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Faculty of Social Sciences
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BACHELOR THESIS

**Innovation in small and medium
enterprises**

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Declaration of Authorship

The author hereby declares that he compiled this thesis independently, using only the listed resources and literature. This thesis was not used to obtain another academic degree.

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Prague, May 18, 2012

Signature

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Abstract

This thesis provides insight into factors that influence the innovation activity of small and medium enterprises (SMEs) in the Czech Republic. Its key part analyzes a survey conducted among over eleven hundred Czech SMEs. A model of determinants of innovations is constructed and estimated. Own R&D is identified as a key driver of innovations for the firms. Other important factors include investment into technology, improvement of quality of a product or service or presence on foreign markets. Barriers to innovations and external factors with negative impact as perceived by the firms do not prove to constitute a real inhibitor of innovative activities.

Keywords SME, innovation, entrepreneurship, small and medium enterprise
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Abstrakt

Tato práce poskytuje vhled do faktorů ovlivňujících inovační aktivitu malých a středních podniků (MSP) v České republice. Její klíčovou součástí je analýza provedeného dotazníkového šetření mezi více než tisícem českých MSP. Pomocí modelu inovací jsou identifikovány hlavní faktory, které je ovlivňují. Vlastní výzkum a vývoj je vyhodnocen jako hlavní zdroj inovací. Mezi další důležité faktory ovlivňující inovace patří investice do technologií, zlepšování kvality produktů a služeb nebo přítomnost na zahraničních trzích. Bariéry inovacím a negativní vnější vlivy, tak jak je vnímají firmy, nepředstavují dle závěrů modelu skutečné překážky inovačním aktivitám.

Klíčová slova MSP, inovace, podnikání, malé a střední podnikání
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In the first part of my thesis I will describe the role of small and medium enterprises (SMEs) in the economy. Analysis of situation of Czech SMEs will follow. It will include a historical overview from the transition period and insight in the current importance of SMEs for the Czech economy. The thesis will also elaborate upon theory of innovations and their determinants. Its key part will analyze and discuss innovation activities of Czech SMEs, supported by results from a survey conducted by the author.

Struktura BP:

1. Introduction
2. Role of SMEs in the economy
3. Role of SMEs in the Czech economy
4. Determinants of innovation of SMEs
5. Innovation activities of Czech SMEs

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Acronyms

bn	billion
CIS	Community Innovation Survey
CZK	Czech koruna
CZSO	Czech Statistical Office
EC	European Commission
EFTA	European Free Trade Association
EU	European Union
GDP	Gross Domestic Product
IPO	Initial Public Offering
IT	Information Technology
LLC	Limited Liability Company
m	million
MITCZ	Ministry of Industry and Trade of the Czech Republic
NACE	European Classification of Economic Activities
OLS	Ordinary Least Squares
OPEI	Operational Programme Enterprise and Innovations
PSE	Prague Stock Exchange
R&D	Research and Development
SME	Small and Medium Enterprise
trn	trillion
USA	United States of America
WSE	Warsaw Stock Exchange

Chapter 1

Introduction

What are the determinants of success of the small and medium firms? That is an interesting and crucial question to ask, especially in the context of current evolution of the world. Globalization, fast pace and uncertainty are at the heart of it. Identifying the right characteristics of a firm that empower it to thrive in these settings can thus lead to factors of its success. Among other beliefs is a thesis that Small and Medium Enterprises (SMEs) are best suited to take advantage of these trends. Capacity to innovate is considered another strong precondition for ability to survive, grow and retain a competitive advantage. This text aims to explore those theses from a closer look, focusing especially on environment of SMEs in the Czech Republic, their innovative activities and the support they receive.

An important economic discussion tackles the optimal size of a company and its consequences for ability of a firm to act as a valid player in the socio-economic environment in a region, a state, a continent, or in the whole world. Firms of various sizes have also various characteristics that to some extent determine their role in the respective environment. According to these attributes the subjects can be either supported or regulated by the government, which usually looks at three main areas of their possible benefits to wellbeing of the whole society. These are their contribution to economic growth and employment and their competitiveness among other firms in the industry both domestically and internationally. Those who manage to successfully fulfill the goals should attract the attention of support and be naturally rewarded by tangible economic profit.

Innovations play an indispensable role in everyday activities of today's society, spanning across all areas of our lives. They are especially important in technical and economic disciplines. Whereas they are a key to progress in the former one, they are an essence of success or failure for the later one. Innovative activities have become an important aspect of every economic or scientific activity, because they create new space for potential specialization and future growth. They allow us to push limits further and the new quickly becomes the standard. In the ever more globalized and interconnected world they are a necessity rather than an option for firms if they want to survive and grow further. Thanks to their creative nature they embody positive benefits both for their inventor and their user. The inventor usually earns a reward in a form of money or respect. The user then gets a result with improved quality, availability, diversity or increased quantity.

The question is whether small or large firms are better suited to bring the desired goals of growth, employment and competitiveness and whether innovation is something that can significantly improve chances of firms to achieve success. This text will argue that small and medium sized businesses and especially their innovative activity are capable of and well suited for pursuing such desirable goals. The capacity alone is not enough to bring favorable results. Since they play a vital role for the Czech economy, this potential should be well developed and constantly nurtured by means of direct and indirect state support.

Chapter 2

Role of SMEs in economy

2.1 Definition of SME

Before we start dealing with SMEs, it is important to introduce their definition,¹ which is based on Commission Recommendation (2003/361/EC) and came into effect on 1 January 2005. As a novelty it introduces the new category of micro enterprise. The key drivers that determine to which size-category a firm belongs are: number of employees and either its turnover or balance sheet total. We can find three subcategories within the SME segment, presented in Table 2.1.

Table 2.1: Definition of SME: Key size determinants

<i>Company size</i>	Employees	Turnover	Balance sheet total
Medium	< 250	≤ €50m	≤ €43m
Small	< 50	≤ €10m	≤ €10m
Micro	< 10	≤ €2m	≤ €2m

Source: Author, Commission Recommendation (2003/361/EC).

There is also a criterion of independence, which defines an *autonomous* firm as having no possessive or voting rights in other companies or owns less than 25% of core capital or voting rights, whichever is greater, in one or more other companies. Alternatively, other firms own less than 25% of core capital or voting rights in an *autonomous* company. Public investment enterprises,

¹It is necessary to point out that there are various definitions of SMEs. They differ across countries and organizations. This text will follow the one described.

universities, research centers, institutional investors or local independent authorities are an exception. These can hold a share of up to 50%. A firm uses the number of staff *headcount criterion* and financial indicators only from its own financial statements if it satisfies the above mentioned percentage limits.

The definition and the thresholds, which used to be lower, are important especially for the purpose of effective addressing of support for firms of various sizes (European Commission, n.d.). The limits are set to enable a wide range of companies to be involved in support schemes for SMEs and make them eligible for accessing grants and subsidies. Their independency definition is supportive to the role of venture capital funds, "business angels" and other small-firm-investment-oriented institutions. Their share in a firm of up to 50% does not disqualify this firm from above mentioned grant and other schemes. The motive behind classifying firms according to dependency as *autonomous*, *partner* and *linked* is mainly to divide them according to their ability to obtain external funding. The main goal of the system of categories designed in a way that was described above is that the right companies have access to the right financing sources.

2.2 Role of SMEs in economy

SMEs are a fundamental component of every market oriented economy. Their vital role is justified by a plenty of macro and micro-economic indicators and stretches beyond economic rationale to the socio-political dimension. Since they are evident contributors to employment and economic growth and continually provide improvements to overall well-being throughout the country, they are often in focus of government support and grant schemes from the EU. These support schemes are not meant to give SMEs an unfair advantage over other subjects, but rather to help them overcome some of their weak sides which they cannot overcome by themselves. Focusing solely on this segment does not create a successful economy, but leaving it to its own fate might not bring the desired goals either. This chapter will focus on both qualitative and quantitative aspects of SMEs in the national economy.

Among the most admired qualities of small businesses² is their flexibility, from

²The terms "small firms", "small businesses" or "SMEs" will be used interchangeably.

both internal and external perspective. Thanks to their size they can quickly react to changing economic conditions, e.g. by entering or exiting a particular business, and are less burdened by administrative or regulatory requirements. They adapt new technologies fast and react to new trends quickly. On the other hand, they are not usually equipped with sufficient capacities to promptly scale-up in case of a sudden increase of demand. They are also vulnerable in terms of their limited capability to diversify their production, both in territorial and product-range aspect, especially in the short term. Another strength of small firms stems from their usually flat organizational structures. They are able to decide very quickly because they do not suffer from a robust decision making process. What their management, often represented by a few people, can decide within days, corporations evaluate for months.

Human resources, their treatment and the use of their potential differ between small and large firms. The ability of a firm to attract and retain talent has become a crucial precondition for its successful competing position in the market (Hiltrop, 1999). Large companies can lure candidates on higher average salaries (Conaway, 2009) (even without stock options and benefits) and often offer plenty of training and development opportunities. They also tend to be located at various places, often internationally, which gives an employee a chance to move to and work at a preferred region or country. On the contrary, large firms lack individual approach and closer ties between their people. Small firms can usually offer family-like working environment, which is an important factor for some people who are deciding where to work. Smaller number of people allows those most talented to stand out compared to clumsy hierarchical structures elsewhere. It also gives the individuals more power to create a tangible impact and change things with visible results that can be attributed to those responsible for them.

Let us finish with a clearly qualitative aspect of a firm – the role of the entrepreneur. His central role for a small firm has been widely discussed and examined. He, as a founder and a key person with decisive power, is often the main source of innovations and serves as a motivator for the rest of the firm. The literature has been focusing on the characteristics of an entrepreneur that lead to his decision to start a new venture and bring it up. We can find characteristics such as vision, proactivity and desire for achievement among the right qualities attributed to entrepreneurs (Storey, 1994). Some scientists

argue that entrepreneurs are born whereas the others state that entrepreneurship can be taught (Audretsch, 2006). Wherever the truth lies, it is true that motivating and educating people is the first step in creating an environment where entrepreneurship should thrive. Above all, the negative notion of failure and entrepreneurs' greed for money are still present in the Czech republic (Morávek, 2010).

The fear from failure and environment not sufficiently conducive towards individuals' venture pursuits are present especially on the European continent where a majority of people lack the right kind of nature compared to Americans. Education in this field from an early age could and should change the current situation. The European Union (EU) has shown its concern when proposing the Renewed European cooperation in the youth field 2010-2018.³ One of the suggested initiatives to develop and enhance was employment and entrepreneurship. One idea to support this initiative was proposed by a conference on youth employment in Belgium in 2010: "EU and Member States should enable formal education curricula to promote and support creative thinking and entrepreneurial skills in young people".⁴ In such environment potential entrepreneurs will have plenty of opportunities to acquire and practice new skills and knowledge.

There are also various reasons why an aspiring entrepreneur would start a new business. It is relevant to mention these reasons because they might implicitly influence the success potential of the new business. "An 11 country study of motivations to start a business", a wide literature review by Scheinberg and MacMillan (1988), suggests 38 motives for starting a business. In an empirical analysis, this number is later reduced to 21 and items are gathered in 6 uncorrelated components. These are: "Need for Approval", "Perceived Instrumentality of Wealth", "Degree of Communitarianism", "Need for Personal Development", "Need for Independence", "Need for Escape". They are used also by other researchers.

Birley and Westhead (1994) take five of them⁵ and add up two new: "Tax

³Council Resolution

⁴Joint recommendations of the Belgian presidency EU Youth Conference on youth employment, EC-Leuven-JointReccommendations.pdf

⁵"Need for Approval", "Need for Independence", "Need for Personal Development", "Welfare Considerations", "Perceived Instrumentality of Wealth"

Reduction and Indirect Benefits” by her own and ”Follow Role Models” identified by Dubini (1988). These seven categories are then used in an empirical study concerning 405 new independent businesses in Great Britain to evaluate the relationship between business start up reasons and consequent firm growth and size. The study, on the contrary to what might have been naturally assumed, finds out that different motivations do not lead to better results, i.e. higher sales or increased employment levels. Once a business is established, the reasons why it was established do not matter. The same result, with categories based on those mentioned above, is achieved by Dahlqvist and Davidsson (2000) who use longitudinal database with over seven thousand cases in Sweden. No connection between initial motivation and survival of a firm is found. Performance and motivation are found to be connected in two categories, although the effect is quite economically insignificant. Here we see that motivation only matters to push the person to start a business and has no meaning afterwards.

2.3 Financing of SMEs

The legacy of problems that characterized the transition period can still be found present in current settings of the institutional framework. Although negatives such as moral hazard and soft budget constraint of banks have disappeared, historically poorly functioning capital market especially for SMEs still remains an issue. Financial conditions of small firms are therefore often regarded as their most obvious drawback. The ability to obtain financing is problematic due to their lack of sufficient collateral and relatively higher level of risk compared to large firms. There are also not so many ways how small firms can obtain capital compared to the large ones. Corporate bonds or private equity from large funds are unfortunately not an option, especially for starting enterprises.

Storey (1994) summarizes the whole problem: ”... smaller firms find it difficult to obtain small sums of equity capital and feel penalized by an inability to obtain, or to obtain at high rates of interest, loan capital.” This is clearly illustrated by Hughes (1992), cited in the above mentioned book, who found out that long-term loans created only 20.5% of all loans of small manufacturing companies, compared to 61.7% by large ones. On top of this, Storey (1994) comments that even small firms here are larger than an average representative of small firms. This said, financing of SMEs looks quite gloomy. We will bring

up to date insights from the current situation in the results from our survey.

Still only the largest companies can afford to be publicly traded on Prague Stock Exchange (PSE) due to its low liquidity and volumes. For a long time, i.e. since 1995 to 2003, the exchange was stagnating in rather low volumes of trade (PSE, 2012). Only during the economic rise between 2004 and 2007 can we see a higher level of trading. It has seen only 10 Initial Public Offerings (IPOs) since 1998. Compared to Warsaw stock exchange (WSE), for example, which managed to lure 38 new listings in 2011 alone (WSE, n.d.), PSE could be doing much better. WSE has even a sWIG80 index that tracks 80 companies with smaller value of listings. Although a stock exchange provides financing solutions for large companies and thus is not directly affecting SMEs, it can and for some surely does serve as motivation and a desired milestone. IPO offers an opportunity for a firm to cash-out on its past efforts and success and utilize current attractiveness.

Not only banks should serve as sources of capital for SMEs, but also, and probably more importantly, seed and venture capital (and later stock exchange) should be a way of obtaining so called smart money (Investopedia, n.d.), i.e. financial funding plus guidance and contacts from an experienced investor. The "smarter" the money is, i.e. the more experienced the venture capitalist is, the more likely is a firm to go public (Sorensen, 2007). ? explains the advantage of an IPO for holders of a minority stake: "IPOs are usually the easiest way to exit investments, since minority owners find it hard to force a company's owner to sell." The example of smart money funding demonstrates that proper funding can have a significant impact on firm (and industry) performance. Silicon Valley is a great example of that. Czech market with venture capital is lagging behind the EU standards too. Innovation Union Scoreboard 2011 found out that it reaches only 12% of the EU27 average (Pro Inno Europe, 2011). MITCZ (2012b) is taking steps to improve the environment by setting up a seed fund providing seed, startup and venture capital and tutoring to beginning innovative companies. The fund is allocated up to CZK 1.4bn from both government and EU money. We can only hope that promising and innovative projects will find it easier to obtain sufficient funding for their activities.

Chapter 3

Role of SMEs in Czech economy

3.1 SMEs during transition period

SMEs were the main subject of the so called small-scale privatization, which was realized between 1991 and 1993. Mládek (1997) provides a brief overview of its program accompanied by useful statistics and technical details. Popular impatience, caused by pace of political reforms being faster than economic ones, motivated the politicians to show their ability to bring about an economic change as promptly as the political one. And so trade and services were chosen as the first subjects of privatization, because they seemed as the easiest target. Mainly due to the fact that their private ownership would certainly be more efficient and because their underrepresentation in the economy promised a significant growth compared to the industrial sector.

Ownership rights were allocated solely through public auction. The total number of units sold amounts to 22,380 with 95% of the subjects sold falling to price categories below CZK 5m (Dlouhý and Mládek, 1994). The average starting price was CZK 1,184,500 and average final price 1,665,000 (41% premium) (Earle et al., 1994). They also identify the main categories of the sold subjects: shops, restaurants and services (85% of units). Although some factories were also part of the small privatization program, they were later taken to auctions of large-scale privatization because the former program proved to be insufficient in terms of handling firm's liabilities. Whereas for small firms these were not a problem, factories needed more treatment regarding their employees and debts (Mládek, 1997).

According to a survey, mentioned by Hanousek and Kočenda (2004), small firms were the cause of low unemployment and accounted for majority of newly created jobs. The authors conclude that: "retained profit of small firms was a major determinant of new investment." They also examine the effect of ownership on firm performance. In case of state owned firms, it is not certain whether they performed better after privatization. Concentrated and private ownership improved performance only in case when it was foreign. The approach of restructuring that foreign owners used was usually different from the one used by domestic owners. While the former concentrated on strategic restructuring, e.g. by increasing sales and profit, the latter employed a rather defensive way of reducing sales and labor costs. It needs to be mentioned that small privatization program was opened only to Czechoslovak citizens according to law 427/1990 Sb. by Federal Assembly of Czechoslovakia.

Mládek (1997) identifies two main contribution of the relatively successful small-scale privatization. Firstly, private firms quickly improved the performance of retail and wholesale trade and services. New owners, similarly to those in restitution, were suddenly endowed with sufficient collateral needed for obtaining bank credit, which enabled them to invest further in their property. As a result, numerous middle class consisting of owners of SMEs emerged, serving as a solid foundation for social and political stability.

3.2 Role of SMEs in Czech economy

SMEs constitute a backbone of the Czech economy, both in microeconomic and macroeconomic terms. To underpin this straightforward statement, however, a large amount of fairly detailed data is needed. This is a complication, as one often does not have all necessary data at hand. There are basically two problems with data on SMEs. The first and the most obvious one is the availability of reliable data. It is nearly impossible to put together a comprehensive statistics (ideally a census) on such a large population of subjects. Even if, theoretically, that would be possible, there still would be a problem that the data may not necessarily reflect reality as enterprises might not have enough time or expertise to provide the data at the right quality or time. There is one thing need to be stressed out very clearly: it is nearly impossible to even count all Czech SMEs, as defined above, because for this it would be needed to have their numbers of employees and turnover and structure of ownership. For

enterprises moving around the defined thresholds this may be a challenge for themselves.¹ Moreover, what about the role of the statistical office trying to collect at least some data.

The second difficulty, regarding data granularity, is that data obtained from Czech Statistical Office (CZSO) and Ministry of Industry and Trade (MIT) are often presented as aggregates for the whole economy (or on regional or NACE basis) and scarcely categorized according to number of employees (or other usable indicators), which is our primary criterion for definition of an SME. Even these categories may prove misleading, as we have found out on the data retrieved from a large-scale firm level database Magnus.² We have used the database extensively to assemble a valuable dataset, which will be described later, containing some 90 thousand records. Although we attempt to present as much reliable and realistic numbers, we are aware of many possible sources of incorrect measurements or collection of incomplete information.

In Table 3.1 we present the structure of numbers of active economic subjects in the Czech Republic according to employee categories to give the reader an overview of the current state and the development since Czech Republic's EU accession. All registered subjects are enlisted in the Access to Registers of Economic Subjects/Entities system, ARES,³ run by Ministry of Finance of the Czech Republic. Ours are not numbers of all registered subjects, which are about twice as high (CZSO, 2007) as active subjects', because we consider these data to be less meaningful. Active subjects are recognized according to data obtained by statistical surveys, tax returns and payments for social insurance and thus give as least some lead of economic activity.

We see that the total number of active economic subjects has been slowly increasing over time and in 2011 there was almost a million and a half of them. A vast majority, 99.85%, of all subjects can be classified as SMEs. Although there is a strong category with not explicitly specified number of employees, we can assume that it contains chiefly subjects with no or a low number of employees.

¹European Commission (n.d.) has published its "Guide to EU definition of SME" to help them.

²MagnusWeb. Available at: <<http://www.magnus.cz/cz/magnusweb>> [Accessed: 24 April 2012]

³Access to Registers of Economic Subjects/Entities. Available at: <<http://www.info.mfcr.cz/ares/ares.html.en>> [Accessed 25 April 2012]

Table 3.1: Structure of enterprises according to number of employees

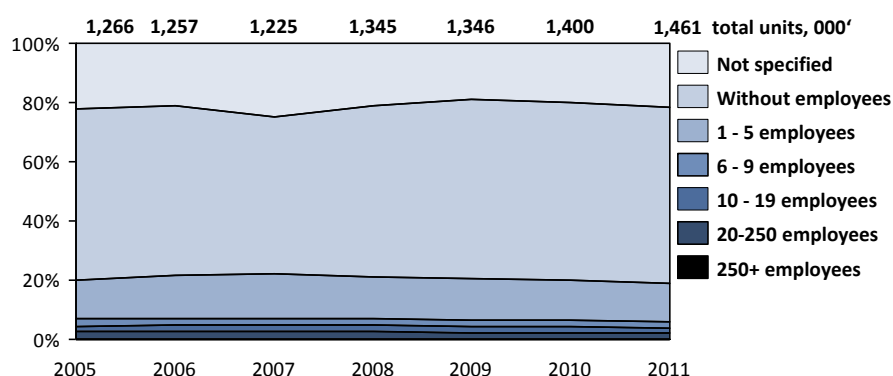
Year	Total active subjects	Categories according to number of employees										
		Not specified	Without employees	1 - 5	6 - 9	10 - 19	20 - 24	25 - 49	50 - 99	100 - 199	200 - 249	250+
2005	1 266 336	277 271	733 249	169 922	28 137	26 129	6 356	12 015	7 211	3 394	639	1911
2006	1 256 771	262 296	723 796	183 214	28 473	26 850	6 401	12 138	7 386	3 492	649	1968
2007	1 224 863	302 601	647 818	185 007	29 346	27 267	6 579	12 393	7 473	3 545	691	2040
2008	1 345 589	284 251	780 260	188 734	30 383	28 208	6 845	12 639	7 787	3 599	702	2071
2009	1 346 185	253 963	817 540	183 855	30 316	27 903	6 433	12 454	7 519	3 477	662	1969
2010	1 399 983	281 109	841 562	187 674	29 856	27 258	6 179	12 529	7 473	3 514	669	2064
2011	1 461 201	319 639	862 087	191 302	29 064	26 686	5 991	12 664	7 421	3 506	621	2124

Source: Author, CZSO (2012b).

The biggest group of subjects is without employees, counting 862,087 subjects in 2011. This one contains also self-employed individuals who do not set up a legal entity such as limited company or joint-stock company. Although being the third most frequent category, for subjects with 1-5 employees the number is around one fourth, or 191,302 in 2011, of the previous category. Counts for all categories for years 2005 to 2011 are summarized in Table 3.1. According to CZSO, there was 1,019,595 SMEs in the Czech Republic in 2010 (MITCZ, 2010). Individual entrepreneurs constituted 806,083 units, legal entities 213,512 units.

Figure 3.1 gives us a better feeling about proportion of various categories on the total number of active economic subjects and its development over years. The total number has been growing slightly, around 2.4% per year. The only year that steps out of the line is 2007, when the "not specified" category swelled and "without employees" category shrank. These two and "1-5" category are growing across time. They are also the categories that represent almost 94% of all subjects. The other categories exhibit stable numbers with the following averages for comparison: "6-9" 29,368; "10-19" 27,186; "20-24" 6,398; "25-49" 12,405; "50-99" 7,467; "100-199" 3,504; "200-249" 662. We see that the number of subjects is inversely related to size of their category.

Figure 3.1: Development of proportion of active economic subjects of different categories on total population

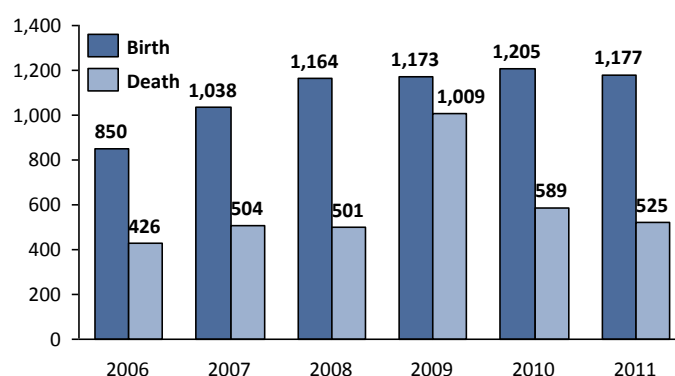


Source: Author, CZSO (2012b).

Development of birth and death rate of economic subjects, presented in Figure 3.2, shows a relatively stable development too. Although it includes subjects of all sizes, we can assume, according to above mentioned proportionality, that it represents mainly SMEs. The average birth rate between 2005 and 2011 was 110,101 subjects a year. The average death rate, influenced by a

sharp increase in 2009, is 59,229; without this peak year it is relatively stable 52,289. The death rate increase was caused by the economic recession, which meant that GDP fell by 4.7% (CZSO, 2012c) and unemployment rose by more than 50% from 4.4% to 6.7% (Eurostat, 2012b). The activity of business start-ups and exits is generally a healthy process in the economy, when unprofitable subjects are forced to leave and give place for new ones.

Figure 3.2: Birth and death rate of economic subjects in 2006-2011, 000'



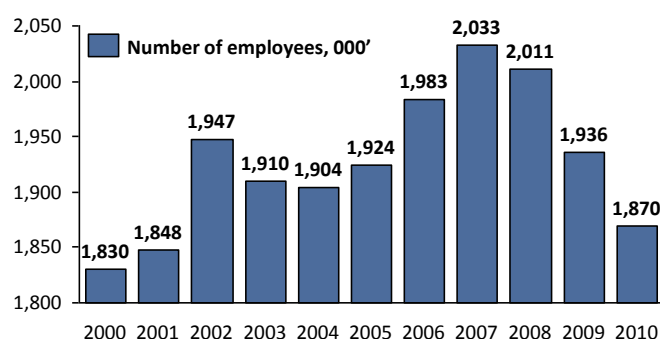
Source: Author, CZSO (2007).

Proportion of SMEs on all economic subjects is very often cited as a striking indicator of their importance (MITCZ, 2010), but this headline alone is not a definite proof of a real value they create. We need to have a closer look on more indicators to be able to reveal the actual contribution these subjects make. Ministry of industry and trade using describes a plenty of them in its report on development and support of SMEs in 2010 (MITCZ, 2010), using CZSO data on SMEs. This kind of data appear to be unavailable to wide audience in public databases. The presented data are also the newest possible to obtain. Among the most relevant indicators supporting the role of SMEs are number of their employees, revenues, value added, investment expenditures and contribution to international trade. Innovative activities of Czech SMEs are examined in more detail later.

SMEs provided employment for over 1.8 million people in 2010, a 60.88% share on total enterprises. Since 2007, when the number peaked at over 2 million, this is a 10% drop. Figure 3.3 presents the development since 2000. Year 2008 was the strongest one also in terms of total revenues incurred by SMEs. It was the only time when they were above 4 trillion CZK, namely CZK 4.5trn. In

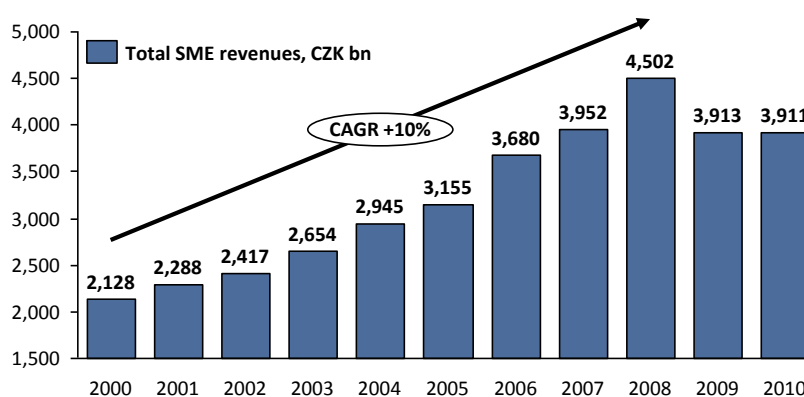
2009 and 2010 SMEs saw return of their revenues to CZK 3,913bn and CZK 3,911bn respectively, a level similar to one achieved on 2007. This is not so bad news, as the total revenues were steadily growing since 2000 till 2008 by compound annual growth rate 10%, as Figure 3.4 demonstrates. Revenues of SMEs accounted for 51.24% of all enterprises' revenues. As we will see also in other indicators, the recession (has) brought a significant drop to all numbers concerning SMEs. Current numbers are, unfortunately, showing very slight a slow recovery too.

Figure 3.3: Number of employees in SMEs in 2000-2010



Source: Author, CZSO (2007).

Figure 3.4: Total SME revenues in 2008-2010

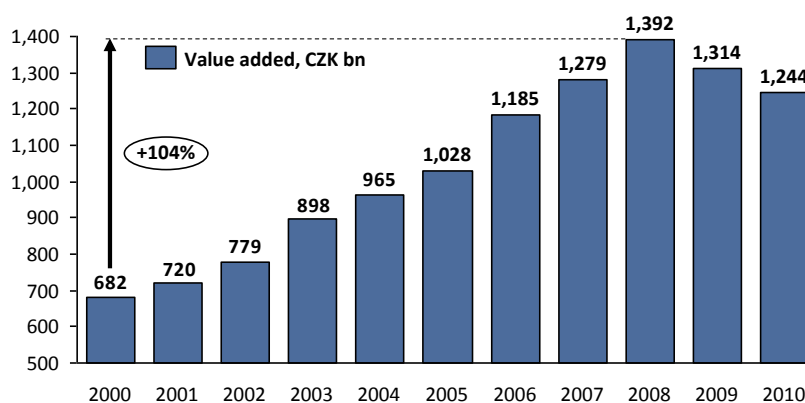


Source: Author, CZSO (2007).

In terms of value added we can already see an increase between 2009 and 2010. CZSO defines value added as a value by which an enterprise has aug-

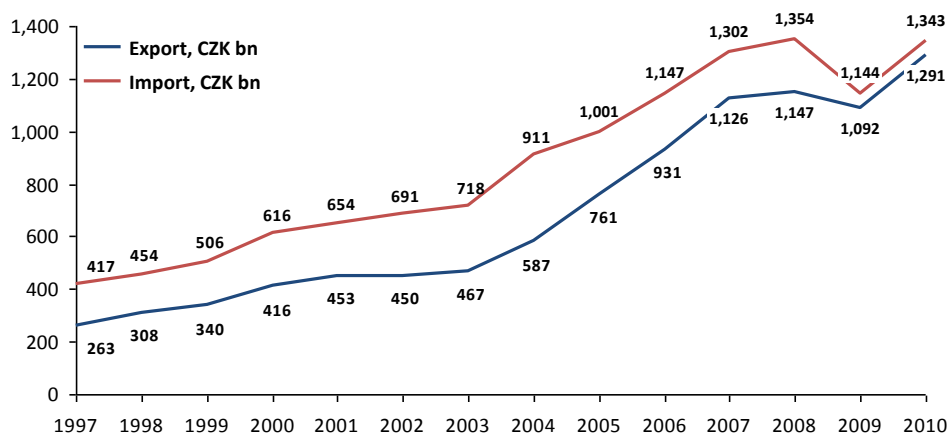
mented its bought inputs (Eurostat, n.d.).⁴ The inputs include raw materials, goods and services. Value added is computed as a sum of operating margin plus revenues of own goods and services plus change in inventories of own production plus so called activation minus output consumption. The total value added by SMEs has doubled between 2000 and 2008 and then dropped by 11% as a result of recession, as demonstrated in Figure 3.5. Its value amounted to CZK 1,244bn in 2010, having a 53.94% share on value added created by all enterprises.

Figure 3.5: Total SME value added in 2008-2010



Source: Author, CZSO (2007).

Figure 3.6: SME exports and imports



Source: Author, CZSO (2007).

⁴Value added is also denoted as accounting value added. Operating margin is computed as the difference between cost of bought goods and revenues coming from selling it.

Another important indicator of economic activity of SMEs is their role in international trade. It is good to know how SMEs are doing especially in the context of the new export oriented strategy crafted by MITCZ (2012a) which has increasing the number of exporters among SMEs by 50% as one of its priorities. This strategy puts emphasis on exports to territories outside Europe, which means that SMEs will eventually be forced to compete globally. So far, their share on total Czech exports in 2010 was 51.3%, amounting to CZK 1,291bn. This number is steadily growing since 1997 as seen in Figure 3.6. The number has more than doubled between 2004 and 2001. The gap between exports and imports has been shrinking over time, from almost 35% to little above 4%.⁵ This is a clear sign that Czech SMEs are able to withstand competition even on the foreign markets.

⁵Proportion of difference between imports and exports on total imports. Average of 1997 and 1998, respectively 2009 and 2010.

Chapter 4

Determinants of innovation in SMEs

4.1 Definition of innovation

At the beginning, it is important to define the concept of innovation and its multiple types. Edwards and Gordon (1984, p. 1) define innovation as “a process that begins with an invention, proceeds with the development of the invention, and results in the introduction of a new product, process or service to the marketplace”. This definition looks at innovation as a rather technological perspective. The issue is that not every innovation begins with an invention. Many innovations take a form of an improvement. This leads us to another definition of innovation used in Community innovation survey:

”an innovation is a new or significantly improved product (good or service) introduced to the market or the introduction within an enterprise of a new or significantly improved process. Innovations are based on the results of new technological developments, new combinations of existing technology or the utilization of other knowledge acquired by the enterprise. Innovations may be developed by the innovating enterprise or by another enterprise. However, purely selling innovations wholly produced and developed by other enterprises is not included as an innovation activity. Innovations should be new to the enterprise concerned. For product innovations they do not necessarily have to be new to the market and for process innovations the enterprise does not necessarily have to be the first one to have introduced the process.” (Eurostat, 2011)

This definition is quite relevant for our later analysis of innovations in the context of Czech SMEs at least in two main aspects. The first one is that

it was used for recognition of innovations in a survey among firms, which is exactly what we have done as well. The second one is that it extends the first definition to innovations with nature other than technological. It also involves improvements and innovations regarding processes that take place within the firm. It thus better covers the areas of our survey and enables the firm to easily identify its innovative activities.

It is also relevant to mention that many scientific papers take patents as representatives of innovations. This is not an appropriate simplification, as Kuznets (1962) suggests, because not all innovations are patented. On the other hand, he also puts forward a supportive argument for patents as a measure of innovations. Patenting not only means technical readiness of an invention, but also manifests entrepreneur's belief in economic profitability of it. Even very slight modifications of already proven concepts which differentiate a particular product from its competitors and thus let it stand out can cause a huge difference in the market although not being patented. On the contrary, there are many patents that remain unused or serve for specific purposes. The Economist explains the strategic purpose of patents on the example why Google was willing to pay \$12 billion for Motorola Mobility:

"The attraction for the internet giant is not the handset-maker's 19,000 employees nor its 11% share of America's smartphone market, but its portfolio of 17,000 patents, with another 7,500 in the pipeline. This will bolster Google's puny arsenal of around 2,000 patents, hugely strengthening its position in current and future legal battles with its more heavily armed industry rivals." (The Economist, 2011)

Current times have brought a climate of "patent cold war" in which companies, e.g. in hi-tech consumer electronics, regularly file lawsuits one against another stating that the counterpart has breached one of their patents, and these count sometimes even in thousands, which was demonstrated above. Such patents can hardly represent genuine innovative activities. We see that the relationship between innovations and patents is at least complicated and current trends do not suggest any improvement in the near future.

There are also various levels of innovation significance (Edwards and Gordon, 1984, p. 17) that categorize innovations according to the amount of novelty incorporated. The strongest one and also the least frequent is "The innovation established an entirely new category of product". Only the top star companies

reach this breakthrough moment. The second-best category is "The innovation is the first of its type on the market in a product category already in existence". We can see these innovations for example in high-tech consumer electronics. The other two categories encompass innovations that build-up on an already established technology or product. They are also the most frequent ones, defined as "The innovation represents a significant improvement in existing technology" and "The innovation is a modest improvement designed to update an existing product". Drucker (1986) offers four basic categories, listed according their significance: breakthrough, complementary, additive, incremental. Their frequency of occurrence follows an inverse sequence, but none of those ought to be neglected in order to achieve constant move forward and keep up with trends. These categories should be taken only as an example of innovation classification because there are plenty of classification schemes, as Coccia (2006) points out.

In a more managerial tone, compared to the previous technical one, Drucker (1986) identifies seven sources of innovations in his book "Innovation and entrepreneurship". These are "the unexpected", "incongruities", "process needs", "industry and market structure", "demographics", "changes in perception", "new knowledge". It is needed to stress out these various sources of innovations, because business owners or people responsible for designing new products or services too often tend to find inspiration only in a few, if any, of these sources. Take an example of mobile phones for seniors. Producers were focusing too much on the technical or appearance part and did not take into consideration the demographics. When working on a new concept or proposition, more aspects of the product should be evaluated and attention should be drawn especially at the sources that have not been sufficiently exploited yet.

4.2 Theoretical background of innovations in enterprises

This chapter will provide an overview of possible determinants of innovations in enterprises. Some of the conclusions are valid particularly for SMEs, some are meant generally to be enhancing innovative activity. At the beginning it is necessary to state a general impression that we have gained from the often mixed and inconclusive studies and that also comes from a common sense. Although it

would be perfect to have a clear idea about what is the best innovation environment, both within the firm and outside it, we reckon that it is nearly impossible to come to concrete statements which would be quantitatively supported and valid in the real environment. As Audretsch (2006) remarks in his book, which we used extensively to gain an insight into entrepreneurship and innovations, results based on empirical analysis tend to be valid on a high general level of countries or with reasonable understanding on a sectoral or regional level. But when it comes to a firm-level observations analysis, every firm is unique and no single inference can be drawn.

Innovation and firm's characteristics

The conclusions presented here are thus usually quite general in spite of the usage of various information-rich firm level data, moreover, they in many cases coincide with what common sense would tell straight away. The examined influential factors of innovations can be put into a couple of categories. Firstly, those regarding the firm characteristics such as its size, structure of ownership, organizational structure or R&D expenditures. The problem here is how to obtain the data and how to ensure their reliability. R&D is considered one of the key drivers of innovation. The World Bank defines it as:

”Expenditures for research and development are current and capital expenditures (both public and private) on creative work undertaken systematically to increase knowledge, including knowledge of humanity, culture, and society, and the use of knowledge for new applications. R&D covers basic research, applied research, and experimental development.” The World Bank (2012)

The definition itself is problematic in the context that it is desirable to measure the effect of R&D spending on innovation. Buying a license is not a R&D expenditure then, although it enables the buyer to make full use of the innovative potential developed by someone else. Audretsch (2006) remarks that innovation activities can be measured either on the input side, e.g. by R&D expenditures, or on the output side, e.g. by patents. Generally, there is a problem of measurement of effects of various expenditures on innovations. In services industry, whose proportion on Czech GDP is constantly growing (Eurostat, 2012a), expenditures on expanding the knowledge and skills of workers or investment into marketing of a new services can be viewed as ways to enhance innovation. At least two complications emerge.

How to deal with different levels of qualifications workers have prior to entering a particular firm. Some firms invest into human capital already by attempting to attract the best students. Other complication comes with measurement of intangible innovations such as unique business model or successful marketing campaign. Beck (2008) suggests an example of world-class financial industry in Great Britain, for which innovation activity is hard to measure by standard indicators, and summarizes the whole problem as follows: "Traditional methods of measuring innovation, such as the level of investment in research and development, don't tell the entire story."

Nevertheless, the following studies provide us with results of their empirical analysis. Acs and Audretsch (1988) compare innovations in large and small firms (using definition of a small firm having less than 500 employees) and finds that innovations are negatively related to concentration of an industry and unionization of workers. On the other hand, there is a positive relationship found between innovations and R&D expenditures, amount of skilled labor and an extent to which large companies comprise the industry. These determinants have then various effects on small and large firms, concluded by a remark that: "These findings are not without ambiguity".

Audretsch and Acs (1991) also look at the relationship between firm's sales and number of innovations measured in patents. Here the results suggest that: "Most industries exhibit decreasing returns to scale with respect to the output of innovations. In low-technology industries there is at least some evidence of increasing returns." Interpretation should be taken with caution, because only innovative firms were included in the sample. We are also offered an innovation break-down in the sample according to number of employees. Category "1-99" employees has mean number of innovations 2.617, "100-199" 2.117 and 200-499 1.894. Fairly similar number are achieved throughout the whole sample, although the number is increasing to level around 5 for firms with more than 20,000 employees.

Innovation and firm's environment

In second category, having an impact on innovative activities, are those characteristics dealing with the firm's environment, such as geographical location,

presence of university or whether the firm belongs to a cluster. Here we meet the terms such as knowledge or R&D spillovers.

In their paper "R&D Spillovers and recipient firm size" Acs et al. (1994) shed a light on what type of R&D expenditures are beneficial for small firms and what type for large ones. The initial question is how small firms are able to innovate given their very limited resources compared to large firms. The answer is "Small firms innovate through exploiting knowledge created by expenditures on research in universities and on R&D in large corporations." Whereas R&D expenditures made by large firms are beneficial especially for themselves, university R&D matters for small firms and serves as an input for their innovative activity. Another paper (Audretsch et al., 2005) concludes that firms dealing with new knowledge, i.e. R&D, university R&D, skilled labor, and high-technology show a higher propensity to be located closer to universities. Additionally, knowledge context and spillover mechanism play a role.

Feldman and Audretsch (1999) explore the topic of innovation in cities. They tackle the question whether specialization or diversity better promote technological change and economic growth. This is useful to know when promoting technological clusters or larger units of economic activity. The result, coming from research of number of metropolitan areas in the USA, identifies diversity to be more conducive to knowledge spillovers and innovation.

In industries such as biotechnology, firm's access to a scientist matters (Audretsch and Stephan, 1996). However, for some roles of the university-based scientist, either professional or in the firm, the distance does not matter, for some it does. This is the case for the USA. For the Czech Republic, where distances are relatively small and there are only a few universities, we may omit this factor and keep in mind the second conclusion of the paper. Geographic proximity matters for informal knowledge spillovers. The opposite is true for formal knowledge spillovers.

Innovation and firm's market

Third category involves firms' broader economic environment such as market structure and concentration, industry maturity, extent of entry barriers and importance of innovative activity for a particular industry.

Acs and Audretsch (1987) look at various aspects falling in this category in their paper "Innovation, markets structure and firm size". The initial hypothesis expects the following determinants of relative innovative advantage between small and large firms: market concentration, composition of firm size within an industry, extent of entry barriers and overall importance of innovation activity. Innovative advantage of large firms is enhanced in industries that are "capital intensive, concentrated, and advertising intensive". On the other hand, innovative advantage of small firms is enhanced in industries that are: "in the early stages of the life-cycle", and where "total innovation and the use of skilled labor play a large role, and where large firms comprise a high share of the market." The conclusion for small firms is in line with common knowledge that SMEs, thanks to their flexibility, are able to occupy market niches where specific knowledge and innovativeness play a key role.

Innovation and entrepreneurship

Finally, the last category involves entrepreneurship and startup of a new firm as a way of realizing a full potential of the entrepreneur and his innovation. Audretsch (2005) describes this concept by his knowledge spillover theory of entrepreneurship. He states that entrepreneurship "facilitates the spillover of knowledge from universities and private firms, resulting in commercialization of ideas that would otherwise might remained uncommercialized." The institution of starting a new firm is seen as a medium for the knowledge spillover. A scientist, for example, realizes that by starting a new firm he can appropriate higher returns from his invention that he could at his current "knowledge generating entity", i.e. his university, research institute or industrial organization.

This realization is closely connected with knowledge valuation. If scientist's valuation is higher than his employer's, he decides to leave and start a new firm to appropriate the expected high returns from his knowledge, particularly his new invention. Naturally, different uses of the same invention can also have different valuations, because the key role is played by the entrepreneur and his ability to develop and market his ideas, services or products. Firm then serves as a way to commercialize on those inventions.

Traditionally, characteristics of individuals were examined in terms of propen-

sity to start a new business, they were taken as endogenous. Knowledge spillover theory of entrepreneurship takes these characteristics as exogenous and focuses on the context of decision to start a new firm. Entrepreneurship is viewed as endogenously given by current situation and conditions and described in the following way: “entrepreneurship is a rationale choice made by economic agents to appropriate the expected value of their endowment of knowledge”. It is also a response to opportunities generated by investment in new knowledge by incumbent firms or institutions that are not able to completely exhaust the emerging opportunities. Entrepreneurship education and transfer of technology from universities to the market are seen as important contributors to growth and employment creation. Entrepreneurship is understood as a “missing link” between investment in new knowledge and economic growth.

Chapter 5

Innovation activities of Czech SMEs

After examining the role of SMEs for the Czech economy and the background of innovations in the light of economic theory, it is now time to take a closer look on concrete innovation statistics of SMEs in the Czech Republic. A key source of innovation data is the Community Innovation Survey (CIS) (Eurostat, 2010a), a harmonized survey carried out on a firm level throughout the whole EU plus countries of the European Free Trade Association (EFTA) and candidate countries. There have already been eight rounds of CIS and the Czech Republic has participated in six of them since 1999. The last one and also the source of our newest data is so called CIS 2010, which took place between 2008 and 2010 and Czech Statistical Office (CZSO) was responsible for gathering the data in the Czech Republic. It is necessary to take these data with caution and understand them as a general overview of the state of innovations in the country rather than a detailed set of precise indicators.

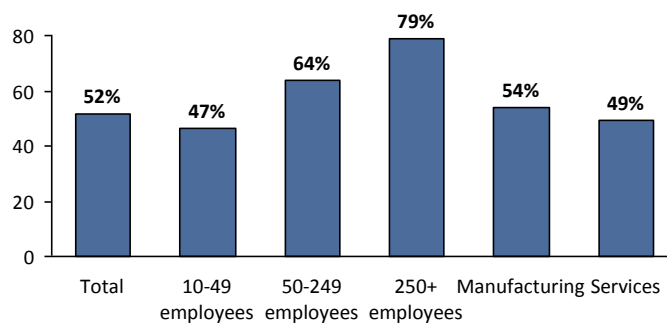
Results of the survey represent responses of 5151 firms with 10 or more employees from selected categories of CZ-NACE which are viewed as key innovation industries (CZSO, 2012a). The topics covered in the survey encompass various fields connected to firm's innovation activities or potential (Eurostat, 2010b). One of the main themes is dealing with various types of innovation. These can be product (service or good), process, organizational or marketing innovations. Other questions include firm's target market, financial implications of innovations (both prior investment and subsequent turnover), nurturing of creativity within a firm and barriers to innovative activities. Another set of questions is

aimed at information sources and cooperation among firms. The questionnaire is fairly complex and contains 28 sophisticated questions in 12 sections.

Considering this and firm's low motivation to participate in such process, we can assume that not all submitted data perfectly reflect reality. An example of a question that can lead to confusing answers is the one asking for percentage of turnover coming from: "New or significantly improved products introduced during the three years 2008 to 2010 that were new" to firm's market, followed by turnover from "New or significantly improved products introduced during the three years 2008 to 2010 that were only new" to the firm and the last option: "Products that were unchanged or only marginally modified during the three years 2008 to 2010 (include the resale of new products purchased from other enterprises)." All this should sum up to 100%. We can imagine how difficult it can be for a manager to calculate such specific turnovers, which are most probably not explicitly tracked in any kind of accounting resources.

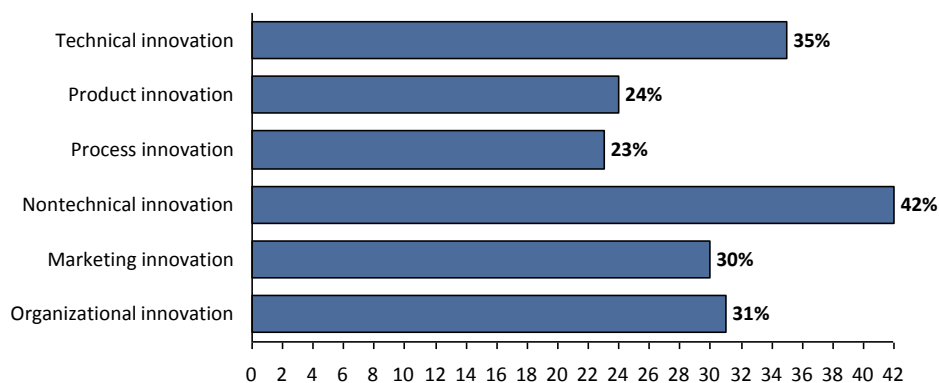
The key figures from CIS 2010 are presented below. The first impression can be obtained from proportion of innovative enterprises with regard to their size or industry. Innovative enterprise for the purpose of the survey is defined as: "... enterprise, which employed an innovation of a product, process (technical innovation) or marketing, organizational innovation (nontechnical innovation)." (CZSO, 2012d). Figure 5.1 shows that only 47% of small (10-49 employees) and 64% of medium enterprises (50-249 employees) engage into innovative activities, with manufacturing sector being slightly more innovative. Figure 5.2 demonstrates proportion of innovative activities according to innovation type. Nontechnical innovations prevail over technical ones by seven percentage points.

Figure 5.1: Share of innovative enterprises in 2010



Source: Author, CZSO (2012d)

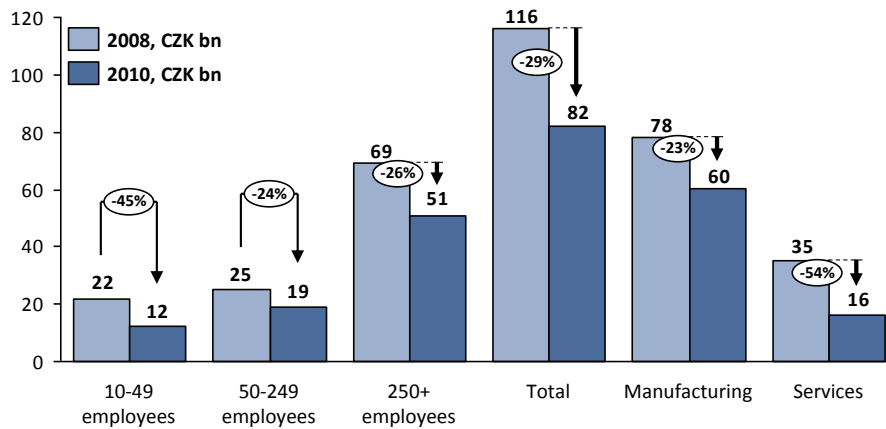
Figure 5.2: Share of innovative enterprises according to type of innovation in 2010



Source: Author, CZSO (2012d)

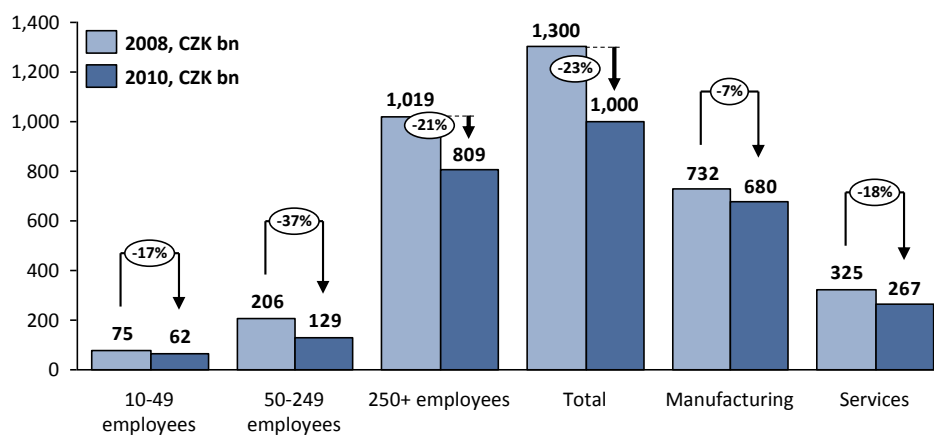
Financial funds spent on technical innovation activities, as presented in Figure 5.3, can be a good indicator of innovative potential. A comparison between pre-crisis period, i.e. 2006-2008, and post-crisis period, i.e. 2008-2010, shows a significant drop in spending. Similar drop can be seen on turnover from innovative products in Figure 5.4. It is important to note that this drop come along with overall decline in revenues since 2008, as was shown in Figure 3.4. From all these figure we can derive that larger companies tend to innovate more on average, share of particular type of innovations is around one third in total population of firms and both financial inputs into and outputs from innovative activities have registered lower numbers due to the economic and financial crisis. Unfortunately, for the time being, the outlook is not quite bright too. Europe is embracing austerity and debts of all kinds are the number one topic. Growth, which would be propelled by innovations, is at best merely on the second place.

Figure 5.3: Spending on technical innovation activities



Source: Author, CZSO (2012d)

Figure 5.4: Turnover from innovative products



Source: Author, CZSO (2012d)

5.1 Innovation survey among Czech SMEs

We have collected over eleven hundred online questionnaires to obtain detailed firm-level data on innovations in Czech SMEs. This complex dataset contains a wide range of indicators covering both firm's internal and external characteristics such as number of employees, structure of ownership, sources of innovations or their barriers, number of competitors, size of operated market and influence of the firm's environment on its actions. The outcomes thus bear valuable information about specific factors that may ultimately lead to innovations. Thanks to the extent of the dataset the right factors influencing innovative activities of firms can be identified and further evaluated in an econometric model. Conclusions and recommendations are then closing the whole analysis of innovations in SMEs.

The aim of the survey was to obtain as much reliable information from SMEs as possible. This would allow us to draw useful and trustworthy inference applicable at best to the whole population of SMEs in the Czech Republic. The process therefore required a sensible balance between detail, providing quality, and simplicity, increasing the quantity. How to achieve the former is extensively described in theoretical concepts by the Oslo Manual (OECD, 2005), which gives a lot of attention to technical innovations and their classification. Two crucial problems emerge when trying to collect such data in reality. The first one is the difficulty to find someone who would be willing to provide such specific data; in case he actually had them. The second problem builds on the first one: even if a firm was willing to provide the data, it could be extremely difficult to extract them in sufficient quality, because no firm has a reason to spent resources on tracking specific aspects of innovations. This is especially true for SMEs, and so the questionnaire was designed to ask simple questions that can be answered quickly and without any research in firm's books.

Searching for contacts to firms was the first step towards having a sufficient amount of potential respondents of our online survey. The MagnusWeb database (Čekia, 2011) was used to gain email addresses to approximately 49 thousand firms in employee categories from *without employees* to *200-249 employees*. Such a large amount emails cannot be sent by standard means and so a server based script was programmed to automate the action. All recipients received a short message kindly asking them to fill in a short survey regarding research

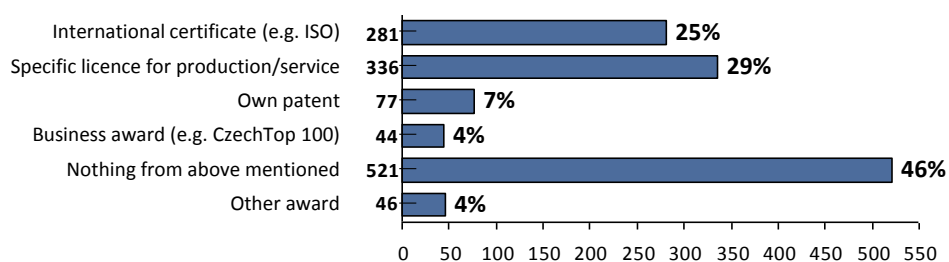
on innovations in SMEs. Also non-innovating enterprises were invited and all respondents were offered the option to get aggregated results. The survey consisted of 21 questions and was designed at vyplnto.cz, a website specialized on conducting online surveys. Almost all questions were short and ready to be filled with just one click, making the answering process really easy and fast. At the same time, where it was possible, the respondent was given an option to fill in his own answer. These answers, despite not fitting well into the model, provided additional insights and more personal opinions. Average time spent answering was around eleven minutes.

5.1.1 Description of the dataset

The final number of received responses is 1,144 and the following section will provide a detailed overview of answers to all 21 questions in order in which they were asked. The order was intentionally created such that it kept attention of the reader throughout the whole sequence of questions.

Figure 5.5 presents results of the first question, which concerned owned licenses, patents or awards. Other answers included plenty of specific certificates, prizes, trademarks or industrial patterns. A few firms are in preparation phase for ISO certificate. Interestingly, five firms expressed their mixed or negative experience with ISO certificates. Almost half of the firms owned nothing. This may be caused by the fact that obtaining a certificate can be a bureaucratic burden for a small firm or that it is of no use for the entrepreneur. Only a small number of firms is a part of any cluster and surprisingly 13% of them does not know whether they belong to such structure.

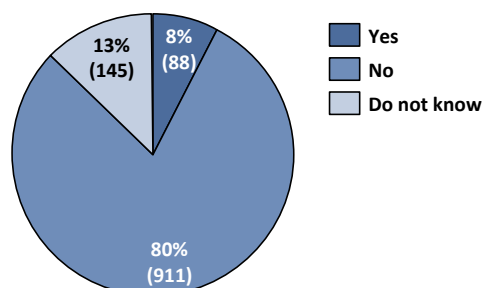
Figure 5.5: Question 1: Do you hold any kind of award, license, certificate or patent?



Source: Author.

Third question asked about the average age of firm's equipment. Although

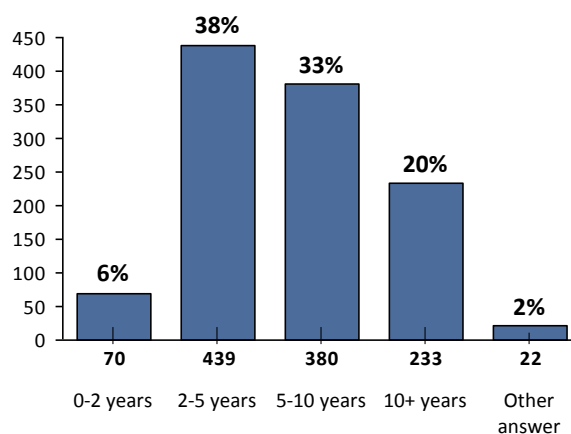
Figure 5.6: Question 2: Is your firm part of any kind of entrepreneurship park or industrial cluster?



Source: Author.

many have equipment of various ages, this question was intuitively targeted at the approximate age of firm's equipment used directly for production or providing a service. Similar problem could occur with competitors, depending on their exact definition and location. A number of firms indicated thousands of domestic competitors.

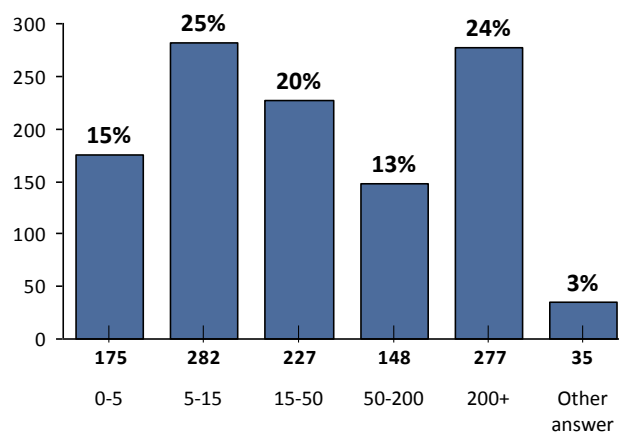
Figure 5.7: Question 3: What is the average age of your firm's equipment?



Source: Author.

The next question regarded areas of competition. Sadly for the firms and luckily, maybe, for the customer, a strong majority of firms competes in price. Many firms remarked that there is often unreasonable pressure on price at the expense of quality. Proportion of firms competing in quality and product innovativeness confirms that. What seems to be wrong is the mindset of the whole society that is too focused on prices. Competition in prices pushes margins

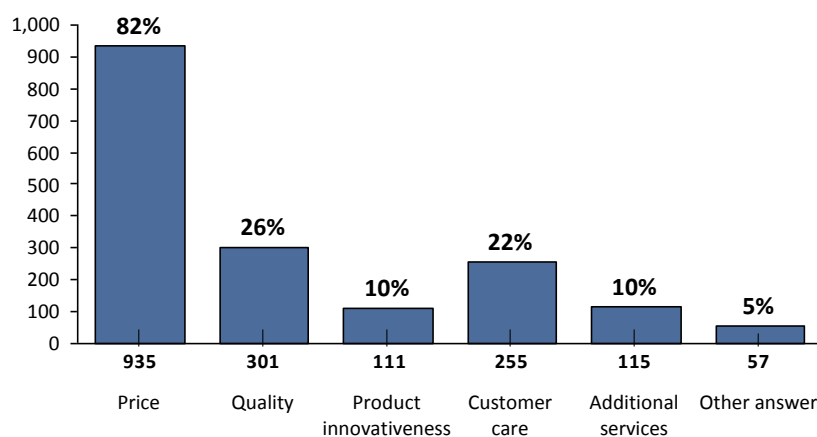
Figure 5.8: Question 4: What is the average number of your firm's competitors?



Source: Author.

down and inhibits so much needed investment into development of new and better products or services.

Figure 5.9: Question 5: In which of the following areas does your firm compete the most with the competition?

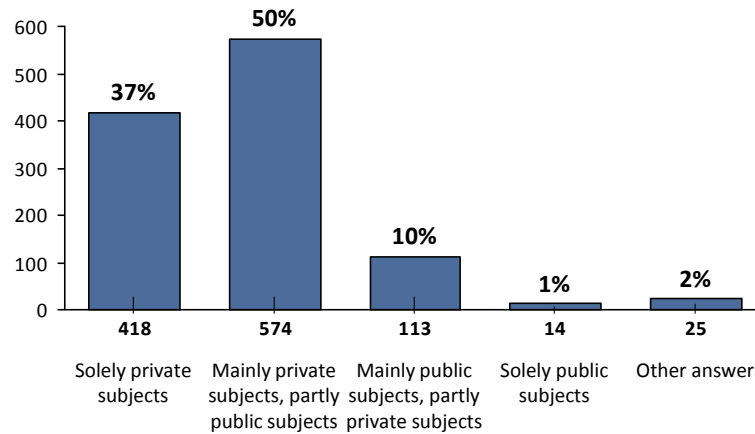


Source: Author.

Naturally, private sphere is the primary target for most of the firms, yet the number could be even higher if the state transferred more agenda on the private sector. The next question aimed at evaluating the environment the state generates for SMEs.

Corruption, tax system and unfair competition have significantly negative impact on SMEs. Disturbing is also the other end of the graph which says that corruption and unfair competition are a positive factor for 11% of firms.

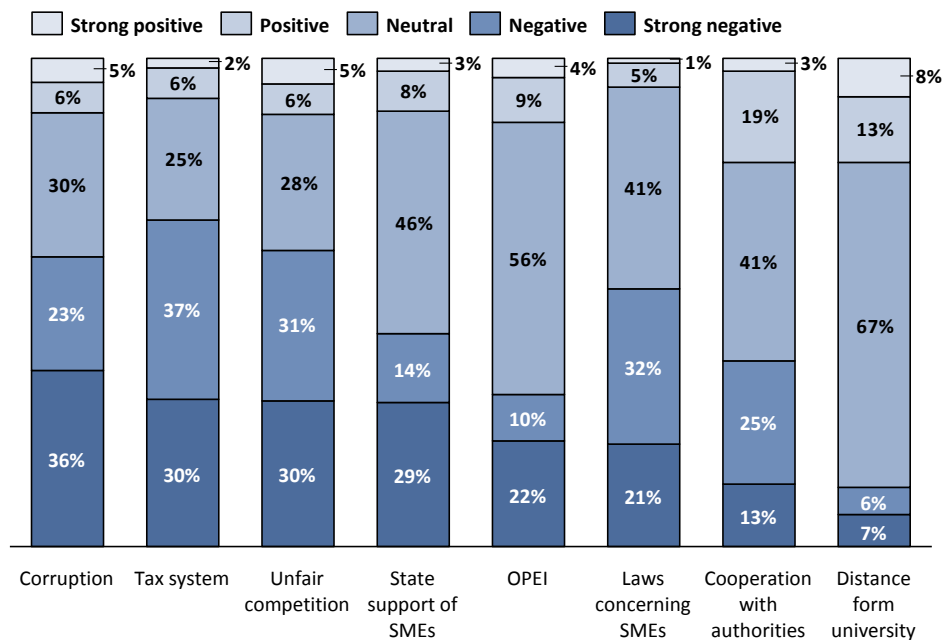
Figure 5.10: Question 6: To whom does your firm serve its products/services?



Source: Author.

All rated factors except for the distance from university were rated negatively, which does not build a good reputation for the state.

Figure 5.11: Question 7: Rate whether the following have a positive or a negative influence on your business

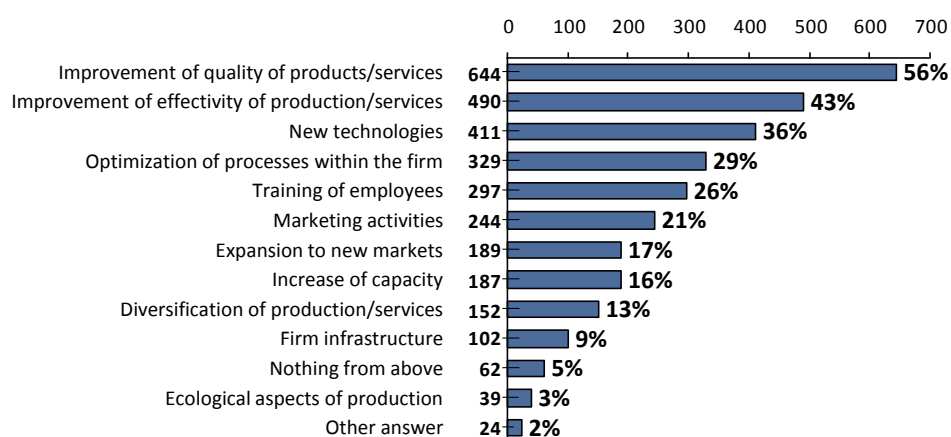


Source: Author.

Although majority of the firms compete with price, it turns out that also over a half of them actually invests in improvement of quality. We believe that

there is still plenty of space for improvement, because some of these categories of investment have proven to be drivers of innovations.

Figure 5.12: Question 8: In which of these areas does your firm mainly invest?



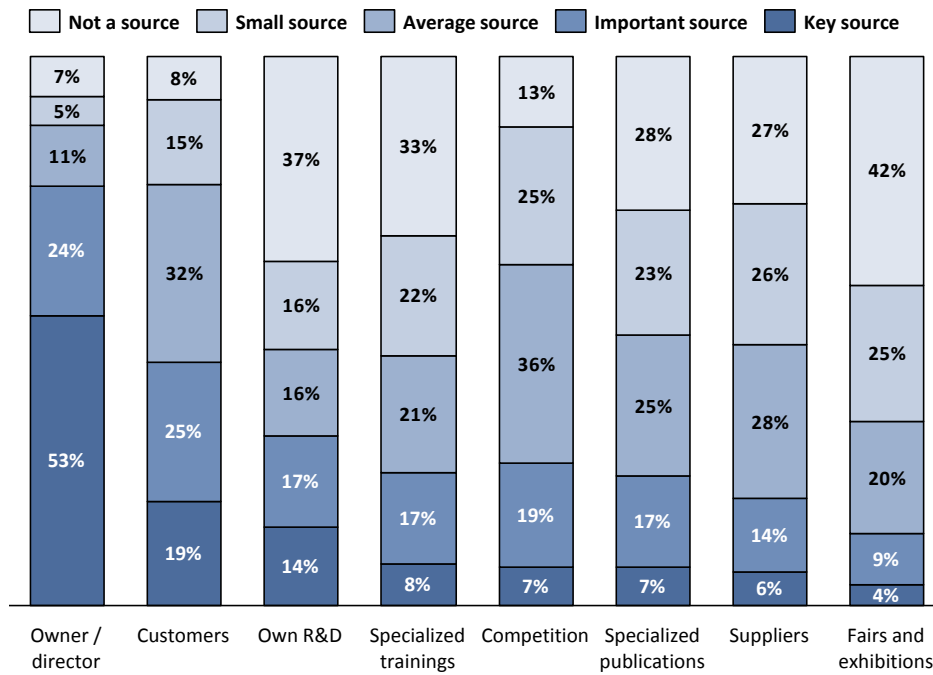
Source: Author.

Another question was inquiring into the sources of innovations for firms. Focusing on the right source can lead to enhanced innovation performance, our model has found out. Although majority of firms perceives their owner or director as a source of innovations, it is R&D and customers that have real impact on them. Our dataset showed that owner or director is the source especially for micro or small enterprises, whereas for medium ones his importance decreases.

Central question of the whole survey followed. Firms were asked to identify approximate number of innovations they introduced since 2010. Innovation was briefly explained as introduction of a new or improvement of a current service, product, process or technology. Majority of firms came up with one to five innovations, the count then sharply dropped. Sadly, 8% of the firms had no innovation since 2010. Other answers included remarks that innovations are not tracked within the firm. No question was asked on categories of innovations, because that would certainly be quite complicated for firms to answer.

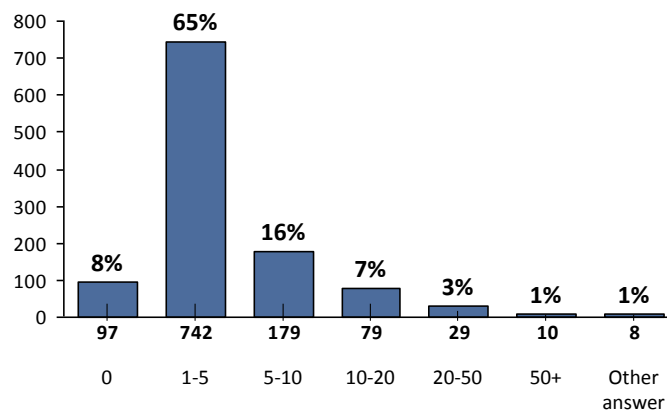
Barriers to innovations were examined next. Firms find little problems when dealing with other firms and do not feel insufficiently equipped by technological equipment. Process of obtaining a license or a patent also does not constitute a barrier. On the other hand, a number of important barriers appears at the top of the graph. Cost of qualified workforce and of financial resources is a problem, as well as insufficient enforcement of property rights and lack of support from

Figure 5.13: Question 9: What are the main sources of innovation for your firm?



Source: Author.

Figure 5.14: Question 10: What is the approximate number of innovations your firm has introduced since 2010?



Source: Author.

the state. Only two from the whole list of inhibiting factors have actually proven to work counter innovations.

It is certainly a good news that one in every four SMEs delivers its products or services abroad. Presence on foreign markets has proven to be a significant determinant of innovations, although this inference is not without ambiguity.

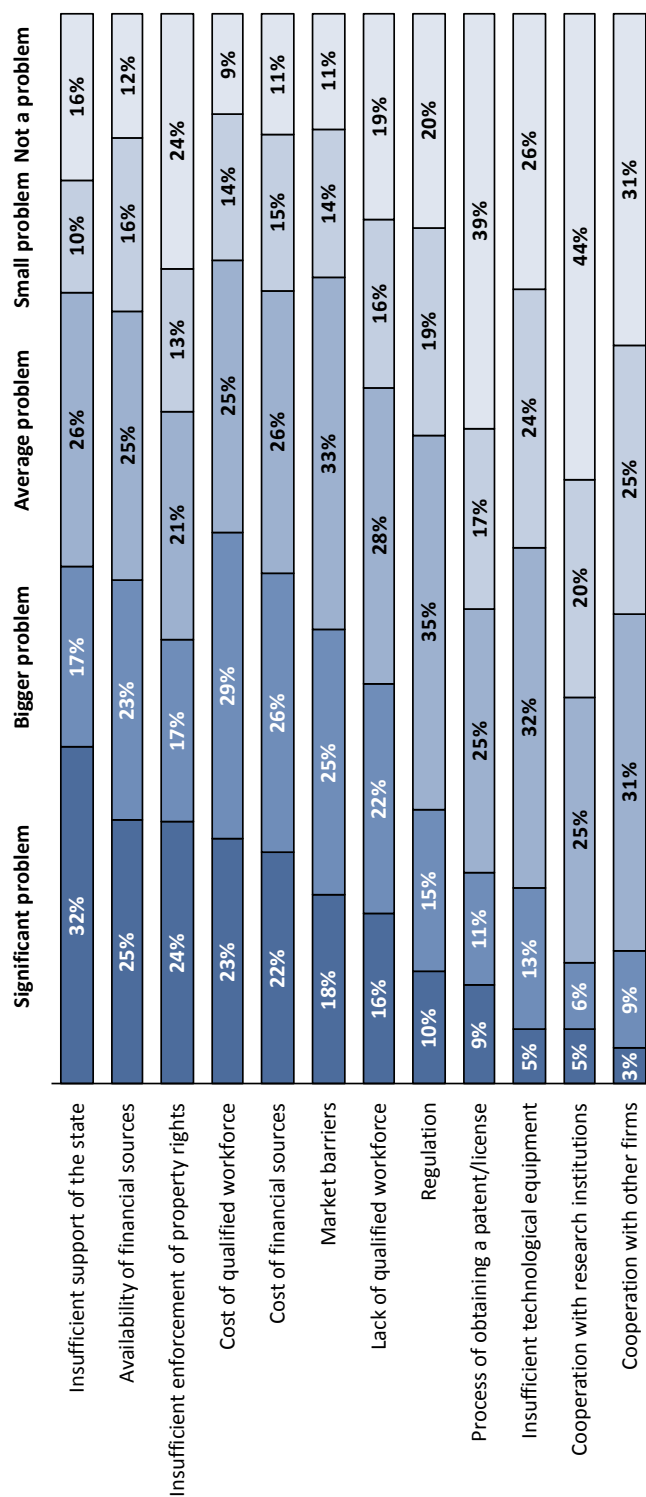
The following set of questions dealt with stratification of firms and their structure of ownership. Majority of respondents had turnover 1-50m CZK and profits 0-0.5m CZK. The number of firm in loss slightly decreased between 2009 and 2011. The sample also offers a wide range of firms sorted according to number of employees, with almost four hundred firms larger than micro enterprise.

Vast majority of firms were limited liability companies (s.r.o). Managers and family were the most frequent owners. Other answers included private entities or municipalities. Most of them would fall into category of managers as owners. Over one thousand of firms were owned 100% by domestic owner. Surprisingly, structure of ownership did not have any effect on innovative activities of firms.

Firms in the sample show diversity in terms of their activities classified by NACE Rev.2. They are represented in 18 out of total 21 categories. Most of them, 79%, fall into five biggest groups.

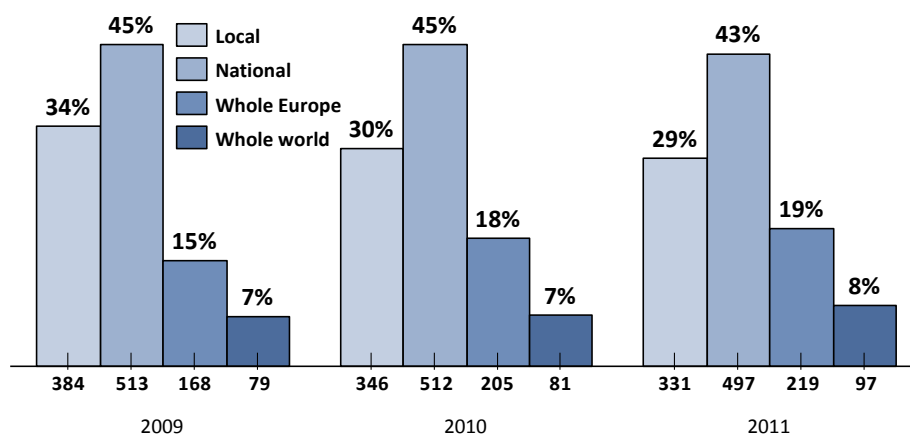
Finally, the questionnaire asked for city and region of registration of the firm. Firms from different regions are represented, with Prague, the capital, being the most frequent.

Figure 5.15: Question 11: What are the innovation barriers for your firm?



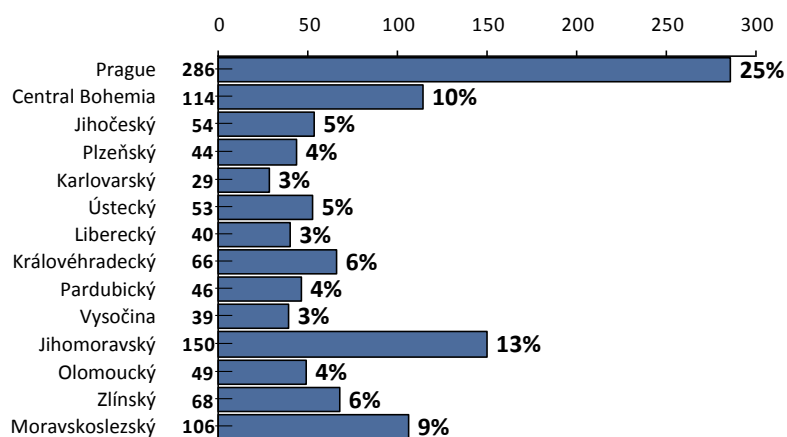
Source: Author.

Figure 5.16: Question 12: What is the size of the main market for your products/services?



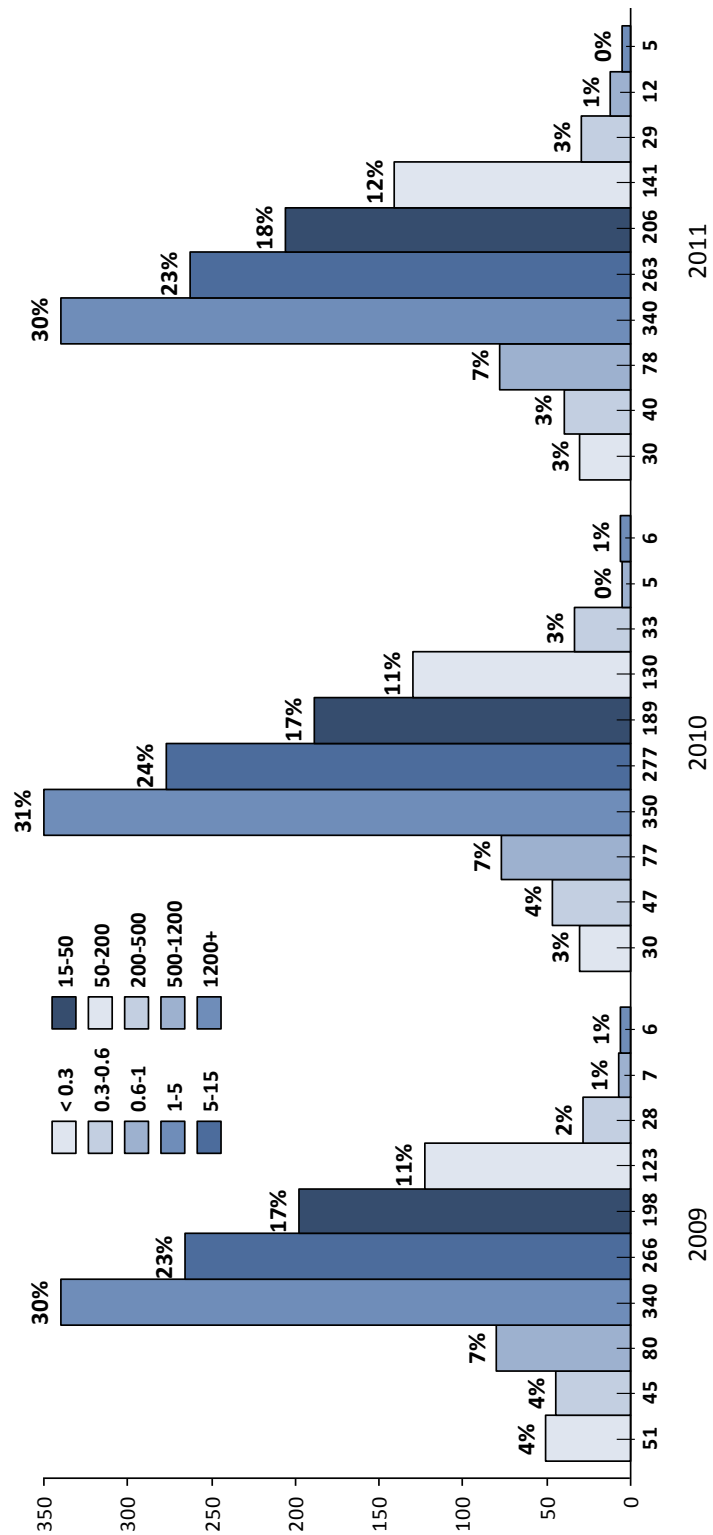
Source: Author.

Figure 5.17: Question 21: In which region is your firm registered?



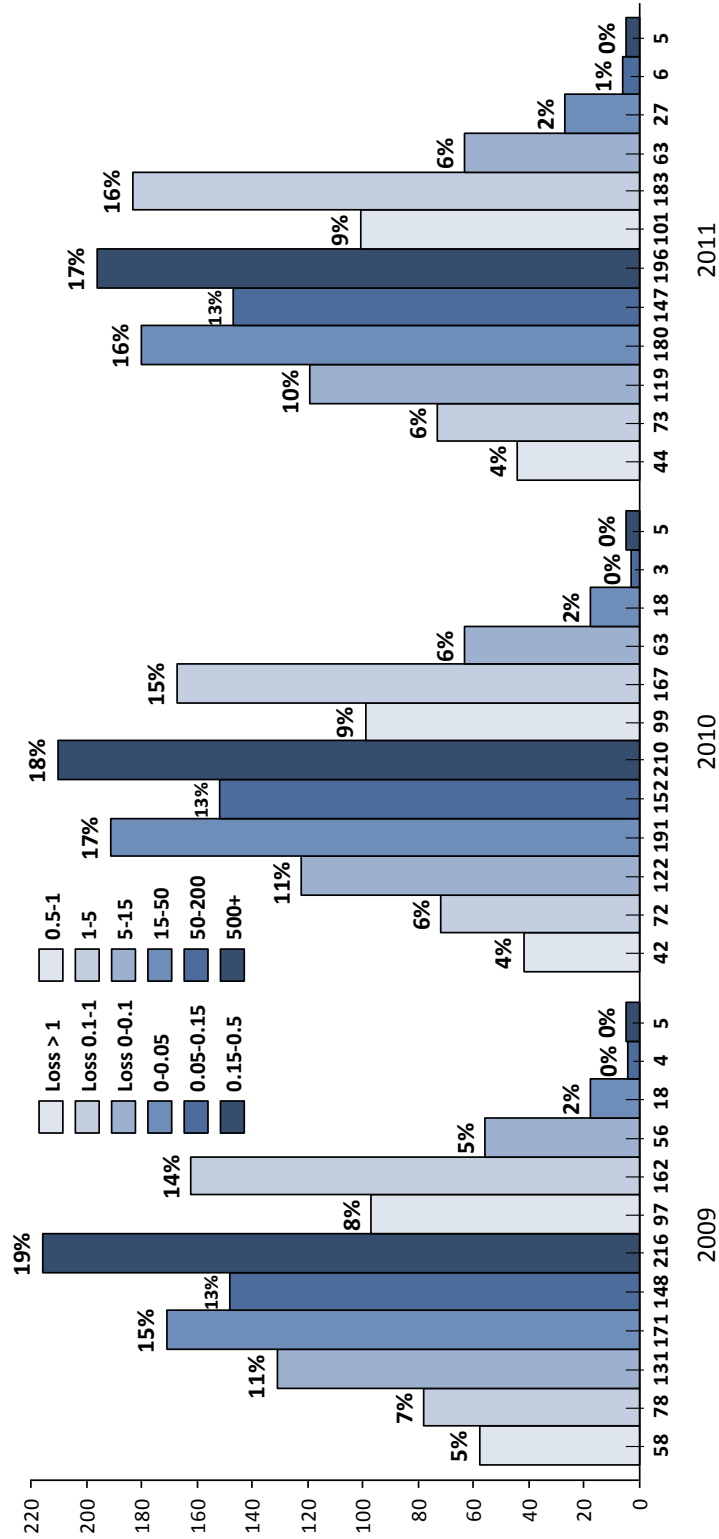
Source: Author.

Figure 5.18: Question 13: What is the turnover of your firm? (CZK, m)



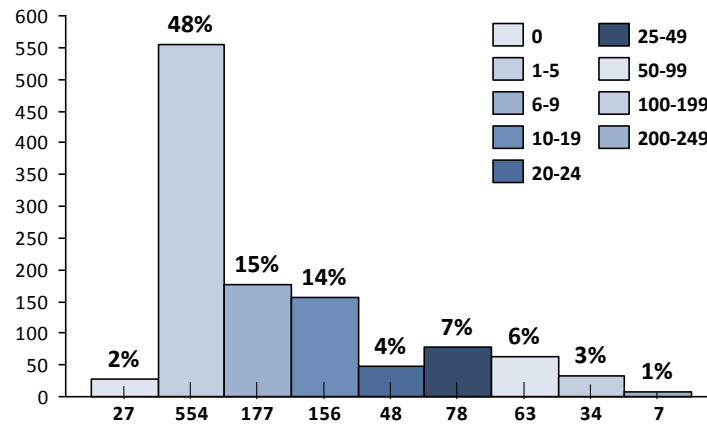
Source: Author.

Figure 5.19: Question 14: What is the profit of your firm? (CZK, m)



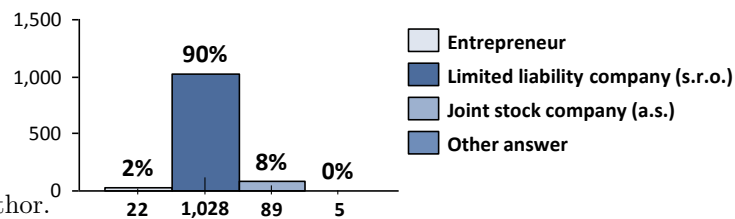
Source: Author.

Figure 5.20: Question 15: What is the number of employees of your firm?



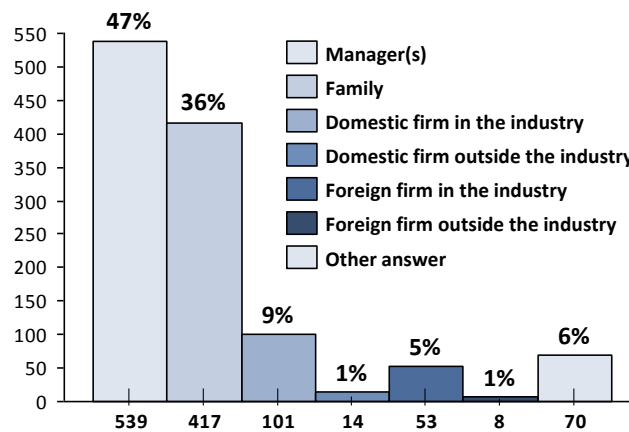
Source: Author.

Figure 5.21: Question 16: What is the form of your enterprise?



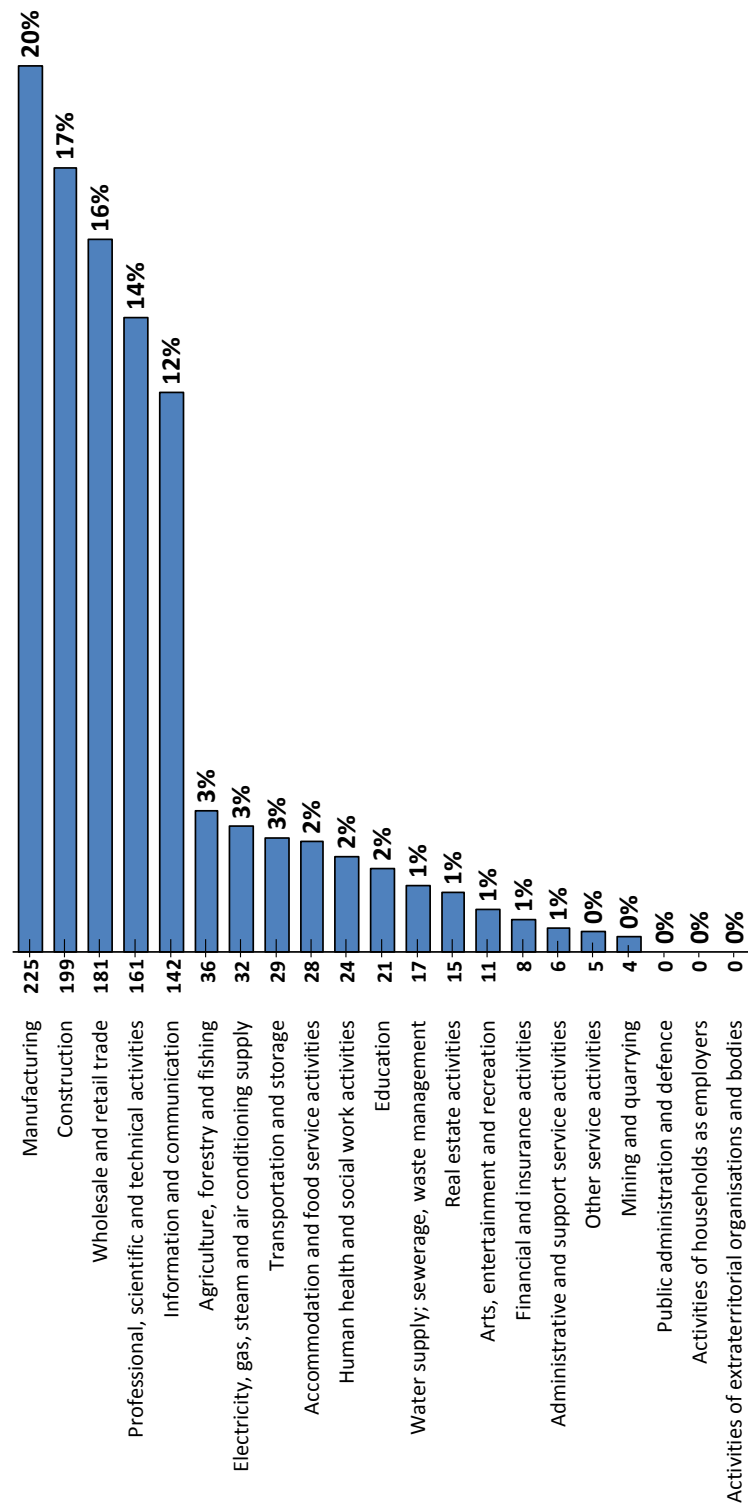
Source: Author.

Figure 5.22: Question 17: Who is the owner of your firm?



Source: Author.

Figure 5.23: Question 19: What is the main business sector of your firm?



Source: Author.

5.1.2 Model of innovations

The aim of this model is to identify determinants of innovations in SMEs. After thorough evaluation of the theory behind innovations, intensive collection of a large amount of data and careful finalization of the dataset, we will now proceed to description of the model and later to its estimation.

The survey intentionally did not ask the respondent to fill in any quantitative data, as that would substantially slow down his completion time and eventually distract him. For this reason the answers were coded into categories, in case of a scale of answers, or binary variables, in case of true/false answers. Some of the categories were further transformed into binary variables to allow for more intuitive understanding of their meaning in the model. The Table 5.2 presents all used variables.

Variables coded in categories were used only for cases where they represented a scale, so that higher number of the category intuitively means higher value of the underlying variable. Explanation of the variables with categories is presented in Table 5.1.

Table 5.1: Description of categories

Variable	Range of values (category number)
innc	Number of innovations: 0 (1), 1-5 (2), 5-10 (3), 10-20 (4), 20-50 (5), 50+ (6)
t11cat	Turnover, m: <0.3 (1), 0.3-0.6 (2), 0.6-1 (3), 1-5 (4), 5-15 (5), 15-50 (6), 50-200 (7), 200-500 (8), 500-1200 (9), 1200+ (10)
p11cat	Profit, m: loss >1 (1), loss 0.1-1 (2), loss 0-0.1 (3), 0-0.05 (4), 0.05-0.15 (5), 0.15-0.5 (6), 0.5-1 (7), 1-5 (8), 5-15 (9), 15-50 (10), 50-200 (11), 500+ (12)
x11cat	Market: Local (1), National (2), Whole Europe (3), Whole world (4)
equacat	Average age of equipment, years: 0-2 (1), 2-5 (2), 5-10 (3), 10+ (4), other answer (5)
comcat	Number of competitors: 0-5 (1), 5-15 (2), 15-50 (3), 50-200 (4), 200+ (5), other answer (6)

Source: Author.

Table 5.2: Description of variables

Variable name	Type	Description
innc	0-6	Number of firm's innovations since 2010.
issmall	Binary	Is the firm classified as small enterprise (10-49 employees)?
ismedium	Binary	Is the firm classified as medium enterprise (50-249 employees)?
t11cat	1-10	Turnover of the firm in 2011.
p11cat	1-12	Profit of the firm in 2011.
x11cat	1-4	Size of the market you mainly served in 2011.
isind	Binary	Does the firm belong to industry (NACE Rev. 2 categories A-F; the rest are services)?
isprg	Binary	Is the firm registered in Prague or Central Bohemia region?
lic	Binary	Does a firm hold any kind of award, license, certificate or patent?
clu	Binary	Is your firm part of any kind of enterprise or industrial cluster?
equcat	1-5	Average age of firm's equipment.
comcat	1-6	Number of firm's competitors.
cpric	Binary	Your firm competes with others in: Price
cqual	Binary	Your firm competes with others in: Quality
cinno	Binary	Your firm competes with others in: Product/service innovativeness
ccare	Binary	Your firm competes with others in: Customer care
cserv	Binary	Your firm competes with others in: Additional services
pri	Binary	Does your firm deliver products/services solely or mainly to private subjects?
imsupp	Binary	Does this factor have strong positive or mainly positive effect on your firm? State support of SMEs.
imoppi	Binary	Does this factor have strong positive or mainly positive effect on your firm? OPEL.
imcomp	Binary	Does this factor have strong positive or mainly positive effect on your firm? Unfair competition.
imcorr	Binary	Does this factor have strong positive or mainly positive effect on your firm? Corruption.
imtax	Binary	Does this factor have strong positive or mainly positive effect on your firm? Current tax system.
imlaw	Binary	Does this factor have strong positive or mainly positive effect on your firm? Current laws for SMEs.
imauth	Binary	Does this factor have strong positive or mainly positive effect on your firm? Cooperation with authorities.

imuni	Binary	Does this factor have strong positive or mainly positive effect on your firm? Distance from university.
intech	Binary	Does your firm invest into: new technologies?
indiv	Binary	Does your firm invest into: diversification of production?
inequal	Binary	Does your firm invest into: improvement of quality of products/services?
ineff	Binary	Does your firm invest into: improvement of effectiveness of production?
incap	Binary	Does your firm invest into: expansion of production capacity?
inexp	Binary	Does your firm invest into: expansion to new markets?
inmark	Binary	Does your firm invest into: marketing activities?
ineduc	Binary	Does your firm invest into: education of employees?
ineco	Binary	Does your firm invest into: ecological aspects of production?
inoptm	Binary	Does your firm invest into: optimization of processes within the firm?
inifr	Binary	Does your firm invest into: firm infrastructure?
siown	Binary	The main or significant source of innovations in your firm is: the owner or director.
sifair	Binary	The main or significant source of innovations in your firm are: fairs and exhibitions.
sicust	Binary	The main or significant source of innovations in your firm are: its customers.
sicomp	Binary	The main or significant source of innovations in your firm is: its competition.
sisupp	Binary	The main or significant source of innovations in your firm are: its suppliers.
sirnd	Binary	The main or significant source of innovations in your firm is: own R&D.
sipub	Binary	The main or significant source of innovations in your firm are: expert publications.
sitrn	Binary	The main or significant source of innovations in your firm are: expert trainings.
bankt	Binary	Do you perceive this factor as a significant barrier to innovation: market barriers.

bafia	Binary	Do you perceive this factor as a significant barrier to innovation: availability of financial sources.
bafic	Binary	Do you perceive this factor as a significant barrier to innovation: cost of financial sources.
bareg	Binary	Do you perceive this factor as a significant barrier to innovation: regulation.
balic	Binary	Do you perceive this factor as a significant barrier to innovation: process of obtaining a license/patent.
bapro	Binary	Do you perceive this factor as a significant barrier to innovation: insufficient enforcement of property rights.
basci	Binary	Do you perceive this factor as a significant barrier to innovation: cooperation with scientific institutions.
bacoo	Binary	Do you perceive this factor as a significant barrier to innovation: cooperation with other firms.
bawfl	Binary	Do you perceive this factor as a significant barrier to innovation: lack of qualified workforce.
bawfc	Binary	Do you perceive this factor as a significant barrier to innovation: cost of qualified workforce.
baite	Binary	Do you perceive this factor as a significant barrier to innovation: insufficient technical equipment.
baiss	Binary	Do you perceive this factor as a significant barrier to innovation: insufficient support of the state.
isllc	Binary	Is the firm type limited liability company (s.r.o.)?
ownman	Binary	Who is the owner of your enterprise? Managers.
ownfam	Binary	Who is the owner of your enterprise? Family.
owndfi	Binary	Who is the owner of your enterprise? Domestic firm in your industry.
owndfo	Binary	Who is the owner of your enterprise? Domestic firm outside your industry.
ownffi	Binary	Who is the owner of your enterprise? Foreign firm in your industry.
ownffo	Binary	Who is the owner of your enterprise? Foreign firm outside your industry.
ownown	Binary	Who is the owner of your enterprise? Own answer.
ownpct	Binary	Half or more of the firm is owned by a domestic owner.

Source: Author.

Number of innovations according to categories was selected naturally as an explained variable. Dependent variables for the final model have been carefully chosen during the process of crafting a solid model reliably identifying the key determinants of innovations. Just eight observations had to be taken out of the model, because they did not contain information on number of innovations the firm has achieved. Before starting the estimating process, we have developed several hypotheses to be tested by the model.

Hypothesis I: firm holding any kind of patent, license or award will tend to be on average more innovative than the one that does not. This comes from the belief that intellectual property that is worth patenting or deserves an award is somehow new, special or means a significant step forward. However, all patents or trademarks do not necessarily have to represent innovations, as was thoroughly discussed in previous chapters.

Hypothesis II: Various kinds of investments the firm can make will have a positive effect on innovations, especially investment into new technologies and into improvement of quality of products/services. In the world of today, the speed of information transmission and high intensity of the use of IT offer tremendous opportunities for those that are appropriately skilled and well prepared to make use of them. This is true for any industry and any size of enterprise.

Hypothesis III: Particular sources of innovations will have a stronger impact than others. We assume that R&D and the owner/director will be those influential sources. R&D is one of the most discussed determinants of innovations and the model should prove this. Unfortunately, it can be quite costly for smaller firms to carry out their own research initiatives. Instead, their owner is expected to be the driver of new things enriching the firm's production.

Using OLS, the following model in Table A.3 has been estimated in Gretl, a statistical software. It used 1136 observations, consisting of seventeen variables, three of which were categories and the rest binary variables. Prior to estimation of this final model, several other models were constructed and have proven many variables to be insignificant. These models will be discussed later and their results are presented in the appendix.

Table 5.3: Estimation of the model

Dependent variable: inncc

Heteroskedasticity-robust standard errors, variant HC1

	coefficient	std. error	t-ratio	p-value	
const	1.47266	0.159257	9.247	1.13e-019	***
issmall	0.165982	0.0596294	2.784	0.0055	***
ismedium	0.237062	0.101381	2.338	0.0195	**
x11cat	0.0873657	0.0311018	2.809	0.0051	***
clu	0.210344	0.111385	1.888	0.0592	*
equcat	-0.0583045	0.0282749	-2.062	0.0394	**
comcat	0.0417306	0.0170488	2.448	0.0145	**
intech	0.195795	0.0511415	3.829	0.0001	***
indiv	0.170762	0.0711476	2.400	0.0166	**
inqual	0.224740	0.0484179	4.642	3.87e-06	***
inmark	0.186406	0.0626827	2.974	0.0030	***
ineduc	0.119551	0.0544416	2.196	0.0283	**
inoptm	0.186879	0.0562329	3.323	0.0009	***
sicust	0.168964	0.0491289	3.439	0.0006	***
sirnd	0.420076	0.0592865	7.086	2.45e-012	***
bamkt	-0.106499	0.0471260	-2.260	0.0240	**
basci	-0.140265	0.0692244	-2.026	0.0430	**
isllc	0.147413	0.0891638	1.653	0.0986	*
Mean dependent var	2.323063	S.D. dependent var	0.887721		
Sum squared resid	736.7092	S.E. of regression	0.811759		
R-squared	0.176342	Adjusted R-squared	0.163818		
F(17, 1118)	12.64190	P-value(F)	7.67e-33		
Log-likelihood	-1365.927	Akaike criterion	2767.855		
Schwarz criterion	2858.490	Hannan-Quinn	2802.088		

Levels of significance: 1% ***, 5% **, 10% *

White's test for heteroskedasticity -

Null hypothesis: heteroskedasticity not present

Test statistic: LM = 187.405

with p-value = $P(\text{Chi-square}(155) > 187.405) = 0.0389377$

Breusch-Pagan test for heteroskedasticity -

Null hypothesis: heteroskedasticity not present

Test statistic: LM = 143.805

with p-value = $P(\text{Chi-square}(17) > 143.805) = 3.9688e-022$

Source: Author.

Both White's and Breusch-Pagan tests have revealed heteroskedasticity in the residuals, therefore heteroskedasticity robust standard errors were used. Although the R-squared of the model is relatively low, certain relationships are clearly present. Normality of residuals has been tested using q-q plot and the residuals are found to roughly follow a normal distribution, with certain level of tolerance. Details are available in the appendix. No multi-collinearity was found. The residuals tend to be slightly more negative thanks to low variance in the explained variable and its rather discrete character.

The base firm in the model is a micro enterprise, not in a cluster and with other form than limited liability company, which has all binary determinants of innovations set to false. For this hypothetical firm, having only 0-5 competitors and serving a local market, average innovation category is estimated to be 1.5, which falls somewhere in-between the first two categories, e.g. the firm has 0-5 innovations. The categories can be intuitively understood as continuous, simply meaning that the higher estimated value the higher innovation category and more innovations.

Enterprises classified as small or medium tend to be more innovative than micro ones. This can be caused by their relative abundance of financial and human resources. Some of them can be specifically devoted to developing new products or services. Micro enterprises, often represented by one key person, do not have this option.

Larger target market induces more innovations. This relationship could be also viewed from the other direction, that innovations cause the firm to expand territorially. These two links cannot be simply separated because they occur simultaneously. Innovations enable the firm to compete internationally and at the same time international market puts more pressure on innovativeness of the offered good.

Surprisingly, licenses have not proven to be a significant determinant of innovations. This can be caused by their diversity and real impact on the firm. This supports the argument that patents may not be a good representatives of innovations, which was discussed earlier. On the other hand, firm's presence in the cluster plays a positive role. Firms that are aware of this presence, contrasted with those that do not know, are probably also aware of the advantages

that clusters provide especially in terms of synergy.

Increasing age of equipment is found to be negatively related with innovations. This makes sense, as newer equipment offers more innovative and unprecedented uses as the older one. On the contrary, competition has a positive effect, especially higher competition categories have a meaningful impact. Straight-forward interpretation says that more competitive environment forces firms to innovate more. However, a top innovative firm with a unique business proposition can have very few competitors. There are also firms that specialize on serving the public sector. These, after being selected in often dubious public procurements, have no motivation for improvements and factually no competitors.

A number of investing activities of firms show significant impact on innovations. Investments into technologies and quality show a strong impact, also when compared to other variables. Although investment is just a precondition to a potential discovery and its successful realization, it is a necessary step towards achieving innovation. Unfortunately, the survey has shown, many firms cannot afford to invest because basically their main concern is survival. This creates a vicious circle, because without investment innovations have a harder way to come and nobody can expect high profits for mediocre goods or services. By far the greatest determinant of innovations is own R&D, which was indicated as a main source of innovations by 31% of firms. Although own R&D facilities may be a costly investment, it is definitely worth it. It is important to emphasize that not only medium firms exploit its benefits. Already 30% of micro and small enterprises engage in this activity, followed by 41% of medium enterprises. Customers are also an important source. This stems from the fact that they may come to the firm with new and more difficult requests and thus motivate it to higher originality.

Barriers to innovation did not prove to constitute a real barrier to innovations to a large extent, but two actual barriers emerged nevertheless. Market barriers, e.g. competition or insufficient demand, and cooperation with scientific institutions thus have a negative effect on those firms who encounter them. Surprising factor having an impact on innovations is form of the enterprise, when limited liability companies tend to innovate more. This generally means that LLC is the right form of enterprise for SMEs.

Other variables did not prove to be statistically significant factors of innovations. Models with full ranges of indicators, e.g. all innovation barriers or all sources of innovations, were tested and did not show significant outcomes. They are presented in the appendix. For example structure of ownership or various factors impacting the firm appear to have no real influence on innovative activities of SMEs. This obviously does not mean that they should be in any way neglected. Firms just should not expect them to somehow enhance or inhibit their innovative potential.

5.1.3 Recommendations

The model was constructed in order to reveal important factors that have a solid impact on innovations in SMEs. Most of the factors can be influenced by the firm itself, it is therefore desirable for the firm to focus on them. At the first sight, some of them may look unsuitable for a particular firm, probably because the terms are used mainly in different context, i.e. R&D for non-technical firms providing services.

It is important for every firm to translate these variables into its own language and find ways how to exploit the available opportunities. What can mean a new factory for one firm, can be a better software for another. Investments of different kinds have proven to work and deliver innovations. Firms should always find ways how to invest, even if it will not be large sums of capital. Even optimization of processes within the firm will be a good step forwards. Firms should not put too much weight on barriers or external environment as these have not emerged as real inhibitors to innovations.

The state should focus on specific aspects of support for SMEs, where its hand is really needed. It is support of investment activities of SMEs, be it into education of employees or expansion to new markets and intensive support of R&D in firms that are the right targets. These have the potential to bring fruits in the future. General support should create a progressive environment which would enable micro enterprises to grow fast to small and medium ones, which tend to be more innovative.

Chapter 6

Conclusions

This thesis looked at innovations in SMEs from a wide range of perspectives and therefore provides the reader with a complex view about innovation activities of Czech enterprises with up to 249 employees. Its initial part offered an explanation of the important role that SMEs play in the economy. Evaluation of the situation of Czech SMEs followed. It covered their various quantitative and qualitative aspects, including financing and historical overview from the transition period.

Innovations were discussed from a theoretical perspective in the fourth chapter. It provided a wide range of concepts developed around innovations in firms. Role of the entrepreneur and knowledge spillover theory of entrepreneurship were also discussed. A special focus was given to definition of innovation and to problematic measurement of innovative activities.

The last and the most important part of this thesis analyzed results of a survey that was conducted among 1,144 Czech SMEs. Overall, the survey contained 21 questions and the analysis of these questions yielded interesting results. More than three fourths of firms compete with price and among the most problematic factors that have a negative impact on the firm were corruption, tax system and unfair competition. Firms invest mainly into improvement of the quality of their products or services. Improvements of effectivity and new technologies are also important fields of investment.

Moreover, investment into these various fields has proven to have a significant effect on innovations the firm produced. Own R&D has been found as the

greatest source of innovations, with customers also being an influential source. Firm's presence on foreign markets has emerged as another determinant, although its impact is ambiguous here. Small and medium firms tend to innovate more than micro enterprises according to our model. Structure of ownership and perceived barriers to innovations do not show a significant impact on innovations.

SMEs as an integral part of the Czech economy should be supported in several ways to be able to overcome their disadvantage over large companies. This support should be targeted especially to help firms carry out investment activities and to establish their own R&D facilities. General governmental support should ensure that firms can grow from micro enterprises into small and medium enterprises in a relatively short time span due to the fact that SMEs have more innovative potential, as our research demonstrates.

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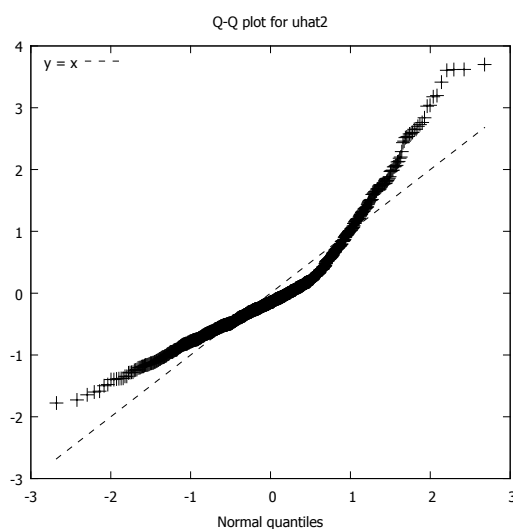
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Appendix A

Additional models of innovations

Figure A.1: Q-Q plot of residuals from the main model



Source: Author.

Model with barriers to innovations

Model with structure of ownership

Model with impact factors

Table A.1: Model with barriers to innovations

Dependent variable: *innc*

Heteroskedasticity-robust standard errors, variant HC1

	coefficient	std. error	t-ratio	p-value	
const	1.49189	0.157068	9.498	1.27e-020	***
issmall	0.152311	0.0610221	2.496	0.0127	**
ismedium	0.230028	0.102328	2.248	0.0248	**
x11cat	0.0838697	0.0306323	2.738	0.0063	***
clu	0.205624	0.111530	1.844	0.0655	*
equcat	-0.0597610	0.0284605	-2.100	0.0360	**
comcat	0.0380063	0.0173228	2.194	0.0284	**
intech	0.200307	0.0519259	3.858	0.0001	***
indiv	0.170625	0.0715263	2.385	0.0172	**
inqual	0.220146	0.0490207	4.491	7.84e-06	***
inmark	0.186657	0.0626293	2.980	0.0029	***
ineduc	0.115460	0.0557343	2.072	0.0385	**
inoptm	0.187790	0.0559078	3.359	0.0008	***
sicust	0.172537	0.0492276	3.505	0.0005	***
sirnd	0.412622	0.0599166	6.887	9.56e-012	***
bamkt	-0.100128	0.0481666	-2.079	0.0379	**
basci	-0.150010	0.0779486	-1.924	0.0546	*
isllc	0.144149	0.0900569	1.601	0.1097	
bafia	0.0227293	0.0596016	0.3814	0.7030	
bafic	-0.0944966	0.0593852	-1.591	0.1118	
bareg	-0.0724663	0.0597626	-1.213	0.2256	
balic	0.118160	0.0754337	1.566	0.1175	
bapro	0.0239303	0.0524467	0.4563	0.6483	
bacoo	-0.0688929	0.0737354	-0.9343	0.3503	
bawfl	0.0166870	0.0578086	0.2887	0.7729	
bawfc	0.00446595	0.0582455	0.07667	0.9389	
baite	-0.0163526	0.0638561	-0.2561	0.7979	
baiss	0.0711381	0.0536499	1.326	0.1851	
Mean dependent var	2.323063	S.D. dependent var	0.887721		
Sum squared resid	730.9516	S.E. of regression	0.812221		
R-squared	0.182779	Adjusted R-squared	0.162865		
F(27, 1108)	8.361418	P-value(F)	8.24e-30		
Log-likelihood	-1361.471	Akaike criterion	2778.942		
Schwarz criterion	2919.929	Hannan-Quinn	2832.194		

Source: Author.

Table A.2: Model with structure of ownership

Dependent variable: inncc

Heteroskedasticity-robust standard errors, variant HC1

	coefficient	std. error	t-ratio	p-value	
const	1.43576	0.162922	8.813	4.62e-018	***
issmall	0.159873	0.0596801	2.679	0.0075	***
ismedium	0.245994	0.101217	2.430	0.0152	**
x11cat	0.0922897	0.0320018	2.884	0.0040	***
clu	0.208502	0.112733	1.850	0.0646	*
equcat	-0.0585076	0.0285422	-2.050	0.0406	**
comcat	0.0430309	0.0172418	2.496	0.0127	**
intech	0.193662	0.0510737	3.792	0.0002	***
indiv	0.174536	0.0726832	2.401	0.0165	**
inqual	0.221176	0.0487023	4.541	6.20e-06	***
inmark	0.192581	0.0620839	3.102	0.0020	***
ineduc	0.120639	0.0543798	2.218	0.0267	**
inoptm	0.191853	0.0560961	3.420	0.0006	***
sicust	0.163256	0.0491174	3.324	0.0009	***
sirnd	0.421181	0.0596706	7.058	2.96e-012	***
bamkt	-0.100745	0.0471327	-2.137	0.0328	**
basci	-0.152948	0.0710919	-2.151	0.0317	**
isllc	0.153823	0.0909535	1.691	0.0911	*
ownfam	0.00453644	0.0538225	0.08429	0.9328	
owndfi	0.123795	0.101155	1.224	0.2213	
owndfo	-0.236449	0.200221	-1.181	0.2379	
ownffi	0.0533914	0.139381	0.3831	0.7017	
ownffo	0.224868	0.537229	0.4186	0.6756	
ownown	0.0857234	0.0999920	0.8573	0.3915	
Mean dependent var	2.323063	S.D. dependent var	0.887721		
Sum squared resid	733.8816	S.E. of regression	0.812383		
R-squared	0.179503	Adjusted R-squared	0.162533		
F(23, 1112)	9.493717	P-value(F)	2.02e-30		
Log-likelihood	-1363.743	Akaike criterion	2775.486		
Schwarz criterion	2896.333	Hannan-Quinn	2821.131		

Source: Author.

Table A.3: Model with impact factors

Dependent variable: inncc

Heteroskedasticity-robust standard errors, variant HC1

	coefficient	std. error	t-ratio	p-value	
const	1.48087	0.163473	9.059	5.80e-019	***
issmall	0.167364	0.0599967	2.790	0.0054	***
ismedium	0.244393	0.102998	2.373	0.0178	**
x11cat	0.0890332	0.0312765	2.847	0.0045	***
clu	0.208099	0.111593	1.865	0.0625	*
equcat	-0.0613922	0.0285513	-2.150	0.0318	**
comcat	0.0412844	0.0171535	2.407	0.0163	**
intech	0.198022	0.0520661	3.803	0.0002	***
indiv	0.174693	0.0710386	2.459	0.0141	**
inqual	0.221143	0.0487928	4.532	6.47e-06	***
inmark	0.185789	0.0626921	2.964	0.0031	***
ineduc	0.120216	0.0557254	2.157	0.0312	**
inoptm	0.187527	0.0566479	3.310	0.0010	***
sicust	0.167230	0.0490472	3.410	0.0007	***
sirnd	0.420066	0.0598662	7.017	3.94e-012	***
bamkt	-0.103085	0.0470061	-2.193	0.0285	**
basci	-0.146492	0.0703312	-2.083	0.0375	**
isllc	0.137757	0.0904535	1.523	0.1281	
imsupp	-0.0691244	0.0805395	-0.8583	0.3909	
imoppi	0.0116955	0.0758059	0.1543	0.8774	
imcomp	0.0502629	0.101607	0.4947	0.6209	
imcorr	0.0393882	0.0988262	0.3986	0.6903	
imtax	-0.0585102	0.112905	-0.5182	0.6044	
imlaw	0.0274927	0.136155	0.2019	0.8400	
imauth	0.0260276	0.0611763	0.4255	0.6706	
imuni	-0.000348093	0.0594349	-0.005857	0.9953	
Mean dependent var	2.323063	S.D. dependent var	0.887721		
Sum squared resid	735.3898	S.E. of regression	0.813949		
R-squared	0.177817	Adjusted R-squared	0.159299		
F(25, 1110)	8.687839	P-value(F)	2.58e-29		
Log-likelihood	-1364.909	Akaike criterion	2781.818		
Schwarz criterion	2912.735	Hannan-Quinn	2831.267		

Source: Author.

Appendix B

Reproduction of the online survey

Figure B.1: Reproduction of the online survey

Vyplnto.cz – komplexní realizace online průzkumů

Inovace v MSP

Konec vyplňování **20. 05. 2012 14:00**, výsledky budou k dispozici pouze zadavateli.

Počet otázek: 21 Průměrná doba vyplňování: 00:11:36

Pokud si nejste jisti odpovědí, zvolte bez obav i přibližnou hodnotu. Velmi Vám děkuji.

povinná otázka

1. Uveďte prosím, zda Vaše firma vlastní (pokud ano, zaškrtněte)

Mezinárodní certifikát (např. ISO) Specifickou licenci pro produkci/službu
 Vlastní patent Podnikatelské ocenění (např. CzechTop 100) Nic z výše uvedeného
 Vlastní odpověď:

povinná otázka

2. Je Vaše firma součástí klastru či podnikatelské zóny?

ANO NEVÍM NE

povinná otázka

3. Uveďte prosím průměrné stáří vybavení Vašeho podniku

0-2 roky 2-5 let 5-10 let více než 10 let Jiná odpověď:

povinná otázka

4. Uveďte prosím přibližný počet Vašich konkurentů

0-5 5-15 15-50 50-200 více než 200 Jiná odpověď:

povinná otázka

5. Ve kterých oblastech nejvíce soupeříte s konkurencí

Cena Kvalita Inovativnost produktu Péče o zákazníka Doplnkové služby
 Vlastní odpověď:

povinná otázka

6. Své produkty/služby dodáváte

Výhradně soukromým subjektům Převážně soukromým a částečně veřejným
 (státním) subjektům Převážně veřejným (státním) a částečně soukromým subjektům
 Výhradně veřejným subjektům Jiná odpověď:

povinná otázka

7. Ohodnoťte pozitivní či negativní vliv na Vaše podnikání

U každé podotázky prosím zvolte odpověď v rozpětí ++ až --:

--	--	--	--	--	--	--

Source: Author, Vyplnto.cz

Státní podpora malého a středního podnikání (obecně):	++ <input type="radio"/>	+ <input type="radio"/>	0 <input type="radio"/>	- <input type="radio"/>	-- <input type="radio"/>
Operační program podnikání a inovace (OPPI):	++ <input type="radio"/>	+ <input type="radio"/>	0 <input type="radio"/>	- <input type="radio"/>	-- <input type="radio"/>
Nekalá konkurence:	++ <input type="radio"/>	+ <input type="radio"/>	0 <input type="radio"/>	- <input type="radio"/>	-- <input type="radio"/>
Korupce:	++ <input type="radio"/>	+ <input type="radio"/>	0 <input type="radio"/>	- <input type="radio"/>	-- <input type="radio"/>
Současné nastavení daňového systému:	++ <input type="radio"/>	+ <input type="radio"/>	0 <input type="radio"/>	- <input type="radio"/>	-- <input type="radio"/>
Současná podoba zákonů týkající se MSP:	++ <input type="radio"/>	+ <input type="radio"/>	0 <input type="radio"/>	- <input type="radio"/>	-- <input type="radio"/>
Spolupráce s úřady:	++ <input type="radio"/>	+ <input type="radio"/>	0 <input type="radio"/>	- <input type="radio"/>	-- <input type="radio"/>
Vzdálenost univerzity:	++ <input type="radio"/>	+ <input type="radio"/>	0 <input type="radio"/>	- <input type="radio"/>	-- <input type="radio"/>

povinná otázka

8. Váš podnik investuje převážně do (vyberte prosím max 4 oblasti)

Zvolte alespoň jednu možnost, maximálně 4 možnosti.

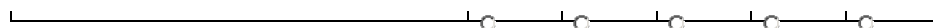
Nových technologií Diverzifikace produkce/služeb Zlepšení kvality produktů/služeb Zvýšení efektivity produkce/služeb Navýšení kapacity Expanze na nové trhy Marketingových aktivit Vzdělávání zaměstnanců Ekologických aspektů produkce Optimalizace procesů ve firmě Infrastruktury podniku Nic z výše uvedeného Vlastní odpověď:

povinná otázka

9. Zdrojem inovací/námětů na inovace ve Vašem podniku jsou (1-není zdrojem, 5-je hlavním zdrojem)

U každé podotázky prosím zvolte odpověď v rozpětí 1-5:

Majitel(ka)/ředitel(ka) firmy:	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
Veletrhy a výstavy:	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
Zákazníci:	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
Konkurenční firmy:	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
Dodavatelé:	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
Vlastní výzkum a vývoj:	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
Odborné publikace:	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
Odborná školení:	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>



povinná otázka

10. Uveďte prosím přibližný počet inovací, které Vaše firma uvedla od roku 2010 (Inovací se rozumí uvedení nové nebo vylepšení stávající služby, produktu, postupu nebo technologie)

0 1-5 5-10 10-20 20-50 50 a více Jiná odpověď:

povinná otázka

11. Jaké vnímáte bariéry inovační činnosti Vaší firmy (1-není problém, 5-velký problém)

U každé podotázky prosím zvolte odpověď v rozpětí 1-5:

Tržní bariéry (konkurence, nízká poptávka):	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
Dostupnost finančních zdrojů:	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
Cena finančních zdrojů:	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
Právní regulace:	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
Proces získání patentu/licence:	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
Nedostatečná vymahatelnost vlastnických práv:	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
Spolupráce s výzkumnými institucemi:	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
Spolupráce s jinými firmami:	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
Nedostatek kvalifikované pracovní síly:	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
Náklady na kvalifikovanou pracovní sílu:	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
Nedostatečné technologické vybavení:	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>
Nedostatečná podpora ze strany státu:	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>

povinná otázka

12. Velikost trhu, na který převážně dodáváte Vaši produkci/služby (I export do jedné mimoevropské lokality se počítá jako globální trh)

U každé podotázky prosím zvolte odpověď na dané škále:

2009:	Lokální (kraj) <input type="radio"/>	Národní (ČR) <input type="radio"/>	Celá Evropa <input type="radio"/>	Celý svět <input type="radio"/>
	Lokální (kraj)	Národní (ČR)	Celá Evropa	Celý svět

2010:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2011:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Lokální (kraj)	Národní (ČR)	Celá Evropa	Celý svět

povinná otázka

13. Uveďte prosím přibližný roční obrat Vašeho podniku v Kč

U každé podotázky prosím zvolte odpověď na dané škále:

2009:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<300 tis	300 až 600 tis	600 až 1000 tis	1 až 5 mil	5 až 15 mil	15 až 50 mil	50 až 200 mil	200 až 500 mil	500 až 1200 mil	>1200 mil	
2010:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<300 tis	300 až 600 tis	600 až 1000 tis	1 až 5 mil	5 až 15 mil	15 až 50 mil	50 až 200 mil	200 až 500 mil	500 až 1200 mil	>1200 mil	
2011:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<300 tis	300 až 600 tis	600 až 1000 tis	1 až 5 mil	5 až 15 mil	15 až 50 mil	50 až 200 mil	200 až 500 mil	500 až 1200 mil	>1200 mil	

povinná otázka

14. Uveďte prosím přibližný roční zisk Vašeho podniku v Kč

U každé podotázky prosím zvolte odpověď na dané škále:

2009:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
	Ztráta >1mil tis	Ztráta 100 až 1000 tis	Ztráta 100 tis	0 až 50 tis	50 až 150 tis	150 až 500 tis	500 až 1000 tis	1 až 5 mil	5 až 15 mil	15 až 50 mil	50 až 200 mil	200 až 500 mil	>500 mil
2010:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
	Ztráta >1mil tis	Ztráta 100 až 1000 tis	Ztráta 100 tis	0 až 50 tis	50 až 150 tis	150 až 500 tis	500 až 1000 tis	1 až 5 mil	5 až 15 mil	15 až 50 mil	50 až 200 mil	200 až 500 mil	>500 mil
2011:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
	Ztráta >1mil tis	Ztráta 100 až 1000 tis	Ztráta 100 tis	0 až 50 tis	50 až 150 tis	150 až 500 tis	500 až 1000 tis	1 až 5 mil	5 až 15 mil	15 až 50 mil	50 až 200 mil	200 až 500 mil	>500 mil

povinná otázka

15. Uveďte prosím přibližný počet zaměstnanců

Bez zaměstnanců 1-5 6-9 10-19 20-24 25-49 50-99 100-199 200-249 250 a více

povinná otázka

16. Uveďte prosím Vaši formu podnikání

Živnostník S.r.o. A.s. Jiná odpověď:

povinná otázka

17. Uveďte prosím, kdo je vlastníkem Vašeho podniku

Zvolte alespoň jednu možnost.

Manažer/manažeři Rodina Domácí firma v oboru Domácí firma mimo obor Zahraniční firma v oboru Zahraniční firma mimo obor Vlastní odpověď:

povinná otázka

18. Uveďte prosím přibližnou strukturu vlastnictví Vašeho podniku

U každé podotázky prosím zvolte odpověď na dané škále:

domácí vlastník:	<input type="radio"/> 0%	<input type="radio"/> 1- 25%	<input type="radio"/> 25 - 50%	<input type="radio"/> 50 - 75%	<input type="radio"/> 75 - 99%	<input type="radio"/> 100%
zahraniční vlastník:	<input type="radio"/> 0%	<input type="radio"/> 1- 25%	<input type="radio"/> 25 - 50%	<input type="radio"/> 50 - 75%	<input type="radio"/> 75 - 99%	<input type="radio"/> 100%

povinná otázka

19. Uveďte prosím hlavní obor činnosti Vašeho podniku

Zemědělství, lesnictví, rybářství Těžba a dobývání Zpracovatelský průmysl Výroba a rozvod elektřiny, plynu, tepla a klimatizovaného vzduchu Zásobování vodou; činnosti související s odpadními vodami, odpady a sanacemi Stavebnictví Velkoobchod a maloobchod; opravy a údržba motorových vozidel Doprava a skladování Ubytování, stravování a pohostinství Informační a komunikační činnosti Jiná odpověď:

povinná otázka

20. Uveďte prosím město, kde je registrován Váš podnik

(text)

povinná otázka

21. Uveďte prosím kraj, kde je registrován Váš podnik

Hlavní město Praha Středočeský Jihočeský Plzeňský Karlovarský Ústecký Liberecký Královéhradecký Pardubický Vysočina Jihomoravský Olomoucký Zlínský Moravskoslezský Jiná odpověď:

[Ukončit vyplňování dotazníku a smazat vyplněné hodnoty](#)