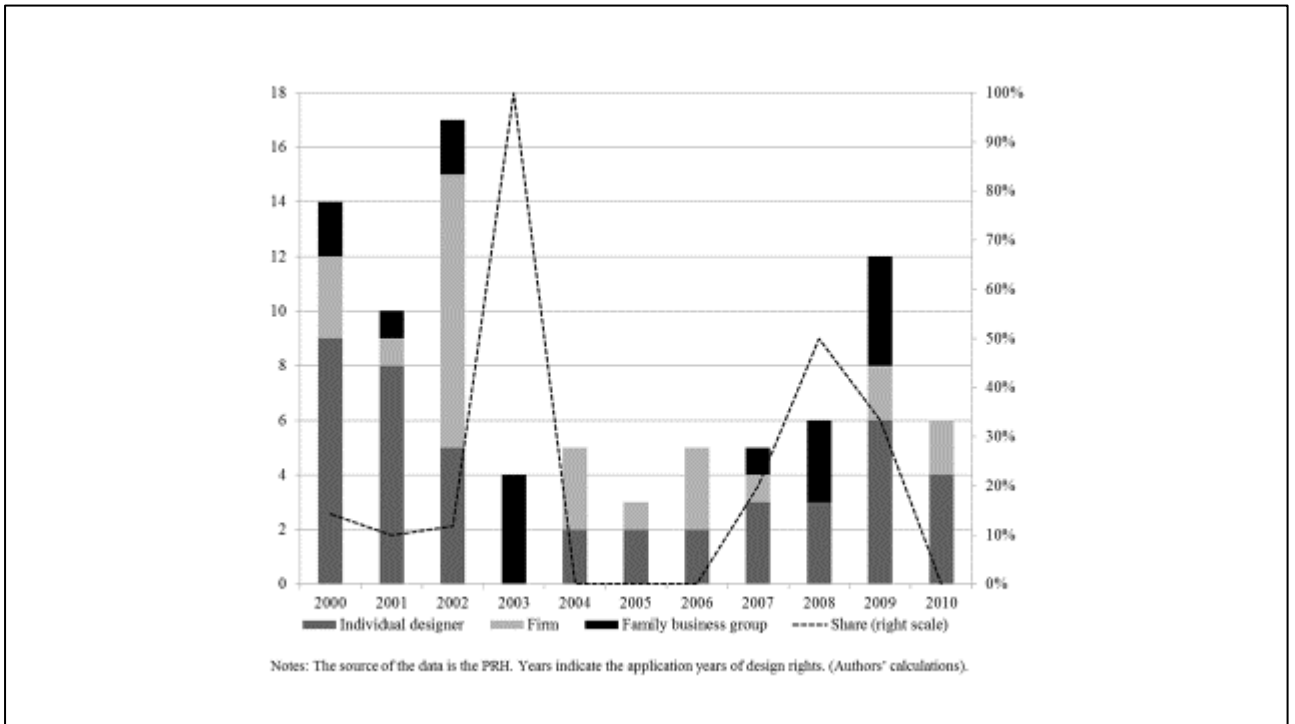


Figure 4

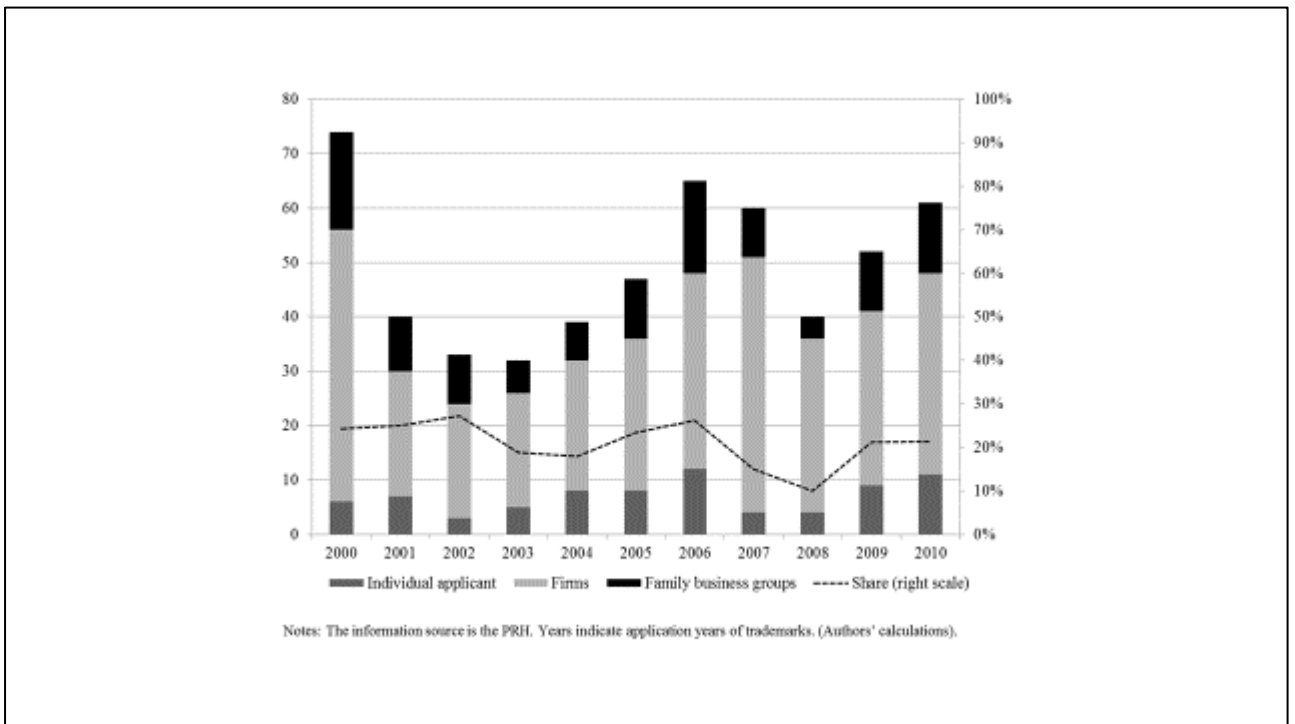


Table 1

Concepts	Innovation outputs	Family firms	Family business group
Definition	<ul style="list-style-type: none"> <li>• Patents</li> <li>• Utility models</li> <li>• Design rights</li> <li>• Trademarks</li> </ul>	(1) generally known as a family business, and/or (2) the firm indicate itself as a family business, and/or (3) family members are actively participating in the management and/or ownership of the company.	Family firms which consisted of multiple legal entities as family business groups
Information sources	<ul style="list-style-type: none"> <li>• PATSTAT Worldwide Statistical database, (2016, April edition)</li> <li>• Trade register of Finnish Patent and Registration Office, PRH</li> </ul>	<ul style="list-style-type: none"> <li>• Fonecta Finder company database</li> <li>• Company webpages</li> <li>• Trade registers</li> <li>• Webpages of Lahti Industrial Association (Lahden Teollisuusseura ry) and Family Business Association (Perheyriesten Liitto ry)</li> </ul>	<ul style="list-style-type: none"> <li>• Fonecta Finder company database</li> <li>• Company webpages</li> <li>• Trade registers</li> </ul>

Table 2

City	Population (2010)	Rank.	Number of jobs (2010)	Rank.	Share of tertiary educated (2010)	Rank.	Total R&D investments (M€) 2000-2010	Rank.	Total R&D investments (k€) per population 2000-2010	Rank.
Helsinki	588549	1	381625	1	37,5	2	28361	1*	48,188	1*
Espoo	247970	2	118585	2	43,9	1		1*		1*
Tampere	213217	3	116219	3	32,4	4	10124	4	47,482	5
Vantaa	200055	4	103955	4	29,3	8		1*		1*
Oulu	185419	5	83581	6	33,6	3	8828	5	47,611	4
Turku	177326	6	94188	5	30,4	7	3875	6	21,852	6
Jyväskylä	130816	7	60805	7	32,8	5	2195	7	16,779	8
<b>Lahti</b>	<b>116582</b>	<b>8</b>	<b>52065</b>	<b>8</b>	<b>25,3</b>	<b>13</b>	<b>597</b>	<b>12</b>	<b>5,121</b>	<b>13</b>
Kuopio	112336	9	50164	9	29,0	9	1215	8	10,816	9
Kouvola	88072	10	34359	12	22,8	15	126	15	1,431	15
Pori	85026	11	36305	11	24,7	14	521	13	6,128	12
Joensuu	73305	12	32943	13	27,6	11	683	11	9,317	11
Lappeenranta	71982	13	31613	14	26,7	12	710	10	9,864	10
Hämeenlinna	66829	14	30336	15	28,6	10	336	14	5,028	14
Vaasa	64345	15	37395	10	32,0	6	1208	9	18,774	7

Notes: Information source is Statistics Finland. Share of tertiary educated refers to the share of population aged 15 or more that have obtained tertiary education. Total R&D investments between 2000 and 2010 are calculated using constant prices in 2000 (2000=100). Total R&D investments per population are calculated using population in 2010 (first column). \*Helsinki, Espoo and Vantaa form the 'greater Helsinki' (i.e., Uusimaa Region) and Statistics Finland does not provide R&D investments separately for them. Hence, they share the same ranking in R&D investments.

Table 3

	<b>Applicant</b>	<b>Patent and UM filings</b>	<b>Industry</b>	<b>Family business group</b>
1	Peikko Group	60	Manufacture of fabricated metal products	X
2	Teknoware	53	Manufacture of electric lighting equipment	X
3	UPM-Kymmene Wood	49	Manufacture of paper and paper products	
4	Raute	47	Manufacture of machinery and equipment	X
5	Stora Enso Packaging	31	Manufacture of paper and paper products	
6	Kemppi	26	Manufacture of machinery and equipment	X
6	Stala	26	Manufacture of fabricated metal products	X
8	Merivaara	17	Manufacture of medical and dental instruments and supplies	
8	Actioneco	17	Manufacture of fabricated metal products	
10	Isku	11	Manufacture of furniture	X

Table 4

	<b>Applicant</b>	<b>Design right filings</b>	<b>Industry</b>	<b>Family business group</b>
1	Isku	63	Manufacture of furniture	X
2	Stala	43	Manufacture of fabricated metal products	X
3	Peikko Group	28	Manufacture of fabricated metal products	X
4	Asko	25	Manufacture of furniture and domestic appliances	
5	Instrumentarium	24	Manufacture of medical instruments and supplies	
6	Stora Enso Packaging	23	Manufacture of paper and paper products	
7	Peem	20	Manufacture of furniture	
8	Hämeen Kalustaja	18	Manufacture of furniture	
9	Raute	11	Manufacture of power-driven hand tools	X
10	M. J. Paasikivi	10	Manufacture of fabricated metal products	

Table 5

	<b>Applicant</b>	<b>Trademark filings</b>	<b>Industry</b>	<b>Family business group</b>
1	L-Fashion Group	94	Manufacture of wearing apparel	X
2	Mallasjuoma	48	Manufacture of beverages	
3	Indoor Group	41	Retail sale of other household equipment in specialised stores; Manufacture of furnitures	
4	Rauno Laulumaa	28	Manufacture of furniture	X
5	Teerenpeli Yhtiöt	25	Manufacture of beverages; Food and beverage service activities	X
5	Isku	25	Manufacture of furniture	X
7	Lahti University of Applied Sciences	20	Higher education	
8	Oilon	19	Manufacture of machinery and equipment	X
9	Novart	18	Manufacture of kitchen furniture	
10	Polttimo	15	Manufacture of malt	X

