

Charles University in Prague

Faculty of Social Sciences
Institute of Economic Studies



MASTER THESIS

**Factors that influence the success of small
and medium enterprises**

Case study of ICT sector in the Czech Republic

Author: **Bc. Martin Krejčí**

Supervisor: **PhDr. Wadim Strielkowski Ph.D.**

Academic Year: **2012/2013**

Declaration of Authorship

The author hereby declares that he compiled this thesis independently, using only the listed resources and literature.

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Prague, May 17, 2013



Signature

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Abstract

Position of small and medium companies in the information technology sector plays important role in the functioning on any state's economy. Focusing on a specific local market and using the Czech Republic as a case study, one has to state that most Czech firms face difficulties when trying to achieve economic success. Based on this fact, small and medium enterprise rating seems to be appropriate approach to determine factors that influence their performance and thus the possibility to help with their situation. Aim of this Master thesis is to determine these factors and construct econometric success rate models. Questionnaire research among ICT enterprises, and further statistical analysis showed that the earnings-employee ratio, average revenues and the R&D importance ratio plays the most important role in their success. Both, financial and non-financial indicators perform significantly in these predictions.

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Author's e-mail	martin@krejci.cz
Supervisor's e-mail	strielkowski@fsv.cuni.cz

Abstrakt

Postavení malých a středních podniků v odvětví informačních technologií sehrává důležitou roli na ekonomice státu. Zaměříme-li se na konkrétní trh České republiky, je třeba konstatovat, že většina českých firem čelí obtížím při snaze dosáhnout ekonomického úspěchu. Na základě této skutečnosti, hodnocení úspěšnosti malých a středních podniků se zdá být vhodným přístupem k určení faktorů, které ovlivňují jejich výkon a tím i možnost pomoci s jejich situací. Cílem diplomové práce je určit tyto faktory a sestavit ekonometrický model úspěšnosti. Pomocí dotazníkového šetření mezi firmami a dále statistickou analýzou výsledků vyplynulo, že poměr zisku na počet zaměstnanců, průměrné příjmy a důraz na výzkum a vývoj jsou nejdůležitější pro určení úspěchu sledované firmy. Důležité faktory ovlivňující sestavené modely představují finanční i nefinanční ukazatele.

Bibliografický záznam

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E-mail autora	martin@krejci.cz
E-mail vedoucího práce	strielkowski@fsv.cuni.cz

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Acronyms

CEE	- Central and Eastern Europe
CIO	- Chief information officer
CIS	- Commonwealth of Independent States
CSO	- Czech Statistical Office (ČSÚ)
CZK	- Czech Koruna
ČEKIA	- Czech Information Agency
EU	- European Union
EUR	- Euro
FDI	- Foreign direct investments
HW	- Hardware
ICT	- Information and communications technology
MITCR	- Ministry of Industry and Trade of the Czech Republic
R&D	- Research and Development
SME	- Small and medium enterprises
SW	- Software

Master Thesis Proposal

Author:	Bc. Martin Krejčí	Supervisor:	PhDr. Wadim Strielkowski Ph.D.
E-mail:	martin@krejci.cz	E-mail:	strielkowski@fsv.cuni.cz
Phone:	+420 732 208 200	Phone:	+420 603 508 627
Specialization:	<i>FFMaB</i>	Defense Planned:	June 2013

Proposed Topic:

Factors that influence the success of small and medium enterprises: Case study of ICT sector in the Czech Republic

Topic Characteristics:

Most Czech firms are facing difficulties in achieving success in their respective markets. Some of them demonstrate more sufficient results than others; other are satisfied with their profitability at a specific level of return. Conversely, there are some that need organizational help to cope with their position. These variations are based on the indicators and factors that are connected to their success rate.

The main goal of this Master thesis is to discover and describe the most significant factors, or rather methods that influence the success of small and medium enterprises (SME) in a specific sector of the Czech economy. The outcomes of this work will be based on the empirical research and my own collection of data.

The primary source for this thesis will be the data set obtained from an SME questionnaire response form and ratios derived from the explored variables.

Hypotheses:

1. Success rate indicators
(There are some indicators that can determine the stability or success of ICT SME in the Czech Republic)
2. Research & Development
(R&D is the main source of development & success of SME.)
3. Influence of non-financial factors
(Non-financial factors such as marketing, product idea & development, etc. significantly influence the success of SME)

Methodology:

This diploma thesis will be heavily based on data collection and empirical research. Both exercises will provide the first-hand data and their non-trivial analysis. Survey questionnaires will be constructed to become the source of data that will be further explored and analyzed. Based on the relevant literature review and data analysis, several econometric models (OLS, GLS and GMM) will be devised and applied. The results will enable the author to identify the success factors of Czech SMEs in different sectors of the economy, as well as to come up with policy implications for their further development and growth.

Outline:

1. Introduction
2. Literature review and state-of-the-art
 - 2.1 Czech ICT sector development
 - 2.2 Success of small and medium enterprises
3. Empirical research:
 - 3.1 Questionnaire presentation and description
 - 3.2 Statistical results and data analysis
 - 3.3. Empirical model testing
4. Discussion of main results
5. Conclusion and policy implications

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1 Introduction

The general position of small- and medium- sized enterprises (SME) plays an important role in the functioning of any state's economy. These companies are largely influential on the development of the state and significantly contribute to the overall economic welfare. Based on previous findings, many authors consider them to be a crucial element for the survival of the state and its inhabitants.¹ Based on these facts, we can assume that researching the factors that have a significant impact on the successful function of SME has a relevant position in decision-making policies.

Focusing on a specific local market and using the Czech Republic as a case study, one has to state that most Czech firms face difficulties when trying to achieve economic success. Some of them demonstrate more sufficient results than others, and some of them are satisfied with their substantial level of profitability or success. On the other hand, there are some that need organizational help in order to cope with their position. These variations are based on factors that could be described using the so-called "success rate".

In 2011, there were 1,066,787 SME in the Czech Republic.² Because of the fact that these companies have a large variation in their orientation and concentration, it is important to concentrate on individual sectors of their business activity to obtain the most descriptive results.

The main goal of this Master thesis is to discover and describe the most significant factors, indicators or rather even methods that influence the success of SME in the Information and Communication technologies sector (ICT) in the Czech Republic. This sector was selected because it is currently undergoing a revolution in its development. Public demand and business opportunities for adaptation of new products and ideas enables companies to achieve rapid market penetration. However, for their stable development there is a further added value needed. This work focuses on the factors that companies consider to be important.

¹ Lin, 1998, p. 1

² Zpráva o vývoji malého a středního podnikání a jeho podpoře v roce 2011. [online: mpo.cz]

This diploma thesis is divided into four main parts. First of all, the sector characterization is presented. Then, a concrete identification of the Czech ICT sector and its actual situation follows. We will even be able to add some rationale as to why it has been selected as the aim of this research. In addition to that, in this section an overall review of previous publications with common topics is described. Papers by Kočenda E. and Lízal, L. (2003), *Český podnik v české transformaci*, Strielkowski Wadim (2012), *Rural micro-enterprises in Polish Transition*, Carol Yeh-Yun Lin (1998), *Success Factors of Small- and Medium- Sized Enterprises in Taiwan*, Gertrude and Alfred R. Oxenfeldt (1951), *Determinants of Business Success in a Small Western City*, Mihály Laki and Júlia Szalai (2006), *The Puzzle of Success: Hungarian Entrepreneurs at the Turn of the Millennium*, and similar works describing the success of SME from all over the world can be mentioned as relevant examples of research literature in the field.

Secondly, we proceed to the empirical research part of this diploma. Sources for this section are based mainly on data collection, interviews and research from a questionnaire circulated among the 7,979 Czech ICT SME, which is available in the ČEKIA Magnusweb database. Here, the questionnaire and its parts are presented. Also, statistical results and further data analysis are devoted to this chapter.

The last two parts summarize the results obtained from this research. We interpret the results from the data analysis and the most important implications. The final chapter finalizes this work where the statistical results and outcomes from interviews are combined as policy implications and suggestions.

In the conclusion of this Master thesis the answers to the following hypotheses are provided and discussed in detail. We explain that there are some indicators that can determine the stability or success of ICT SME in the Czech Republic. Also, we note that Research and Development (R&D) is the main source of development and success of SME in the sector in question. And yet, after all that, there are some non-financial factors such as marketing, product idea & development, etc. which significantly influence the success of SME.

2 General Description & Literature Review

2.1 SME in the Czech Republic

Small and medium enterprises (SME) are the main group of our focus in this thesis. Their analysis represents a relevant field of research because of its significant role in the state. Based on a study conducted by the Ministry of Industry and Trade of the Czech Republic (MITCR), by December 31st 2011, 1,066,787 SME formed 99.84 percent of all registered active enterprises in the Czech Republic. Their significance underscores the fact that more than 60 percent (1,856 thousand employees) of Czechs are employees of SME, their performance ratio in 2011 created 49.5 percent of the ICT sector (CZK 4,064,795 million), and performance value added represented 54.43 percent with a value of CZK 1,342,297 million.³

2.1.1 Definition of SME

Based on a Commission recommendation there are three categories of SME. “Microenterprise is defined as an enterprise which employs fewer than 10 persons and whose annual turnover and/or annual balance sheet total does not exceed EUR 2 million. Small enterprise is defined as an enterprise which employs fewer than 50 persons and whose annual turnover and annual balance sheet total does not exceed EUR 10 million. And the whole category of micro, small and medium-sized enterprises (SMEs) is made up of enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding EUR 50 million, and/or an annual balance sheet total not exceeding EUR 43 million.”⁴ By differentiation into these three categories, we are able to deduce their basic characteristics.

The largest group, from the point view of quantity, belongs to the microenterprises. They represent approximately 91.8 percent of businesses in the European market. It is

³ Zpráva o vývoji malého a středního podnikání a jeho podpoře v roce 2011. [online: mpo.cz]

⁴ Commission Recommendation 2003/361/EC

interesting to note that their business is strongly tied to the family, and it could be made up of just self-employed individuals. Generally, they have problems with penetration into foreign markets or nationwide sales; they focus mainly on local sales. Their lower capital does not allow them to compete with bigger competitors in the market, or can erect barriers to receiving bank loans. Microenterprises show the greatest volatility in the market, as they tended to rise or vanish quite quickly.

Small enterprises have more affable conditions for the European market. They tended to fill the peripheral areas, contribute against monopolization and strengthen competition. They usually seek strong partners to cooperate with.

Medium-sized companies are in a stronger position. It can be deduced that their expense orientation depends on level of development and entering other markets. Neither is it such a problem for them to compete on the European/international level.⁵

2.1.2 SME selection criticism

In this universal definition of SME submitted by the European Commission, several uncertainties for our small- and medium- sized target enterprises can be found. The main problem is that the definition of SME in particular is too broad. It comprises too many individual companies where the interests of individual groups might be different.

Furthermore, the criteria for SME selection do not exclude the possibility that the company management might be connected to large enterprises. In this context, large companies could own MSP by ownership percentages of up to 25 percent, which EU recommendation allows,⁶ or by an even bigger stake thanks to the anonymity of shareholders of a joint-stock company.

The last point of criticism is complemented by the fact that the size of enterprises and public's perception is different in a relation to the nature of the national economy. The Czech public and entrepreneurs usually regard medium-sized companies as large companies in the context of the small Czech market.⁷

⁵ Kdo je SME/MSP. [online: sme-union.cz]

⁶ Commission Recommendation 2003/361/EC

⁷ Kdo je SME/MSP. [online: sme-union.cz]

Based on these facts, we could note that it is difficult to define exact borders for SME classification in the Czech Republic. Regardless of the above-mentioned facts, this thesis holds to the basic SME definition.

2.2 Czech ICT Sector Overview

In this chapter, a further focus on the ICT sector in the Czech Republic is presented. First, we specify what we understand under the ICT sector. Then, we provide some closer characterization of this industry and underline its importance.

The Czech Statistical Office (CSO) declares the ICT sector on the basis of CZ-NACE and OKEČ classification; for the purpose of this work we use CZ-NACE. The ICT sector comprises all economic entities (legal persons, natural persons) whose principal activities include the following sections, groups and classes of CZ-NACE. Firstly, production of ICT and manufacturing industries (group 26 and some of its subclasses), trade in ICT (61 group and its subclasses), and ICT services (62, 58 and 95 groups and some of its subclasses).⁸ A more detailed distribution with its description of CZ-NACE classes is given in *Appendix 1*. Basically we can imagine this class as a group of enterprises whose business activities intervene the production, sale or services of electronic components, computers, telecommunication technologies, consulting in a field of information technology or internet services.

The latest available data for general analysis of the ICT sector are for 2011⁹, when CSO published that, in the Czech Republic, there are 32,443 active enterprises. In addition to this, based on the CSO study¹⁰, the ICT sector made up approximately 3.1 percent in 2011 compared to the whole manufacturing industry. Concerning the employment rate, the number of legal personalities in the ICT sector rose slightly. Over the years 1995 and 2011, job positions rose by approximately 60,000. The figure illustrated below should highlight continuous growth and the importance of the ICT sector. We can compare the development of employment in ICT with the whole Czech labour market. It is noticeable that during the observed years, except for the deepest period of “financial crisis” (2008 - 2009), there was moderate growth in job

⁸ ČSÚ: List of economic activities in ICT sector by CZ-NACE and OKEČ classification

⁹ All the information for 2011 published by ČSÚ (2012) are preliminary estimations

¹⁰ ČSÚ: Information economy in figures (2012)

position creation. Moreover, the share of ICT job places on the whole market rose as well.

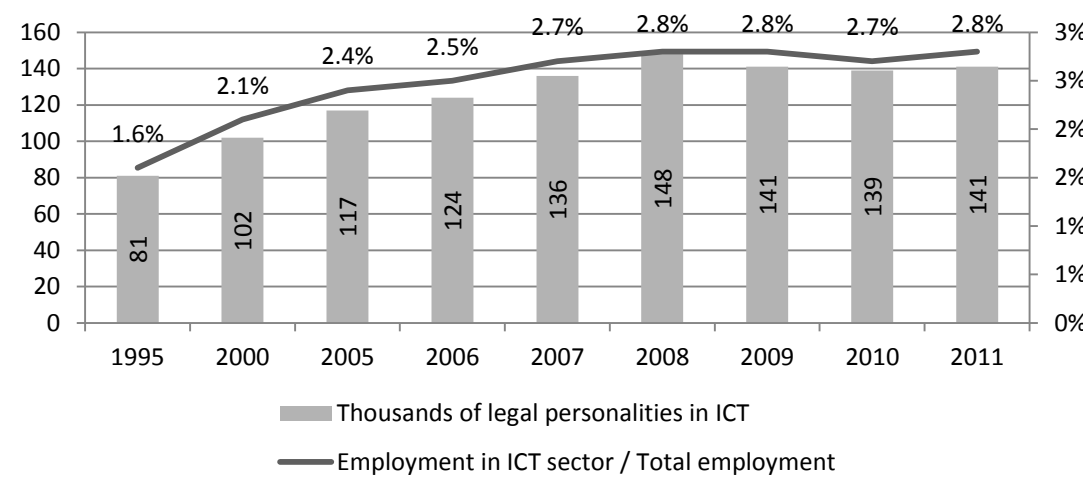


Figure 2.1 ICT sector employment development

Source: ČSÚ: Information economy in figures 2012

It is obvious that the emerging importance of ICT could not be described by just the growth of employment in the sector alone. To underline this statement for the Czech market, there are various publications and organizations focusing on this topic. The World Bank has developed a separate unit to coordinate investments in the ICT sector. The rationale behind the creation of this department is stated on the World Bank’s internet pages: “Technological progress is a considerable driving force behind economic growth. ICT infrastructure in particular has attracted much investment, and generated significant fiscal revenues and employment opportunities in developing countries. The number of mobile phone subscriptions in developing countries has increased from 200 million in 2000 to 3.7 billion in 2010, and the number of Internet users has grown more than tenfold.”¹¹

More specific details for local conditions are given in research encompassing 50 ICT companies in 2009. An survey showed that 80 percent of companies consider the recession to have run its course by the end of 2009.¹² To extend this idea, Voříšek (2010) states that the Czech Republic’s ICT sector is still developing, and we could consider it as the most progressive among with the financial and energy sectors in the

¹¹ About the ICT Sector Unit. [online: worldbank.org]

¹² Zálešák (2009)

past decade.¹³ To support this statement, the figure below shows the production value of the ICT sector and its comparison with the entire business enterprise sector. As we can see, the production grew from CZK 73 billion over the past 18 years to CZK 522 billion, and even the proportion in production of every business enterprise nearly tripled, from 2.3 percent to 6.1 percent.

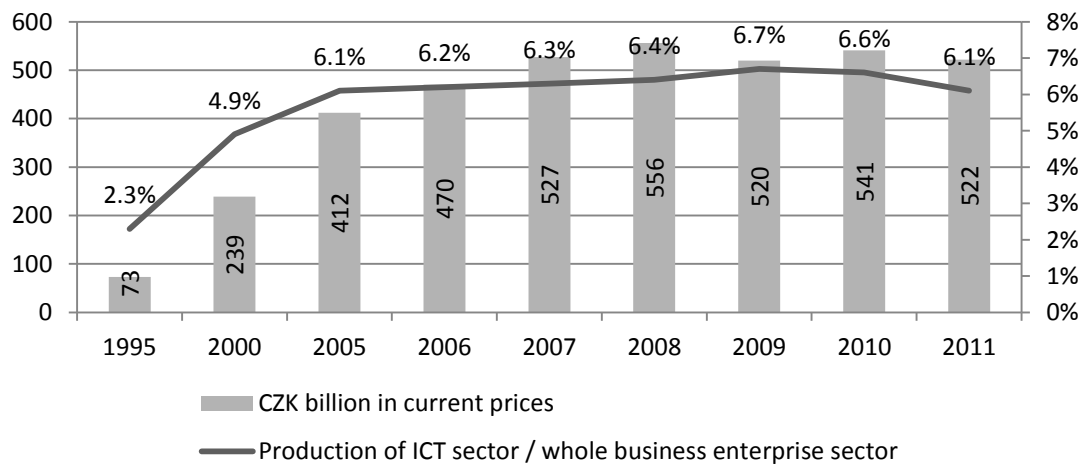


Figure 2.2 Production value in ICT sector

Source: ČSÚ: Information economy in figures 2012

To summarize the above mentioned facts, the ICT sector went through a very significant period in last 18 years. Since 1995, it provided almost 60 thousand positions, and its production rocketed by 715 percent.

If we deconstruct the ICT and analyze its components, we would get different results for each of them. According to Voříšek (2010), ICT services show considerably higher effectiveness and added value (See *Appendix 2*). On the other hand, ICT manufacturing creates almost 61 percent of ICT production and employs higher rate of employees. Keeping the employment rate high should be logically important. However, for long-lasting success of the economy, we should consider moving most resources into the more value adding spheres, like ICT services. Moreover, because of the globalization trend, ICT manufacturing will probably migrate to places with a cheaper work force. Thus, we can conclude that ICT production will partially find its demand on other markets anyway.¹⁴

¹³ Voříšek (2010), p. 4

¹⁴ Voříšek (2010), p. 4

Last but not least, to emphasize the importance of the ICT sector, we should mention that all net contributions from ICT are, in most cases, not realized straightway (like direct revenues from ICT services), but instead they support the process of innovations as well as other processes of organization. This could be observable in the participation of product and service innovations, found mainly in the chemical, logistics and transportation industries. The ICT sector also plays an indispensable role regarding internal process improvements and other technical activities: for example, the engineering and automobile industry.¹⁵

2.3 SME ICT Sector Development

Between 2005 and 2011, the ICT sector overcame a very difficult period of corporate financial crisis. Budget shorting of various companies had a significant impact on expenses on the side of new technologies and development, thus it is rational to expect a decline in the number of companies supplying this kind of service. Moreover, as was mentioned before, SME are the first who tended to be volatile in cases of sector changes. It can be noted in the figure below that trend was accurate.

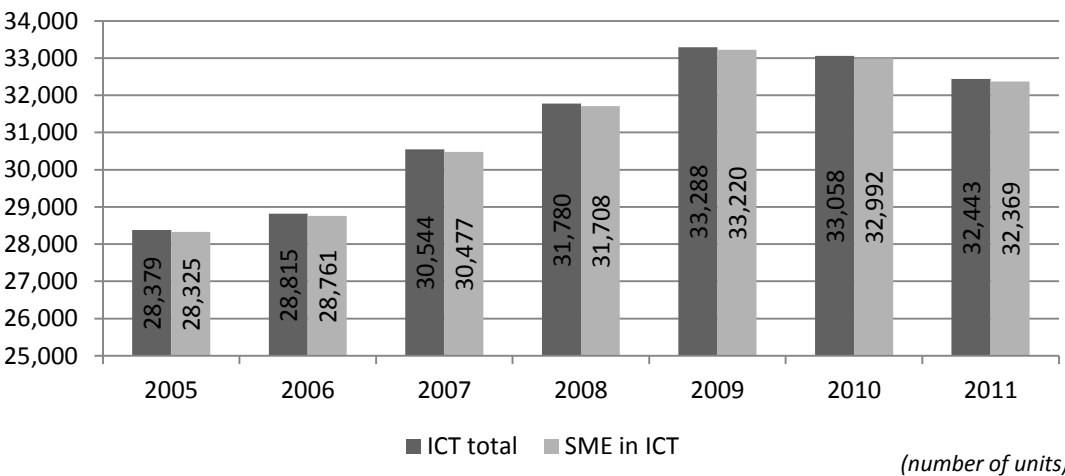


Figure 2.3 Size of ICT sector in the Czech Republic

Source: ČSÚ: ICT sector in the Czech Republic

From the beginning of 2005 until 2009, growth of SME in ICT determined almost the entire sector by adding up to 1,716 companies per year. This can also be noted in Figure 2.1, which shows that this trend slightly increased the share of employees in

¹⁵ Voříšek (2010), p. 3, 9

ICT by 0.4 percent in the Czech Republic. Previous statements pointed out that the financial crisis forced many enterprises to cut their budget and start saving, thus this figure illustrates the slow decline of the ICT industry.

In terms of employment, in the last 8 years ICT consisted of approximately over half of all employees. SME (over time, the share of SME has hovered around 60 percent), has a representation of legal personalities reaching a ceiling of 86.5 thousand. Figure 2.4 presents developments in the employment area over this period.

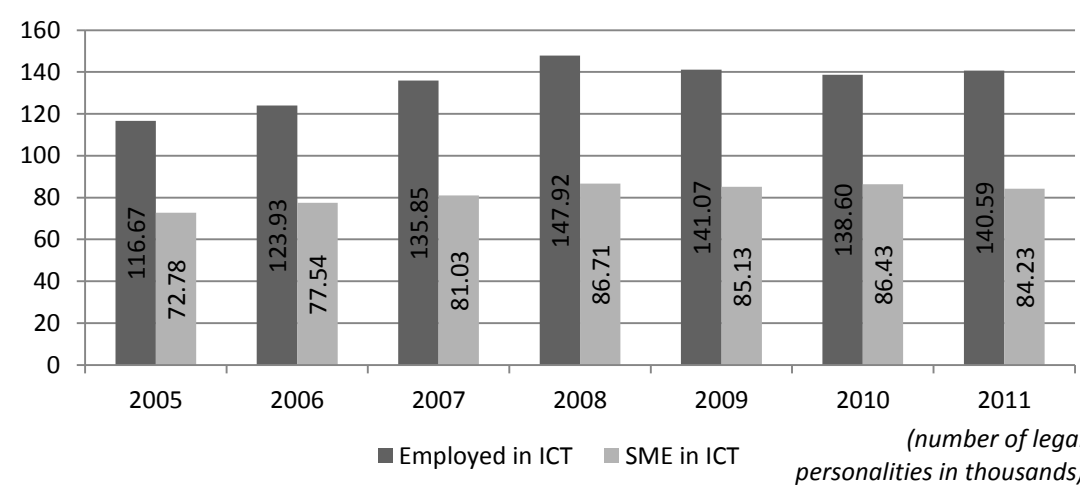


Figure 2.4 Employment among SME in ICT sector

Source: ČSÚ: ICT sector in the Czech Republic

How did the SME cope with the local market in 2009, after having been affected by the financial crisis? From the survey among 90 companies (2009), the best way to ride out the economic slowdown should be investing in innovation and the development of new products, especially in those fields in which the SME had previous experience.¹⁶

Figure 2.5 should highlight the fact that it is possible to notice the emerging investment in research and development during the last 8 years. Enterprises obviously responded to the economic crisis in kind, bearing out the validity of the previous statement. Over the observed period, R&D in SME rose by CZK 1.26 billion. To compare the initial R&D per one enterprise, in 2005 it created approximately CZK 70 million per SME and in 2011, it was CZK 100 million per SME. If we express those numbers as percentages of revenues, in 2005 R&D formed only 0.89 percent of one

¹⁶ Zálešák (2009)

SME revenues and in 2011, R&D already represented 1.33 percent of SME revenues. An illustration of the R&D costs is presented in Figure 2.6 below. All other calculations and numbers are attached in *Appendix 2*.

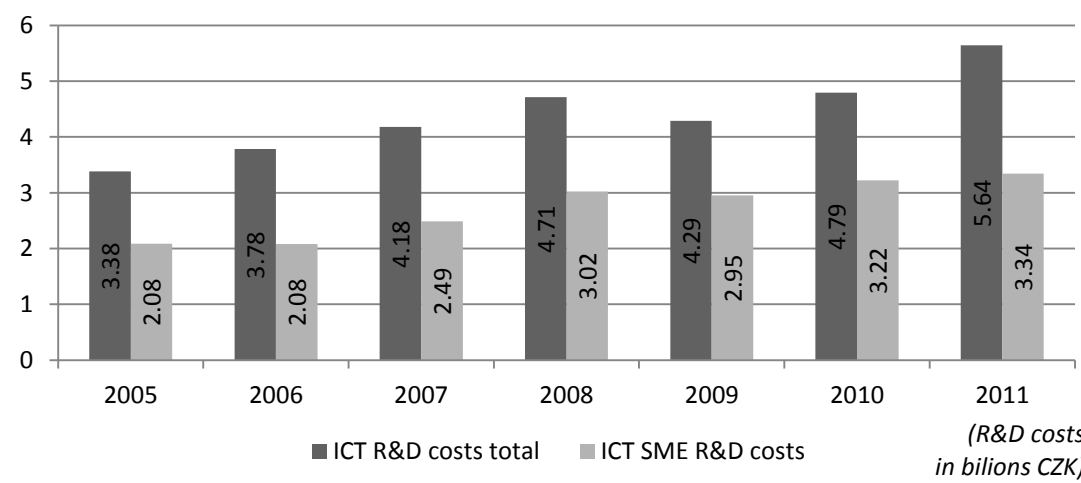


Figure 2.5 Research & Development costs in ICT

Source: ČSÚ: ICT sector in the Czech Republic

Finally, yet importantly, it is vital to mention value-added development between 2005 and 2011. The table of numbers in *Appendix 2* indicates that the difference between revenues and production consumption stayed at the same level with just a slight increase by CZK 4.51 billion in total numbers. (Starting with CZK 159.37 billion (CZK 5.63billion per one SME) and terminating at CZK 163.88 billion in the SME ICT sector (CZK 5.06 billion per one SME). This means that over the analyzed period, in total numbers, companies earned more money. On the other hand, if we divide those earnings per one SME, we would get slightly different information. They reduced the profit margins by CZK 0.57 billion on average. If we assume that the number of SME increased as well as the revenues, the effect of lower profit margins might theoretically indicate higher competition between companies. Therefore, this could indicate that the ICT sector is still open to new enterprises.

To summarize this chapter, SME in the Czech ICT sector plays one key role. They definitively form the organizational structure related to the amount of companies in this sector. Furthermore, more than 60 percent of legal personalities were employed during the past 8 years (around 1.6 percent of total employment) in this sector. The financial crisis had a strong impact on ICT SME, with the number of enterprises trending downward as of 2009, while the rest of them started to invest more in R&D

to implement new technologies and products. However, ICT shows signs of competitiveness and it is still possible for new enterprises to enter the market. This is because of the fact that over the period of 2005 to 2011, the number of SME grew while their revenues rose, but the profit margins were trimmed back. Company research from 2009 states that, for the Czech Republic, ICT will perform as a prosperous and absolute core of business. The number of workers in information technology is slowly approaching 200 thousand, which is almost equivalent to the automotive industry. Moreover, it is believed that most new investment will come to ICT. Therefore, supporting development of the bio and nano technology fields is crucial.¹⁷

2.4 Literature Overview

2.4.1 Studies on SME Success Rate

Motivation for describing the success or growth of SME comes from various sources all around the world. The main reason represents the research dedicated to improvements and advice to the government. As was mentioned above, SME creates the majority of the companies established in the given state, thus the implementation of governmental policies should not be harmful to the environment for wealthy enterprise growth. Kaibori (2001) emphasizes the importance of such positive national conditions, especially among transition countries. Meanwhile, the entrepreneurs have come to establish enterprises on their own and with their own capital in order to secure adequate income and stable working conditions for employees. Government usually faces a strong decline in working conditions and economy.¹⁸ It is crucial for them to set appropriate rules that would create smooth and stable growth conditions.

In this kind of environment, it is necessary for owners to establish their companies with individual resources like quality of service or goods, capital, sales, management, know-how, technology, information, business connections, and then accumulate them and expand into business opportunities. This usually creates a very important environment for national competitiveness and economic growth.

¹⁷ Zálešák (2009)

¹⁸ Kaibori (2001), p. 2

One could argue that these indicators, which need to be researched for policy setting reasons, are not common and that the diversity in culture, social conditions, historical background or stage of economic development among the individual states in the world. Kaibori (2001) oppose with the suggestion that “there are many things in common in market mechanisms such are economy conditions, management principles, and economic units”.¹⁹ In the following lines, some of the research papers presenting general success factors are described.

As we mentioned, many of the works are oriented on the transitory countries, in which the entrepreneurs faced to the completely new conditions and opportunities for the successful enterprise establishment on their own.

Laki (2006) examined key success skills of the post-socialistic Hungarian entrepreneurs. From his interview-based research, the socio-demographic characteristics dominated the success in the transiting Hungary. “Age, gender, schooling, and residence mattered: in the entrepreneurial arena of the 1990s, it was a group of highly educated middle-aged urban dwellers that possessed a definite advantage ahead of all others.”²⁰ In addition to this, the employment history and general “luck” played the significant role as well. Kadocsa (2011) conducted similar research among SME in Hungary, which was pointed to the impact of the EU accession on them. Main finding of this work was that “small businesses do not capitalize on the opportunities offered by the European Union, and do not make efforts to apply for EU grants and funds, or attempt to penetrate new markets”.²¹ However, Kadocsa notes that there are different factors that influence SME success such as cost management, trade and marketing, production, technical development and finances.

Aidis (2006) conclude hers research within the Lithuanian SME with the similar results as Laki (2006) that the education of the entrepreneur plays important role in the success, but she finds one more variable, which turned to be more significant. She adds the role of the export orientation as a key growth factor. Moreover, as a quite surprising fact could be that the “learning-by-doing” concept seemed to be not

¹⁹ Kaibori (2001), p. 3

²⁰ Laki (2006), p. 27

²¹ Kadocsa (2011), p. 17

important factor of the transition growing companies. We must note that the negative influences, which might have impact on the company's success, are also required to complete the whole analysis. This paper was enriched for analysis of the negative influences like corruption factor which pointed up as one of the most influential. Among the negative effects, surprisingly, the Lithuanian enterprises did not comprise the taxes payments.²² Author based this study on the concept of the multinomial logit estimator.

Jasra (2010) recognizes the financial and technological resources, government support, marketing strategies, and entrepreneur skills to have a significant and positive impact on business success among the 520 Pakistani SME.²³ Within the researched companies, the study finds out that the financial resources are the key factor, which the enterprises selected as the most important. Jasra comments that this could be due to the poor governmental and banking support into the SME industry. The whole study was based on the responses from the questionnaire which were processed via basic multiple regression in IBM SPSS software.

The success factors of African SME are discussed in Monibo (2003), Harabi (2002), and Govindasamy (2010). First of all, Monibo introduces his work with a story of successful bakery in Nigeria which terminated its business after the death of the entrepreneur. He states the main question if behind the whole success of a company lays only the founder's contribution. To accomplish this aim, the dynamic model techniques are used. In more detail, the survival function is depicted as the most suitable. To conclude this work, Matubi noted that succession problem of owner leave influenced almost 54 percent of companies significantly that they had to close within the next year. (Approximately, half of them, closed at once). Only 37 percent of the sample survived the "succession experience".²⁴ Harabi, on the other side, explore the success factors of Macedonian companies as omitted variables from the growth equation of a company. This paper describes which of the factors contributes to the future size of an enterprise the most significantly. According to Harabi, the important ones with positive effect are following: company location, diversification effect, legal status, price competition, strong demand for product, governmental

²² Aidis (2006), p. 22

²³ Jasra (2010), p. 7

²⁴ Monibo (2003), p. 12

positive regulations. Negative factors, he recognizes the qualification of workers, small population centers, and governmental negative policies.²⁵ As we can notice, the government appears on both sides. Last of the above-mentioned papers is devoted to the South African minorities – Indians. In this work, mainly the causalities of differences between the successful enterprises were measured (managerial skills, personal factors, financing factor and ownership structure). These causalities were compared with the basic statistic values such as the mean, standard deviation, frequency and range. From the research, the education factor and family involvement seemed to be as only the significant factors of influence. Number of years since the establishment appeared in the statistics but author rejected this variable because of lack of observations.

Chittithaworn (2011) suggests following factors, which could help the entrepreneurs in Thailand to set up such a beginning standards or more likely investments into the company to get the growing and wealthy SME. Collected 146 statistical responses showed that company's characteristics, customer and market demand, cooperation, marketing, external environment, and financial with other kinds of resources are significant enough to describe almost 60 percent of the model variations. Again, the multiple regression analysis is being used. Chittithaworn finds out that the Porter's Generic Strategies developed by Michael Porter generates conditions for successful start-up SME growth in Thailand (cost leadership, market differentiation, product focus characteristics).

Research across the Taiwanese companies (Lin, 1998) shows that on the first place, the entrepreneurs indicate the success in the progress in company's structure, technology, and development. After that, the managerial skills author deemed as much more significant than technical skills. However, the study concerned only 43 observations; it is one of the quite different approaches so far.

From the western background, a study on American family-owned companies by Matwani (2006), confirmed that most of family member's issues strictly relate to the enterprise performance, also "selecting a successor who possesses strong sales and marketing skills" is crucial for their success. One of the last conclusions was that the formal plan of succession and communication with the successor represents

²⁵ Harabi (2003), 17

important role. The process of data collection author developed on the questionnaire survey among almost 4000 SME with 368 responses (which represents 9.2-percentage response rate). Several limitations of their model arise in the conclusion part, Matwani states that expect the lack of the available data their hypothesis could suffer from the subjective bias. It is because their analysis was based only on answers of CIOs and top managers. Moreover, the fact that this research was based on cross-sectional industries could cause significant mistakes in final values for concrete industry study.

Yusof (2000) represents one of the industry specialized analysis, which was conducted on SME from the automotive sector in the United Kingdom. Their aim was to discover main success factors and total quality management implementation. Response rate from the questionnaires was over 20 percent and the data analysis was done with IBM SPSS software. Closely, “a reliability and validity analysis on the survey instrument was conducted”.²⁶ To verify the results, some of the tests on reliability were presented (consistency test, construct and criterion-related validity test). Concerning the results, among the English enterprises, the most significant factor seemed to be the management leadership abilities, results and performance reports, employee training, adopting a quality assurance system. “On the other hand, the areas that actually need more attention from these companies are those having low practice levels, like continuous improvements of system, technical improvements, supplier quality assurance.”²⁷ Terminating remarks are devoted to the recommendation. We could perform similar analysis on other industries to compare the cross-sectional differences in SME or as well to introduce the extension of time-based performance of the companies.

Final research paper from the SME success factor analysis is based on the Polish rural micro-enterprises at the time of EU Accession (Strielkowski, 2012). This work is oriented on the section of food-processing sector and author process it among 300 enterprises. Results are corresponding with Kadocsa (2011). Polish enterprises did not find the benefits coming from the possibility of applying for grants or funds in the EU, but on the other side, they surprisingly evaluate as an important factor the age (probably the experience) of the manager – founder of the SME. In addition, the

²⁶ Yusof (2000), p. 14

²⁷ Yusof (2000), p. 13

paper finds a correlation of the micro and macro-economic conditions between the poor and rich areas in Poland. Authors based the analysis on the linear regression model with response variable defined as the enterprise profit per employee depended on the sum of observed explanatory variables.²⁸

Unfortunately, there are no representative academic or advanced working resources on case studies from Czech background on SME success rate. There is a short discussion on performance of Czech companies after the economic transition in the following chapter.

2.4.2 Other Studies on SME Performance

Reasons why to study performance of companies might be various. Consultancy services, credit scoring for banking loan acceptance, but mainly the research on impact of the policy implementation. Kaibori (2001) refers to one of the governmental motivations in the United Kingdom, the Bolton Commission Report of 1971. “Small and medium-sized enterprises offer a sphere of activities to people with enterprising spirit, produce creative goods, services and technology, and provide a means for a leap forward to up-and-coming entrepreneurs who will lead industrial circles of tomorrow.”²⁹

Based on the research among British SME, the government adopted five policies to support growth and wealth of enterprises. First one was to ensure the stable economy for easy investment and business environment. Next to that, government should guarantee production of reliable labor force by advanced education and training process within the English youth. There were other resolutions which the policy-makers should undertake like tax burden reduction to make a possible business opportunities expansion, opening of the market to introduce world competitiveness, and lastly, the proneness of the public institutions to the business stable growth. From these UK implementations, it is obvious that they lead to stable and successful enterprises in the economy. Significant factors of these implementations were the calm political and economic situation, professionalism of labor force and fluent cooperation of public sector and private corporations.

²⁸ Strielkowski (2012), p. 6

²⁹ Kaibori (2001), p. 14

Quite different findings were stated in Seley (1981) who surveyed US SME with an aim to describe their needs for their stable development. His research showed that companies do not see the additional support of government in form of employee training, or lowering tax burdens as helpful. Most of the companies can cope with these problems on their own, but they recognize some other needs like better crime protection, sanitation, transportation, and lower energy costs.³⁰

One of the more recent researches by Gál (2010) discuss factors which influence the performance of SME in the EU with an aim to reach better competitiveness on the market. This paper introduces a decomposition of influential factors into several classes. Selected determinants are classified into the time-variation: ex-ante and ex-post, demographic macro-; micro-environmental classes, and external, internal factors. Concerning the macro-environmental analysis, the work is following the STEEP analysis (Social, Technological, Economic, Ecological, Political Legal factors). Also, Porter's diamond analysis is used for external micro-environmental class and lastly, the internal indicators are corresponding with most of the literature sources presented above.

Another theory defining a long-term success of companies comes from Porter (1980). Porter's Generic Strategy suggests choosing between three different approaches from which an enterprise should select just one to be successful on the market. Cost Leadership represents a company methodology with a strong accent on low spending and low costs. This could be the case where the firm has access to unique source which gives an opportunity for cost advantage. Product differentiation presents a company which is able to differentiate its products to its customers and thus to be able to charge a premium price for the uniqueness. The third generic strategy arises from the original focus of a company. "Focus strategies grow market share through operating in a niche market not attractive to, or overlooked by, larger competitors."³¹

Peacock (2000) examining the wealth of companies from opposite point of view. His work classifies the determinants of failure of SME in Australia. Paradoxically, as a first indication of unsuccessful enterprise, he sees in the owner is the business concept. Idea behind this fact sets that the constant growth of a company cannot be

³⁰ Seley (1981), p. 16

³¹ Allen (2007), p. 5

managed by only one manager - owner in charge, after reaching some level of development, there is too many posts to manage and all various decisions for one person. With this statement several others arise mainly connected with the theory of single manager, founder. Isolation, “there is no doubt that many people start their own business motivated at least in part by a need for independence and to control their own destiny, but this mean isolation from peers or specialists that are available in a large companies. Lack of information, lack of time, pressure, too narrow product specification, external changes (like governmental regulations, employment requirements, etc.), high business risk, and the fact that SME are seldom in equilibrium case situations are other negative influential factors that could cause their failure.³² Crucial point of failure of SME Peacock (2000) sees in a lack of managerial skills. Thus in this field is need for an assistance in form of advisory services or governmental aid. Paper defines several spheres of increasing success of enterprises: start up preparations, business and management education, management training, regular advisory services.

Estrin (2009) researches the effect of privatization on the ownership of companies in the world. Based on the analysis of papers published so far this work clearly state: “First, privatization to foreign owners is found to result in considerably improved performance of firms virtually everywhere in the transition economies – an effect that is best characterized as a fairly rapid shift in performance rather than a gradual improvement over an extended period of time Second, the performance effect of privatization to domestic owners has on average been less impressive and it has varied across regions. The effect has been smaller, often delayed, but positive in CEE; it has been nil or even negative in Russia and the rest of the CIS. “³³ In addition to these findings, paper also comments that concentrated ownership in companies could lead to better performance results than dispersed; worker ownership does not have negative impact so as the wholly owned foreign ownership. These statements underline the importance of capable, well-educated management and a possible positive influence of foreign decision-making bodies for the good performance of a company.

³² Peacock (2000), p. 7

³³ Estrin, (2009), p. 28

List of literature contributing the motivation for this thesis closes series of studies by Hanousek a col. with the research among the Czech enterprises from the time of economy transition. Following an advanced econometric model, Hanousek (2005) denies many hypotheses that the privatization will lead to the better performance of privately owned enterprises. On contrary, results “indicate that the performance effect of privatization and different types of ownership are on the whole surprisingly limited and that many types of private owners do not generate performance that is different from that of firms with state ownership”.³⁴ On the other hand, foreign owners (studied industrial companies) showed generally much higher yields in terms of success. Criticism of previous researches on company performance analysis arose in this work. Hanousek (2005) recommends that within the observed data there is a significant possibility of selection and omitted variable bias in post processing which would lead to severe problems with endogeneity.

Lastly, Hanousek (2012) investigates the actual impact of foreign direct investments (FDI), owner structure and coalitions on Czech firms. The results confirm similar researches. The statements are corresponding with Estrin (2009) that concentrated foreign ownership exhibits superior results compared to domestic, thus FDI are performing as beneficial to successful performance of a company at least at the microeconomic level. Concerning to structure of owners, this work is evaluating the majority owners as not the best structure to improve efficiency; more recommended is a minority domestic owners who are in coalition instead of share differed structure. They might end-up in rivaling between each other, which would not bring more success to the enterprise.³⁵ Again advanced econometric models are presented to verify the stated hypotheses to avoid mainly problems with selection of variables.

2.5 Literature & ICT Sector Conclusion

Finally, brief summary as a sufficient motivation for Czech ICT SME analysis should been presented. Above listed statement emphasize the importance of SME. They usually create more than 90 percent of active firms in a given state. In case of the Czech Republic, it is even more than 98 percent, which create approximately two

³⁴ Hanousek (2005), p. 28

³⁵ Hanousek (2012), p. 15

thirds of working places. Analysis of SME success is crucial from various reasons, starting with the fact that government policies have the substantial influence on them (Harabi, 2002), and from other reasons like banking success scoring, consultancy services analysis (Peacock, 2000).

Authors are usually consistent in their comments on indicators, or more rather factors that influence the SME success rate positively or also negatively. Most of them agree on the education factor, employee training (Laki, 2006; Aidis, 2006; Peacock, 2000). But other influences are obvious from the researches: age of manager – owner (Strielkowski, 2012; Laki, 2006); market skills and experience of the selected manager (Laki, 2006; Yusof, 2000; Monibo, 2003; Matwani, 2006); ownership structure (Hanousek, 2005; Hanousek, 2012; Estrin, 2009); product orientation and trade (Aidis, 2006; Jasra, 2010; Chittithaworn, 2011; Porter, 1980); government influence (Kaibori, 2001; Aidis, 2006; Jasra, 2010); and many others. In addition, several problems come from previous analyses that we have to hold. Hanousek (2005) emphasize on the importance of selecting appropriate variables for modeling to preserve problems with the endogeneity. Yusof, on the other side, prefers the specific orientation of the research because of the possible variance among the cross-sectional industries. This could lead to severe inconsistency in the results for individual sectors.

Importance of ICT sector analysis underlines Kaibori (2001) with high-tech companies in the Silicon Valley in the U.S. “In recent years, the U.S. economy has been enjoying a long-term, brisk performance, posting strong growth. One of the driving forces behind the booming economy is a group of high-tech companies in Silicon Valley in the West Coast. They were established as venture companies by engineers or researchers in the field of information technology. But, they have become big businesses in only several years, with their stocks listed on stock exchanges. They are no playing a key role in enhancing the competitiveness of the U.S. and raising the economic growth rate of the country.”³⁶ Czech ICT sector has gone through a “revolutionary” period in last two decades, and yet, it still has a potential to develop. Thus, we should consider the analysis of different factors influencing their success as important and value-adding topic of research.

³⁶ Kaibori (2001), p. 3

3 Empirical Research

Most of the information given in this chapter is mainly based on survey between Czech ICT SME and further empirical analysis. Based on the relevant literature review and data description, an econometric analysis is applied on collected data. Proposed results provide verification of the main hypotheses, which should clarify if there are any significant indicators identifying success of ICT companies.

Firstly, the individual parts of questionnaire and the method of collection is proposed. This interpretation should clarify the topic and authors aim. Sequentially, the data description and other data interpretations introduce basic results of the analysis. Closer categorization and detailed figures interpret the current mood within the ICT sector in the Czech Republic. Moreover, as result of empirical analysis between the ICT SME, their understanding of business success rate is presented. After reading first paragraphs of this analysis, it should be possible to state if the analysis of ICT SME success rate is credible to verify.

Next part deals with the econometric model, which outcome is indicating significant success rate indicators the explanatory variables with different success rate dependent variables. The explaining variables based on relevant literature research and from the questionnaire survey. Further information about the importance of R&D within the company and other non-financial factors such as age of an enterprise, education of CEO, product originality, and others are analyzed. Relevant factors are determined by individual variables from collected data set via linear regression, which is considered as the most suitable instrument. Further discussion about significance, possible correlations, problems with the model are presented as well.

3.1 Data Description

Analytical part of this thesis is heavily based on the questionnaire survey distributed among the Czech ICT companies. Information about individual enterprises including contact e-mails was borrowed from ČEKIA the Magnusweb database.

With the assistance of filters in the Magnusweb database, author was able to select the specific target group of companies. The selection corresponds to the CSO definition of the ICT sector. This step created 39,463 companies records in total. The identification number and the name expressly give their records in the database, but others indicators are usually not completed. Among these observations, there are notes about 5,774 companies that belong to the SME classification; 86 enterprises, which over exceeded SME by the number of employees; and 33,603 not recognized. On the other side, 23,326 enterprises are categorized by the annual return category, but on the other side, if we look for another financial category, for example, assets variable is filled only for 5,853 companies and within them, even some unrealistic records are found. Similar results were observed within some other variables, which radically reduced the validity of prefilled data sample.

Despite of there is quite wide range available observable variables in the database; many of them are not sufficiently completed and they are not suitable for the research of this thesis. Moreover, one of next adverse implication of the unsuitability of the Magnusweb database is caused by the considerable difference in the amount of subjects in the ICT sphere. CSO records in 2011 demonstrate 32,369 active enterprises. If we examine previous trend in the creation of new companies, the proposed number by Magnusweb do not considerably correspond to CSO. These are some of the reasons, why author choose the possibility asking directly the respondents via questionnaire form, to get appropriately selected, up-to-date, and formed data about analyzed companies.

All companies are selected with regards to filled e-mail contact address from the ICT sphere which represented 7,979 potential respondents. E-mail was messaged to all contacts with a request to fill the survey. In two waves of request, author faced many remarkable positive and negative reactions to this request.

Most of the responses were excusatory with the justification that the respondent struggle with lack of time and labour force to devote someone to fulfill my request. Another relatively significant part of respondents was that they did not want to participate on such a survey by providing their internal data. Some of them confessed that they faced to the leakage of information by this kind of cooperation. Moreover, many of addressed companies reacted quite aggressively, that the amount of such a student researches cannot be tolerable for common company. This could be caused by the fact that not many research agencies do not publish their results of the researches and analyses thus students or individuals are forced to find their own data about the situation within the Czech ICT sector.

Positively related reactions were connected mostly to the topic that the respondent did not know how to answer all the questions. There were some cases when the questioned person expressed unusual interest in the research and wanted to consult potential effects, consequences and reasons concerning the ICT sector. In addition to this, there is a space for expressing these ideas in the questionnaire, which is examined in the subchapters hereafter.

The survey was active for approximately one month, during April, and the respondents were asked in one wave overall. After this round, only 47 answers were collected, which could not be considered as a sufficient or reliable sample. Second round followed after, increased the number of completed questionnaires to 131.

However, first question divided the sample into two separate parts of the respondents who agreed with sharing their purveyed information and who did not. This reduced the sample for another 26 observations, which finished the final sample on 105 completed surveys. If we get rid of the outlier observations, on average, time spent on fulfilling the questionnaire was 24.8 minutes, where most of the respondents finished in 20 - 30 minutes. Outliers were mostly caused by the fact, that respondent opened the questionnaire and got back to it later, for example after the second reminding wave. Figure describing the distribution of time spent on the questionnaire is in the *Appendix 3*.

Unfortunately, this sample represents only 0.325 percent of the 2011 CSO ICT companies and 0.266 percent of the ICT sphere Magnusweb records. According to

Barlett (2001), if we use continuous data in the research, by the population size of 10 000 the 83 respondents would be appropriate for confidence interval of 0.10. For the same amount of population, the categorical data would require 264 respondents. Research of this thesis combines both, so the number of respondents should be between those values. 105 answers could be than considered as not quietly sufficient sample, which only partially reaches the level of significance. Nevertheless, results of this research could be used as a background study for further research with wider possibilities and more numerous incomes of answers.

3.2 Questionnaire

Questionnaire distributed among the ICT companies consist three parts including thirty direct questions and three optional supplement questions to provide an opportunity for respondents to express their ideas and opinions. Various types of questions were posed – multiple choices, yes/no, pick one and rating, and description questions. Transcriptions from Czech language of the individual tasks holds in the *Appendix 4*, but below, there are laid some rationale and motivation of particular questions and parts of the questionnaire.

Questions from the first part help with the correct categorization of enterprises. On the base of first few questions, author is able to verify if the company identification number correspond to the connected variable in the source database. Furthermore, the classification based on the company size and amount of employees on managerial posts are asked. In addition, based on the studies from the literature (Hanousek 2012), the categorization based on the owner structure represents an important part of company division. As a last question in this part, the classification to the field of proficiency is presented. This distribution is slightly different from the CSO categorization.

Author wanted to divide ICT companies into four categories: software-developing, hardware-developing enterprises, whose main orientation is to develop and create new technologies in the field of products and software. Next are software and hardware distribution companies. Professions of these two are to deliver and apply ready-made solution to the customers. This kind of division is held because of the fact that software and hardware companies tent have different structure of revenues.

While the software-developing enterprises have more likely costs on the side of personnel and employees, hardware-developing enterprises usually deal with considerable costs due to the material purchase and they gain from the profit margin of the goods sold. According to author, these different types of costs/gains could cause slightly different understanding of success of the respondents.

Financial indicators are one of a few variables that can be easily and precisely quantified. Moreover, they usually reflect most of the operations that the company is facing to and executing during the examined period. It is then important to calculate with them in the analysis. Next part of the questionnaire is dealing with financial indicators. Firstly, respondents were asked to fill in some of the underlying indicators in past three years 2010 - 2012. These were the revenues from services and products sales, marketing costs, costs on Research and Development, how much they spend on employees training and how high were their total costs and earnings. An expectation in next two years (2013, 2014) on the development of the same indicators as in the question before is the following question. Answering with the precise number might be for respondent quite difficult task, therefore only possibilities starting with considerable drop in the value of factor up to considerable growth were asked. By setting some of these factors into different proportions (for example costs on employee training / number of employees, total revenues / total costs, and others), author is able to supplement additional variables to the analysis.

According to previous research, Strielkowski (2012), author asks supplementing questions relevant to the financial analysis. Respondents were asked from which source come the financial assets for company's operations; also, what is the share of equity on enterprise liabilities and if the owners share additional profits with employees. As a concluding question, respondents expressed their opinion which financial indicators could play a significant role in success of ICT companies by rating individual entries on the scale from 0 to 10. (Exemplary items prefilled in the questionnaire are the earnings, turnover per year, divisible profit from business operations, comparative advantage gained from R&D investments.)

Finally, it is important to summarize information about some of the company's non-financial indicators, which could come up with significant value for the whole success rate analysis. Questions for the third part are once again gathered mostly

from the literature sources like the company performance or company success researches. Fundamental points, which many works mentioned are the age of the researched company, size of the city where the enterprise operates in, and questions concerning the CEO and owners. This includes if owners are the part of the managerial body, the age of the CEO as well as how high the education level of the CEO is.

Following questions are mostly aimed to elicit closer information about the company like on what market does it operate on and via which channel does it deliver its services or products such as the internet, wholesale, direct contact, or retail business. In addition to that respondents are asked what they consider as the competitive advantage, and if the enterprise was rewarded by some special honors in the past.

From the research among the ICT SME in 2009³⁷ arose information that the ICT sector could be even more emerging and competitive in the Czech Republic. It is considered that the higher competition within the industry might play a consequential role in its forming and the number of players on the market. That is why the author is asking about competitors' development in past three years and about the trend of customer creation in past and the expectation for the future. Sometimes it is not crucial for a company to develop a stable position on the market a sell its services. The motivation of the entrepreneur could be quite different. Establishment of such a different company could be only for the reason to introduce a new original product, but not to sell it in long term to clients but aim the whole enterprise to be sold to bigger companies on the market. That is why the question about the proprietary change in the nearest future occurs in the questionnaire.

Lack of finance could be one of the crucial problems of a company for a stable development and competitiveness. For this purpose, author designates several questions of this type. If the company received some special start-up grant or the subsidy, it could be essential financial injection for its business or just a fractional benefit. If it is not the financial side, respondents have the possibility to rate some of the additional possible bearings that might cause a barrier to the company's development. Within those, some of the factors were taken from the relevant

³⁷ Zálešák (2009)

literature such as political influence, high costs on different inputs, insufficient education of employees, competition or the market demand.

Finally, respondents are again asked to express their opinion on individual non-financial success rate indicators by rating them by marks from 0 to 10 according to their relevance. Prefilled possibilities are the active R&D, publicity, presence of large projects, age of the company, high value of company if it is sold, global business activities, amount of customers, activities in the big city.

From the technical point of view, the questionnaire was held on the internet pages of Faculty of Social Sciences (<http://krejci-dp.fsv.cuni.cz>). This internet address was chosen deliberately to create an serious impression and thus to reduce the risk that the respondents might fear of corporate surveys without an academic sense. Request for completing the questionnaire were sent by e-mail. Respondents were also given the possibility to download a document containing all survey questions and prepare their answers. Responses were collected with the IBM SPSS Data Collection software, which is programmed for this kind of research. By using this software, author was able to manage answers online and connect individual databases containing different information about examined enterprises.

3.3 Statistical Results and Data Analysis

This subchapter describes individual effects and trends of the gathered data. Firstly, questions concerning the firms and their distribution are discussed and afterwards their needs and preferences in the field of success are presented.

Most of the respondents were companies from the software development field (56.19 percent), into this category belongs enterprises, which offers products of the non-material character – website, software development. Second largest group represent enterprises that distribute the software solutions. These are the resellers of software and companies, which implement the software solutions (20.95 percent). Two smallest groups are analogically the hardware distributors (17.14 percent) and hardware developers (5.71 percent). Companies, whose fields of activity extend more than one category, were added into more categories at once.

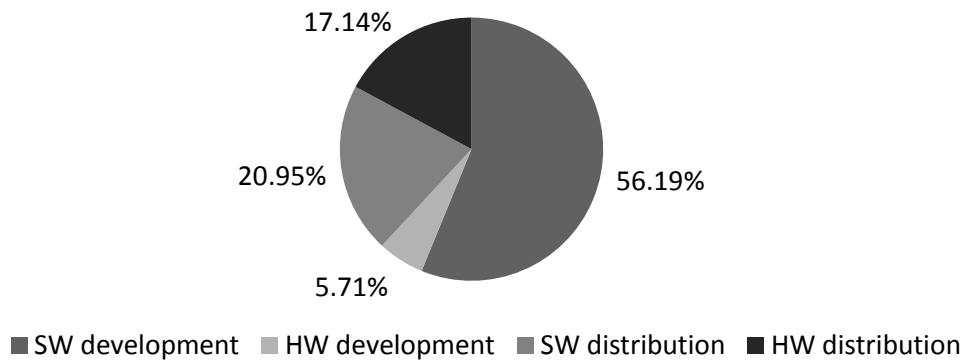


Figure 3.1 Field of activities distribution of ICT SME

Figure above hence denotes that most of the companies in Czech are oriented in the field of software development. This might be logically caused by the fact that it is still easier to create small business company, which develops mobile applications or internet pages than to establish a factory developing new components or devices, moreover in the time of cheap and easy supply from Asian countries. According to some of the commentaries, this hypothesis is confirmed later in this chapter.

These companies are in the most cases owned by one native legal personality (38.1 percent of observations) or one legal entity (25.71 percent). Third largest group represents the group of Czech owners (19.05 percent) followed by the groups of Czech legal entities (15.24 percent), which demonstrate that the ICT sector in Czech Republic still does not attract foreign small investors. Logically, than the smallest group of proprietors are the foreign owners. From the general structure of the sector, it could be assumed that companies, which have foreign owners background, do not come under the group of SME. These could the large global ICT companies like IBM, Microsoft, HP, Canon, Telefónica, and others that settle one of their divisions here.

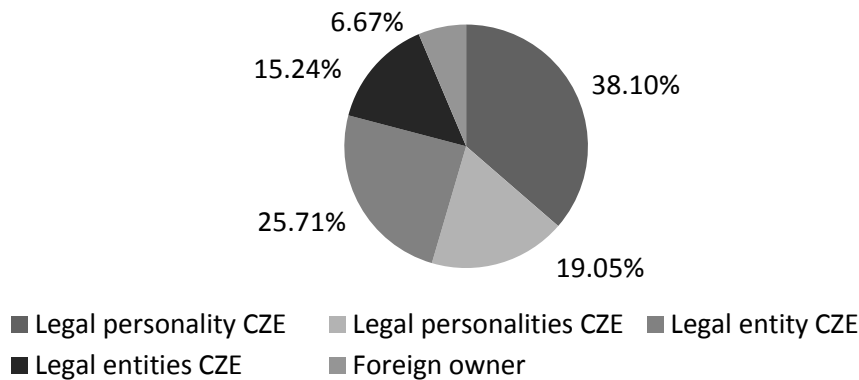


Figure 3.2 Structure of ICT SME owners in the Czech Republic

On average, companies employ 11.94 employees, where 2.05 are on the managerial post. According to Gupta (2010) span of control range is generally quite wide. It represents the 4 - 22 employees under the managers lead, when the number depends mainly on the nature of the work. Moreover, companies with more traditional orientation believe that 5 - 6 subordinates per supervisor would be ideal, and more innovatively based companies prefer the rate of 15 - 20.³⁸ Nevertheless, if the nature of work cannot be precisely determined from this research (mainly hierarchy of the individual enterprises), we could state that the result mostly fits for this division.

Common ICT SME in Czech Republic operates for nearly 13 years and there is 40 percent change that it has a headquarters in the capital city. This statement is based on the fact that average age of a company in the sample is 12.96 years and exactly 40 percent of them operate in the city with more than 1,000,000 of inhabitants, which corresponds only to one city in Czech. From the company age distribution (*Appendix 5*) is noticeable that there were two periods of establishment that could be quite obvious. Older group of enterprises are around the 20 years old. This means that they were settled just at the beginning of 90', when the market was opened to any new companies and it offered many opportunities of focus. Second group represents younger SME than 10 years. This wave might be supported by the increasing trend information technologies in Czech Republic. Amount of internet users increased, web pages presentations boosted, mobile devices started to be more used with wider possibilities of usage, and the new drift of data analysis occurred. All these are the trends, which became popular around 10 years ago and they created the new spot on the ICT market. This statement is supported by the fact that 52.54 percent of analyzed enterprises from software development industry begun their activities after 2003 and Voříšek (2010) states that the ICT services sector tend to be more progressive than the manufacturing sector.

Concerning the geographical distribution, the largest group of respondents actively operates in the capital city (40 percent). Second were surprisingly the cities with less than 50,000 inhabitants (the smallest offered category) with the share of 32.38 percent. Next two categories includes cities with 50,000 to 500,000 inhabitants where

³⁸ How Many Employees Should Your Supervisors Manage? [online: greatworkplace.wordpress.com]

jointly operates 23.81 percent of companies. Smallest group belongs to 500,000 - 1,000,000, where only 3.81 percent of enterprises operate.

Frequently discussed topic that influences the company success is the age and the educational level of the CEO of the firm. From the available sample, managing directors are most often between 35 - 45 years old with finished first-degree academic education, which could be expected based on the empirical studies of employee productivity.³⁹ Joint distribution showed that the most common situation is when the CEO is between 31 - 45 years with finished high education or CEO between 36 - 55 years with finished first-degree academic education. Separate percentage distributions of age and education are listed in the tables below. This analysis has just the informative character, closer description of connection of CEO age and education and understanding of success is mentioned in following paragraphs.

18 - 25	26 - 30	31 - 35	36 - 45	46 - 55	56 - 65	66 +
3.81%	8.57%	20.00%	26.67%	25.71%	14.29%	0.95%

Table 3.1 CEO age distribution categories

Basic	High	First-degree academic	Second-degree academic
0.95%	37.14%	53.33%	8.57%

Table 3.2 CEO educational level distribution categories

Next point of view is focused on the markets that the ICT firms operate on. The largest portion belongs to the domestic market (46.96 percent), followed by the regional domestic market (38.46 percent). Unexpectedly, the smallest parts represent the foreign markets. EU market is impacted by 11.72 percent of analyzed enterprises and there are only 2.86 percent of globally active companies. Thus, it could be implied, that enterprises do not tend penetrate to foreign markets, which might limit their possibilities and capital inflow from non-domestic markets. Moreover, this finding looks surprisingly, because of the fact that in previous paragraphs it was mentioned that the largest representation in the sample is by the software distributing companies, which do not usually have physical boundaries of sale.

³⁹ Ours (2009), p. 23

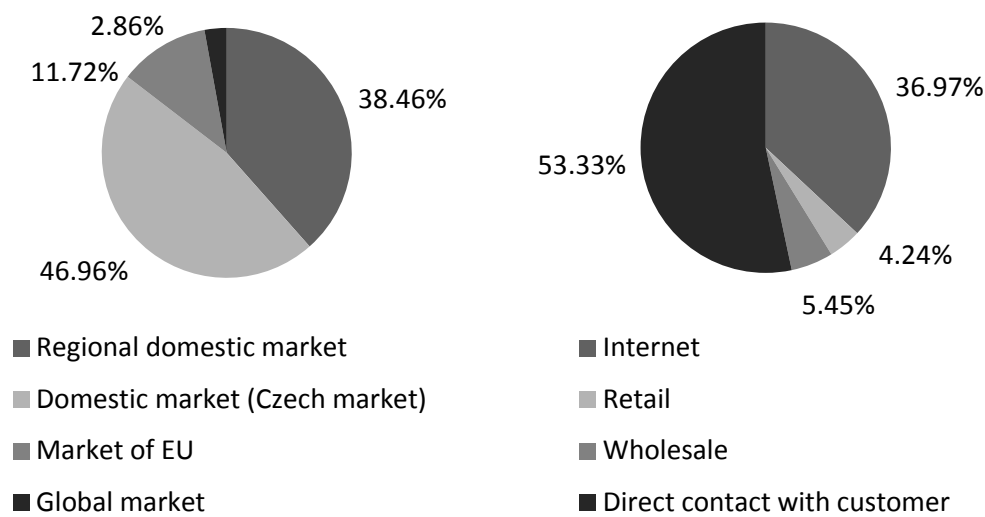


Figure 3.3 ICT SME market orientation and channels of sale distribution

Furthermore, one the finding about most frequent the channels of sales underlines the missing possibility of spreading into foreign markets. Enterprises from 53.33 percent offer their services and products via internet that could possibly open the barriers of their expansion.

Nevertheless, second most popular method is by direct contact with clients (36.97 percent) and remaining share belongs to retail and wholesale distribution. Comparison that is more detailed is stated in the figure above. In addition to this, one of the companies had a commentary on different way of sale and that is the foreign sales distributor.

Another topic concerns the company’s clients and direct competition on the market. Because there is quite large variation between the collected amounts, the exact numbers would not have any explanatory value. However, the first differences marks of the observed years would reveal the trends in growth or loss of the clients. From this point of view, majority of the analyzed companies in 2011 registered increase in the quantity of clients (45.71 percent). Last year, even 49.52 percent of enterprises noticed growth of their customers. This was projected to the companies, whose customers stayed the same between 2010 and 2011 (31.43 percent). For 2012, it dropped to 22.86 percent of firms. The amount of enterprises, which lose customers, is increasing during the observed period. (The growth was from 22.86 percent between 2010 and 2011 to 27.62 percent between 2011 and 2012.) For the current situation in 2013, alternatively, most of the companies expect increase of their

customers by more than 5 percent (35.24 percent). The same numbers as last year expect 32.38 percent of enterprises and 19.05 percent expect slight growth. Rest of them (13.33 percent) does expect diminution. Tables describing these trends are situated in *Appendix 6*.

Financial resources represents quite important component of the success of an enterprise. Several questions arise with this topic. Can the company finance all its expenses by the revenues from previous years? Does it need bank loans or the insufficient funds comes from the owners investments? Do enterprises use available financial subsidies for example like EU grants? This paragraph analyzes collected answers about the financial resource differentiation between the ICT SME. Generally, most of the firms are independent from others subsidies than their previous earnings from sales. All of the categories are around 40 percent self-reliant. Secondly, domestic investments represent alternative way of supporting the operations. They are used to support mostly in case of HW distribution enterprises. Hardware developing firms more likely support their operations banks loans compared to other ICT SME categories. This might be due to the fact that it is quite difficult to establish stable hardware developing company on the Czech market, maybe because of the competition of large corporations, as some of the respondents noted in the commentaries part.

Software companies are only users of financial subsidies and grants. Distributors use them in 13.79 percent of cases. Still they are able to cover their expenses in most cases by sales earnings Summary of this analysis is stated in the table below.

	Domestic investments	Foreign investments	Earnings from previous years	Bank loans	Financial subsidies, grants
Total	35.61%	2.27%	42.42%	11.36%	8.33%
SW development	36.99%	2.74%	43.84%	6.85%	9.59%
HW development	25.00%	0.00%	37.50%	37.50%	0.00%
SW Distribution	31.03%	0.00%	41.38%	13.79%	13.79%
HW Distribution	40.91%	4.55%	40.91%	13.64%	0.00%

Table 3.3 ICT SME Financial resources distribution

In this connection, if a company accepts such a supportive grant, it would be interesting to determine, what does it represents to this company. However, from the sample, only 17 enterprises (16.19 percent) received one. For most of them, it stands for the help with the company development (11 cases) and rest split the opposite options as essential financial fraction and the fractional benefit to its activities.

Concerning the earnings of companies, if they are productive with positive profits, do they share with employees? This might be one of the motivations for them to perform more effectively and add more value to the firm. Based on the research, only 30.48 percent of companies share the earnings within the employees.

Alternatively, new trend of establishing an ICT company occurred lately. They introduce new product, which gets easily popular among users and then, instead of widening the background of this company, they sell the whole idea to larger players on the market. It represents one of the easiest way, how to arrange a big financial inflow to set up for example another business idea or else. According to data, every fourth company from 10 considers the company sale in next 5 years. Most of them are from the software-developing sphere (42.86 percent).

One of the factors of the company's approach to its business could be analyzed with the transparency of their operations. If the firm does not have anything to hide and present all its financial reports and information about the structure changes or organization, it probably does not have any side intentions and has a straight idea of its business. For the Czech conditions, this determinant could be monitored by valuating the amount of information that it publishes in the business register.

Unfortunately, respondents in the researched sample were not divided into groups which do have records in the business register and which do not. However, they were asked to state if and how they publish information about their enterprise. 43.81 percent do periodically upload actual documents. 13.33 percent upload only necessary documents and only if it is needed. 20 percent publish only obligatory information and 22.86 do not publish at all. The unwillingness to publish actual data about the accounting might come from the fear of uncompetitive behavior of competitions and others.

Last paragraph dealing with the general analysis of data sample belongs to the expectations of companies in the next two years. Overall, enterprises in ICT tend feel more likely conservative. Most of them wants to keep all expenditures on marketing, R&D or employee training the same in both years with a slight growth. Expected revenues, earnings and total costs hold the same trend. Firms are expecting the same values or small increase. From the tables below, the overall distribution for individual years, it could be noticed that the earnings are expected to drop a little (approximately by 12.38 percent of companies). It could be considered in most of the indicators, and in R&D expenses is expected noticeable rise in considerable drop after 2013.

	Considerable growth	Growth	Stay the same	Drop	Considerable drop
Revenues	7.62%	43.81%	31.43%	16.19%	0.95%
Marketing costs	3.81%	22.86%	61.90%	11.43%	0.00%
R&D costs	1.90%	18.10%	70.48%	9.52%	0.00%
Employee training costs	0.00%	17.14%	74.29%	8.57%	0.00%
Total costs	1.90%	38.10%	43.81%	16.19%	0.00%
Earnings	6.67%	40.00%	37.14%	14.29%	1.90%

Table 3.4 2013 enterprise expectations distribution

	Considerable growth	Growth	Stay the same	Drop	Considerable drop
Revenues	4.76%	38.10%	30.48%	23.81%	2.86%
Marketing costs	3.81%	14.29%	67.62%	14.29%	0.00%
R&D costs	0.95%	17.14%	68.57%	9.52%	3.81%
Employee training costs	0.00%	15.24%	70.48%	10.48%	3.81%
Total costs	1.90%	34.29%	40.95%	22.86%	0.00%
Earnings	2.86%	40.00%	29.52%	26.67%	0.95%

Table 3.5 2014 enterprise expectations distribution

As it was mentioned before, companies do not expect any unusual rigidity in expenses or in the revenues. They on the other side tend to predict more recognizable decrease in all the values in year 2014. However, does it hold for younger and older enterprises separately? *Appendix 7* analyze the distribution for younger firms (established after 2000) and older. From this point of view, lately established enterprises are predicting higher revenues and costs during both 2013 and 2014. They

expect significantly more considerable growths in R&D expenditures as well as in marketing costs and little bit less in employee training costs than older companies do. On the other side, enterprises with older background in Czech Republic have more predictions that are negative. In all expectations in both years, they report higher values in passive development of both, costs and revenues.

Results of this analysis might be expected. Younger companies are more dynamic and they tend to spend more finances on marketing to get into the attention on the market. In addition, they spend more on R&D to stabilize their know-how and products, maybe to introduce new products, on contrary to older firms that are known on the market and products do not need to be fine-tuned. However, this might be the reason why they expect development that is more negative in analyzed factors.

For a company's success, it is important that it is able to cope with the main barriers of its development. One of the questions in the questionnaire is focused on this topic. Results are quite surprising. Average mark that enterprises gave to all offered factors is only 3.5 on the scale 0 to 10. This could denote that they face only to moderate barriers in Czech Republic.

However, the highest average value receives high competition barrier (5.48/10) and the taxes and fees barrier (5.07) follows it. Enterprises choose also among the most serious problems lack of finances and expenses on employees. Contrary, the lowest value is analogically assigned to low competition environment (0.93) and to insufficient education and qualification of employees (2.33).

Analogically, the boundary values are in to most cases given to corresponding factors that were placed on the first and last positions. (High competition environment worries 20 percent of respondents and low competition does not bother 72.4 percent.) Surprisingly, political situation represents zero value problems in 48.6 percent of cases. More detailed table of the individual results is attached in *Appendix 8*.

Final part of this section is devoted to the valuation of the success indicators chosen by questioned enterprises. From the analyzed data, the most important indicator for companies are the earnings with average value 7.7, in addition to this 44 percent of respondents attached mark 10 to this factor. On the second position are the amount of customers and revenues per year with average value 6.4.

Oppositely, the smallest accent is given to the variable profitable sale in the future (average valuation 2.5). Publicity unexpectedly represents one of the more crucial factors (given average mark 6.3). Generally, based on the results from the sample, enterprises value the success factor averagely; the total average value is 5.02. Division into separate groups of enterprises by for example the age or orientation did not bring up any remarkable information, thus they are not discussed. Individual shares of votes are listed in the table below and predictive value of selected factors is analyzed in the next chapter.

	0	1	2	3	4	5	6	7	8	9	10
Earnings	5.7	0.0	2.9	1.9	1.0	10.5	2.9	8.6	14.3	10.5	41.9
Turnover per year	5.7	0.0	6.7	2.9	1.0	23.8	6.7	13.3	14.3	5.7	20.0
Divisible profit	23.8	1.9	5.7	6.7	4.8	19.0	1.0	8.6	12.4	3.8	12.4
Possibility to invest into R&D	30.5	1.9	11.4	6.7	2.9	19.0	4.8	4.8	8.6	2.9	6.7
Active R&D	18.1	4.8	3.8	3.8	7.6	19.0	5.7	8.6	7.6	1.9	19.0
Publicity	8.6	1.9	4.8	2.9	2.9	18.1	7.6	7.6	21.9	3.8	20.0
Large projects	14.3	2.9	1.0	6.7	5.7	18.1	7.6	7.6	13.3	5.7	17.1
Age of company	16.2	4.8	13.3	10.5	5.7	26.7	5.7	3.8	2.9	3.8	6.7
Headquarters in big city	26.7	4.8	5.7	6.7	5.7	22.9	5.7	9.5	7.6	1.9	2.9
Profitable sale in future	41.0	6.7	12.4	5.7	5.7	17.1	2.9	2.9	2.9	0.0	2.9
Global market activities	31.4	1.0	7.6	11.4	4.8	13.3	5.7	4.8	8.6	3.8	7.6
Amount of customers	10.5	1.0	3.8	3.8	2.9	19.0	4.8	6.7	14.3	9.5	23.8

Table 3.6 Success rate indicators distribution (in percentage of respondents)

In addition to this, author is able to set up the word analysis of the competitive advantage factors that the companies expose as the crucial. The most recognizable words are connected mainly with the customers and the enterprise’s approach to them. Majority of commentaries mention the combination of low products costs of original product with connection of personal approach to the customer and the time

flexibility to fulfill its needs. Smaller portion of respondents mention also the experience from long-lasting existence on the market. Some notes are connected with the variability of implementing the offered products or services and its continuous innovation. Unfortunately, used application does not create analytical report of individual words but the graphical illustration is available. Czech transcription of the analyzed sample results is attached in the *Appendix 8*.

To conclude the success identification of companies, the analyzed companies choose as the most informative unit of success measurement the financial factor earnings where the yearly revenues and amount of customers play important role. Moreover, they identify the key factor the originality and accessibility of their services and products as crucial to have competitive advantage. The predictive value of above-mentioned indicators is discussed in the following chapter.

3.4 Empirical Model Testing

By determining the predictive value of different variables for success rate factors, companies will be able to enhance their internal operations to gain better performance and results. Several other reasons why these processes are appropriate to analyze are summarized in the final parts of this thesis. Econometric models could perform such an analysis. This chapter is dealing in setting several models, which were previously realized in different working paper, which companies indicated as significant and which were stated in the hypothesis of this work.

Process of identification of individual success factors determinants includes all variables into statistic software that stipulate their significance in separate cases. Then, by removing less significant ones, which do not have any predictive value, the final model of given dependent variable is constructed. Results are then discussed and controlled. The outcome should be that they have overall meaning for the purposes of the thesis and that they explain some rational effect. Even though, most of the responses are complete, some of the observations are missing in the data set because of the fact that the financial values question was optional and some respondents skipped it. These are usually continuous variables. Other type of responses, discrete ones, are ordinarily complete, thus if the explanatory variables are compounded only by them, amount of observations is complete for this case.

According to working papers in the literature, most common methodology of this research is generally usage of linear regression. This thesis keeps the same process and applies similar technique. Thereafter, the models are based on the linear relationship between variables Y_i and X_i of the form:

$$Y_i = \alpha + \beta X_i + \varepsilon_i \quad i = 1, 2, \dots, n$$

Figure 3.4 Simple linear regression equation

where Y_i denotes the i -th observation on the dependent variable Y , which represent success rate indicator, and X_i represents i -th observation on the vector of independent, explanatory, variables. n is number of collected observations and α and β are intercept and slope of the simple linear relationship between Y and X .⁴⁰

To get the predictive value of this model, it is important to estimate the intercept and all included coefficients. This step is done through ordinary least square method, where the sum of squares of error terms in the regression is being minimized. This procedure is applicable only if the data sample holds several assumptions. Because this method of ordinary least square regression is widely used among economists and statisticians, author omit closer description and leave it for individual studies from the relevant literature. Tests of the model significance are performed by the software and mentioned in the concluding parts of individual models. Total model accuracy is measured by overall IBM SPSS Modeler mark corresponding to percentage of appropriateness. Information criterion, which is used to compare models fitness, is added to complete valuation. Models with smaller information criterion values fit better. The histogram of Studentized residuals compares the distribution of residuals to a normal distribution. In comparison with normal distribution is illustrated for individual cases. Finally, colinearity test is performed to summarize characteristics of the presented model.

Since in many cases the success factor don not need to be easily quantifiable. It could be for example discreet variable such as publicity (if the enterprise is publicly known), if it is capable of managing large projects or if it could be profitably sold in the future. The method of predicting this variable could be processed by mapping its scale of importance for observed company. Selection of the suitable predictors thus

⁴⁰ Baltagi (2011), p. 49

started with questions 12 and 22, where respondents rate the gravity of both financial and non-financial success factors. (See *Appendix 3* for detailed transcription of the questionnaire questions.)

In previous chapter, for questioned enterprises the most important indicators represent the earnings, actively used R&D, publicity, large projects, and amount of customers. However, in the process of finding relevant variables influencing the gravity of mentioned factors, only one of them matched significantly to some of collected variables in the data set. From this point of view, the importance matching proved only in the case of active R&D.

Continuous variables that could be measured are another possibility to perform such an indicator. Strielkowski (2012) predicts the earnings per employee success factor generally by variables such as owner/manager age, owner/manager motive for enterprise creation, enterprise size, and enterprise location by province enterprise. This indicator showed also group of relevant indicators.

In addition, similar effect indicates also the average revenue in last 3 years, revenues in last year and investments into research and development, thus they are also part of the analysis.

The discrete variable of customer amount does not have any predictors. However, if the real quantities are taken, some variables are able to estimate them. Thus, the number of clients represents the last specified model of company success in observed period.

All the calculations are processed in the IBM SPSS Modeler software, which works on the basis analyzing and performing individual series of nod steps that comes into the final model outcome. Illustration of the process, which led to valid models that are used in this thesis, is attached in *Appendix 9*. Unfortunately, in the software, there is no possibility to export results into appropriate form that could be easily manipulated with, and therefore some results are presented as illustrative figures.

3.4.1 Earnings per employee model

In following sections, results of individual regression model are reported. These are applied in order to identify the factors that are most significant for enterprises success. Opening part of each interpretation stats with the model notation, where the bold numbers state for coefficients values followed by the robust standard errors value in the parenthesis and *,**,*** denoting the significance level less than 1 percent, 5 percent and 10 percent. More detailed table of given results is attached for each model separately in the *Appendix 11*.

Result of the first stepwise⁴¹ model estimation is following:

$$\begin{aligned} zisk_zam_SL = & \mathbf{0.123}(0.832) + \mathbf{0.282}(0.062) \text{ Q7-2010-vysledek_hospodareni_SL}^* - \\ & \mathbf{1.257}(0.567) \text{ Q8-2013-zamestnanci=2}^* - \mathbf{0.039}(0.518) \text{ Q8-2013-zamestnanci=3}^{***} \\ & + \mathbf{0.87}(0.672) \text{ Q9-moznost1=1} + \mathbf{1.326}(0.673) \text{ Q9-moznost1=3}^{***} - \mathbf{0.278}(0.980) \\ & \text{Q9-moznost1=4} - \mathbf{0.002}(0.001) \text{ Q24-2011}^{**} + \mathbf{0.002}(0.001) \text{ Q24-2010} \end{aligned}$$

where *zisk_zam_SL* represents values of logarithm of earnings in last year (2012) per employee on which the *Q7-2010-vysledek_hospodareni_SL*, logarithm of earnings in 2010 has positive influence with the dummy variable if the company's main financial resources are from domestic investments (*Q9-moznost1=1*) or from earnings from previous years (*Q9-moznost1=3*). Dummy variable is recognizable by the "=" character behind the variable name and it stated on which of the possibilities it is applied. On the other side, negative influence has an expected growth (*Q8-2013-zamestnanci=2*) or stay (*Q8-2013-zamestnanci=3*) in the costs on employee training in actual year. In addition to this, negatively appear also if company finances its operations from the bank loans (*Q9-moznost1=4*). Insignificant value, also proving problems with colinearity, is devoted to the number of customers in years 2010 (*Q24-2010*) and 2011 (*Q24-2011*).

⁴¹ IBM help manual (available online): Stepwise methods search fewer combinations of sub-models and rarely select the best one, so another option is to check all possible models and select the "best" based upon some criterion. The available criteria are the maximum adjusted R², minimum AICC, and minimum ASE over the overfit prevention set.

Overall accuracy of the model represents 55.7 percent, where the information criterion 0.599 labels this model as quite stable, but with possible irregularities.

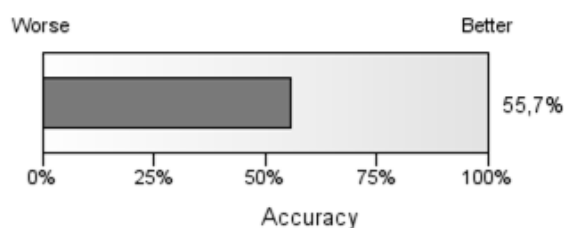


Figure 3.5 Total accuracy of Earnings per employee model

Importance of individual predictors is illustrated in the *Appendix 11* as well as the normal distribution comparison to distribution of residuals. Colinearity test showed that both the Q24 questions might indicate colinearity problem. If they were excluded from the model, it would not change its overall proportions. However, they were kept to show that they might have little influence for the profitability value.

3.4.2 Average revenues model

Next model indicate company's success based on the average revenues performance in past three years (2010 - 2012). This variable was reported as the most important for the respondents in the previous data analysis. Model selection method was performed by the best subsets procedure.⁴² In addition, on the data set, the automatic data preparation technique was applied. By performing this technique, either the non-suitable and outperforming observations are omitted or the categories of some discrete variables are merged to maximize association with the target (predicted) variable. This estimation showed undermentioned results:

$$\begin{aligned}
 \text{trzby_SL_prumer} = & \mathbf{2.926(0.233)^*} + \mathbf{0.0001(0.0001)} \text{ Q7-2012-naklady_transformed}^* \\
 - & \mathbf{1.332(0.349)} \text{ Q12-obrat_transformed=0}^* + \mathbf{0.174(0.263)} \text{ Q12-} \\
 & \text{obrat_transformed=1} - \mathbf{0.866(0.353)} \text{ Q12-obrat_transformed=2}^{**} - \mathbf{0.907(0.363)} \\
 & \text{Q8-2014-marketing_transformed=0}^{**} - \mathbf{0.92(0.397)} \text{ Q16_transformed=0}^{**} - \\
 & \mathbf{0.208(0.165)} \text{ Q16_transformed=1} + \mathbf{0.045(0.021)} \text{ Q29-naklady-na-} \\
 & \text{zamestnance_transformed}^{**} + \mathbf{0.019(0.011)} \text{ Q13_transformed}
 \end{aligned}$$

⁴² IBM help manual (available online): Best Subsets Selection checks "all possible" models, or at least a larger subset of the possible models than forward stepwise, to choose the best according to the best subsets criterion.

where *trzyby_SL_prumer* are computed as average logarithms of total revenues for last three years. *Q7-2012-naklady_transformed* represents the positive added value of the total costs in last observed year. The intercept of this variable is too small because the logarithm transformation was not applied on it. Other variables with positive value are not such significant in this model, these are the *Q29-naklady-na-zamestnance_transformed* (companies for which the costs on employees present a barrier in their development) and *Q13_transformed* (age of a company).

Negatively contributes especially the fact when companies do not adapt their revenues as important part of operations (they do not gain much gravity to them - *Q12-obrat_transformed=0*, *Q12-obrat_transformed=2*). The positive value of the middle variable might be caused by lack of available observations, but in this model, it implicate opposite effect than its border dummy variables. In addition, one of the significant elements is the age of company CEO. Those enterprises, whose managing director's age is between 18 - 30 years, perform with lower average returns. Surprisingly, if enterprise is planning to invest more into marketing in following year (*Q8-2014-marketing_transformed=0*), it also indicates worse results on returns.

Summary statistics of this econometric model demonstrate better results than the previous one. Total accuracy as it is illustrated below reaches 72.5 percent and the information criterion -70.129 indicates well fitting model.

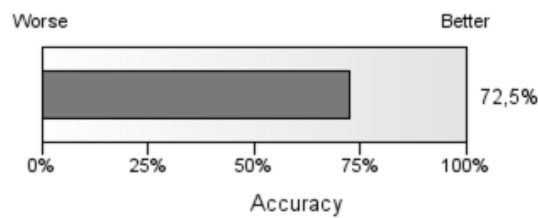


Figure 3.6 Total accuracy of Average revenues model

Again, the importance of individual predictors is illustrated in the *Appendix 11*. Moreover, the normal distribution of residuals seems fitting except a small rigidity on the left tail of the distribution and the colinearity test did not showed any problems with the variables.

3.4.3 Revenues model

To enlarge idea of using revenues as a predictive function of success of individual companies, if the revenues from last observed period are taken, some significant explanatory variables are found as well. Similar method of best subsets selection estimate following model.

$$Q7-2012-trzby_SL = 1.227(0.224)^* + 0.941(0.104) Q7-2012-naklady_SL^* - 0.331(0.12) Q7-2011-naklady_SL^* + 0.122(0.072) Q7-2010-marketing_SL^{***} + 0.007(0.004) Q5^{***}$$

In this case, the logarithm revenues in observed period (*Q7-2012-trzby_SL*) are logically positively and most significantly dependent on logarithm of total costs in the same period (*Q7-2012-naklady_SL*), on the logarithm of marketing costs in 2010 (*Q7-2010-marketing_SL*) and the amount of employees (*Q5*). Questionable could be that the marketing costs from previous or observed year did not occurred as significant. This might be due to lack of collected data. Aleternatively, only negative coefficient are proved for logarithm of total costs in previous year variable (*Q7-2011-naklady_SL*).

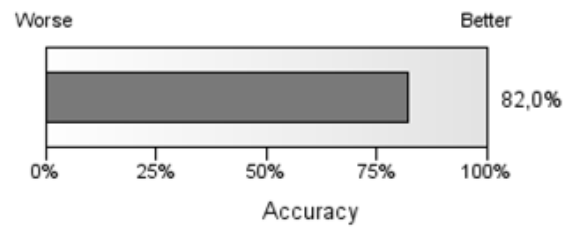


Figure 3.7 Total accuracy of Revenues model

Overlly, this model perform better than the previous again. Almost the same effect is explained by less variables which have obvious influence on its value. Thus, the most important predictor in this is represented by the total costs of acutal year. Others do not reflect so much importancy. Their comparison is attached in the *Appendix 11*. Even though the information criterion reaches -81.779, normality distribution comparison with the residuals do not show much comparable course. Colinearity test confirm above mentioned hypotheses for both total costs. Thus the previous model which predicted revenues should be preffered for these conditions.

3.4.4 Research & Development model

Testing R&D values showed that for both possible approaches (graveness approach and continuous values model) are possible some significant predictors. This is the reason why in this part are discussed both of them.

Firstly, R&D importance model is by forward stepwise model selection method estimated subsequently:

$$Q22-rad = -1.032(0.816) + 3.122(0.836) Q3=1^* + 6.518(1.505) Q3=2^* + 2.448(1.002) Q3=3^{**} + 0.307(0.095) Q12-rozdelitelny-zisk^* + 2.435(0.812) Q7-2012-RaD_SL^* + 0.306(0.112) Q12-rad^* - 1.7(0.819) Q7-2010-RaD_SL^{**}$$

Here, the importance (success) value of the research and development (*Q22-rad*) is characterized by positive affiliation to various types of ICT companies. The most importantly the companies from hardware development sphere (*Q3=2*). Other specifications contribute to this success factor with smaller proportion software developing (*Q3=1*) and software distributing (*Q3=3*) companies. Hardware distribution does not show any significance important for this model. Positively contribute also if the company considers the earnings as an important part of company performance (*Q12-rozdelitelny-zisk*) and logically most important is how much they spend on R&D (*Q7-2012-RaD-SL*) and if they consider the active investments into development as a comparative advantage (*Q12-rad*). Negative coefficient represents the logarithm of investments into R&D in 2010 (*Q7-2010-RaD-SL*).

Total accuracy test shows 58.5 percent accuracy, where the information criterion is heavily high valued by rank 104.688, which indicates that the model does not need to fill well. Distribution of residuals on other side quietly well describe the normal distribution and in addition the importance of individual predictors is equally divided. And the collinearity problem is not spotted among these indicators.

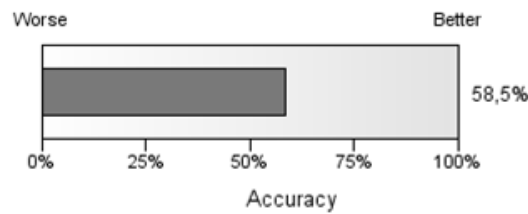


Figure 3.8 Total accuracy of R&D importance model

In figure above, the illustration of total accuracy report is presented. Other indicators ale attached in *Appendix 11*.

Secondly, based on the Figure 3.9, seemingly better model represents the R&D investment in observed year 2012. By using the best subset method of estimating the regression, the result is following:

$$Q7-2012-RaD_SL = 0.014(0.043) + 1.102(0.049) Q7-2011-RaD_SL^* + 0.472(0.021) Q7-2012-naklady_SL^* - 0.474(0.025) Q7-2011-naklady_SL^* - 0.108(0.049) Q7-2010-RaD_SL^{**} + 0.011(0.005) Q29-kvalifikace^{**} - 0.025(0.016) Q7-2010-marketing_SL$$

where the amount of R&D invesments (logarithm) in observed year ($Q7-2012-RaD_SL$) depends mainly on positive financial indicators of logarithm of R&D investments in previous year ($Q7-2011-RaD_SL$), and logarithm of total costs in actual ($Q7-2012-naklady_SL$). Neglectible positive contributor is also the barrier of lack of employee qualification ($Q29-kvalifikace$). $Q7-2011-naklady_SL$, previous year total costs are represents strong negative influence on the model in combination with the less significant predictor of investments into R&D in 2010 ($Q7-2010-RaD_SL$). Logarithm of investments into marketing in 2010 ($Q7-2010-marketing_SL$) also negatively inflence R&D investments this year.

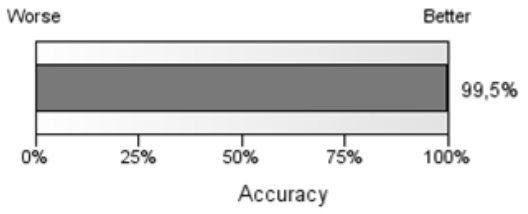


Figure 3.9 Total accuracy of R&D investments model

Although the overall statistics predicts very stable model, with information criterion very low (-259.324) and the distribution of residuals quite normal, colinearity in this case is quite high almost for all financial variables, that it might lead to inaccurate numerical results.

As it was mentioned before, several problems arose during the construction of individual models that cannot be enhanced with available data set. The crucial represents insufficient amount of observations among ICT SME. This could be corrected by using more extensive long lasting research. In addition to this, with wider possibilities of research would be connected a collection of more variables, which were marked by companies as important ones in previous chapter. Thus, more appropriate and quantifiable results would be achieved. Finally, if there would be such a variables, complex econometric model would be possible to apply to gain better described individual effects that would not indicate any statistical problems.

Nevertheless, by previous analysis, some of the remarkable information is collected that might lead to appropriate recommendations. These are discussed in following chapter.

4 Results Interpretation

How is it possible to determine the overall rating of success of ICT SME in the Czech market? Would it be sufficient to use only one function? Since the approaches to the term success are not directly defined and ideas about the success vary between different valuers, it would not be correct to state only one determinant that will represent overall success.

In this thesis, three different standpoints were presented. Each one analyzed the company from a different point of view. Most importantly, according to the studied literature as well as the enterprises themselves, the financial performance is the most crucial component. This statement does not represent any surprising information. Many valuers stand only behind such a methodology and usually do not consider any other influential factors as representing the success of the company. However, the non-financial (or accounting) approach is usually neglected and not much value is given to these indicators. The weight of R&D is represented as consequential for the ICT sphere, which could move the whole sector forward and to add that comparative advantage against outdated methods.

Enterprise performance, which is projected through the earnings per employee variable, represents one such important indicator, even for the ICT sphere. From the sample of variables and observations that was collected from the SME enterprises, this ratio is logically negatively influenced by the expected amount of employee expenses. This could be formulated as the fact that for better company performance it is necessary for expenses on employees to not grow in the future; more specifically, that it employs educated and skilled employees. A surprising fact is that historical earnings plays quite an important positive role in the prediction. It could be caused by the fact (from the empirical summary) that companies are not generally planning any crucial changes in investments or revenues, thus the lag was transformed into the historical values. Thus enterprises, which had better performance and earnings in historical values tend to perform better in this success indicator these days. In addition, the source of general operations financing plays an important role in the

success performance rate. Practical implications and logic could be interpreted to mean that companies do not place trust in financing their activities through bank loans, and thus the model discriminates towards this fact. On other hand, if the owner of a company is capable of financing it using their own resources or from previous earnings, this effect is valued positively.

A continuation of available accounting indicators, which represents the success of any given company, is represented by the total returns of the company. The average performance in stable revenues would then be predicted by total costs in the observed year and it would be negatively discriminated by the “ignorance” of this indicator. This effect could arise in cases where companies are too large to manage overall processes that generate revenues. Another example is a state owned enterprise which does not need to look at this variable. Enterprises that have enough orders and running projects, which quintessentially do not need to check their revenues, might fall into this category. Moreover, uninformed management could ignore such an indicator. In connection to that, another variable that decreases the value of average revenues is the presence of a young CEO (between 18 - 30 years old). This might be caused by the fact that inexperienced managing directors do not always make effective decisions, which in turn might hurt the company. Experience looks to be a crucial indicator of average revenues over time. Other substantial values for this model are know-how, client references and stability, often reflected in the age of a company. Another variable connected to this model is marketing significance. If a company does not place much significance in spending on marketing, it contributes positively. This might be caused by the fact that the examined company already has enough stable background and references that additional marketing investments do not generate the appropriately desired effect.

From the presented list of non-financial indicators, only one performed better specifically in connection to the ICT sphere. As mentioned before, research and development is crucial for this sector. Other indicators did not show any significant value of prediction. However, enterprises actively performing in the field of information technologies reach a high level of success when it highly ranks the importance of R&D. This is the motivation of a success factor from the non-financial point of view.

The rating of a successful R&D program is mainly influenced by the sphere in which the analyzed company operates. If it is from the hardware-development sphere, they automatically gain a high ranking, mainly because of the fact that such an activity in this field is almost required. Introducing new HW products would not even be possible without appropriate research. Other spheres, mainly from software development and distribution, gain less. Another contributor to this rating is represented by the significance of divisible earnings. An enterprise where the possible bonus of divisible earnings exists is motivation for better results in gaining a comparative advantage in introducing newly developed products. Finally and logically, the positive difference in R&D investments is important as well. This implies that the trend towards investing in R&D should grow. Those who, for example, keep the same reserved budget over time are not ranked as highly as those who allocate more resources every year. In addition, the significance of active investment in R&D corresponds to the above-mentioned effect and closes this part of the success rate indicator.

The task of constructing only one indicator of success might seem to be quite difficult and complex. Because of the fact that the overall success of ICT SME depends on various successes that do not need to correspond with each other, one model may indicate a serious deficit of relevant information. The combination of several different factors comprises one of the possible solutions. Research among enterprises in the Czech Republic formed three approaches, which most probably cover the main qualities of success in each given company.

By combining financial and non-financial factors that enterprises in ICT generally use, it is possible to construct success rate models that describe their performance. From the analyzed data set of the ICT SME sample, the earnings/employee ratio, average yearly returns and gravity of R&D success indicators are the most important. For all those ratings, it is possible to collect significant predictors that are able to describe them correctly.

In that connection, the hypotheses stated at the beginning of this thesis were answered. By performing statistical research and further analysis, the author is then able to state that there are indicators, which can determine the success of ICT SME. Although the R&D does not represent the most important success indicator chosen by

companies, they classified it just behind the number of customers and presence of large projects indicators. However, since these two factors do not need and, respectively, cannot be easily predicted by collected information, the gravity of R&D rests as one of the main predictors of this analysis.

Individual models are usually built of various types of repressors. They are from both categories: financial and non-financial. For example, what happens to be important is the membership in a particular sphere of the ICT sector, the age of the CEO, or age of the enterprise itself, as well as predictions of various states, such as expected growth in employee training. This finding answers the last hypothesis that there are non-financial indicators in the success rate analysis which have significant influence on its results.

Based on suggestions from the commentary section of the questionnaire, the following paragraphs are devoted to some concluding notes which will try to summarize some common points of interest.

The constructed models above suggested that there is a negative correlation between company performance and the lack of skilled employees. From this fact, it can be implied that freshly educated students who have the most up-to-date knowledge of modern trends are one of the factors that positively influence a company's success. In addition to this, young people without long-term experience in the labour market represent one of the cheaper working forces available, thus their employment and induction into enterprise processes might include lower costs on the side of wage expenditures and, simultaneously, motivate employees who are willing to grow in knowledge and performance. Unfortunately, this thesis did not contain statistics about the movement of this labour force.

Neither political situation, fees nor taxes occur in any of the models significantly. Even from the descriptive statistics section, companies do not place much importance in the effect of political situations on the success ratio.

It can be gathered from the statistics illustration in the ICT sphere development description that the financial crisis of the previous years has hit this sector markedly. This effect probably carried over into the modeling part as well, mainly seen through

the lagged influence of several types of investments (a frequently used variable was the marketing costs from the previous two years).

5 Conclusion & Policy Implication

Most Czech firms are facing difficulties in achieving success within their respective markets. Some of them demonstrate more sufficient results than others; others are satisfied with their profitability at a specific return level. Conversely, there are some that need organizational help to cope with their position. These variations are based on the indicators and factors that have a connection with their success rate.

The main goal of this Master thesis was to discover and describe the most significant factors, or rather methods that influence the success of small and medium enterprises in a selected sector of the Czech economy.

To start, a general overview of the sector was presented. This part clarified the development and actual position of SME on the Czech ICT market. From this point of view, the ICT is undergoing a difficult time of stagnation. Because of decreasing demand for additional ICT products, many companies face several existential problems in all different indicators, which have transferred into an intense lowering of the supportive trend that occurred at the beginning of the 20th century. The increasing number of legal personnel employed in ICT, as well as total production values and the overall number of SME in the sector has dropped since 2009. Research among companies in the crucial year of 2009 showed what a significant role R&D plays on the future success and survival of ICT enterprises.

This leads to the question; What factors determine correctly a company's performance and its success to survive and succeed on the market? Many approaches to answering this question, coming from all around the world, were presented in the previous chapter. Frequently, outcomes of these analyses showed the existence of several methods that can correctly determine the desired performance indicator. Most of them performed extensive market research in which they analyzed several possible factors that might have some additional value. Then the econometric modeling was applied to the collected data and the verification of the newly formed model was presented as the success indicators.

The same technique was applied for purposes of this thesis. Using the contact database of ICT SME enterprises, the questionnaire form was sent to 7,979 potential respondents to acquire relevant and complete information about the target group of analysis. The questionnaire contained 30 obligatory questions of various types related to financial and non-financial information. From the month-long survey, only 105 complete answers were collected. Despite the fact that the answers represented a considerably small portion of the whole field, they were considered as sufficient to express some additional statistical results.

Descriptive statistical analysis showed that a large share of companies in the ICT sector operate in a software development environment with a share of 56.19 percent. These are followed by software and hardware distribution enterprises. The average structure of these firms is around 11 employees managed by 2 supervisors. A control group with this kind of span is characteristic of conservative, obsolete firms. Their performance on the market is divided into two groups of older companies (around twenty years old) and newer ones (less than ten years old). In addition to the basic characteristics, some closer analysis was introduced.

One answer to the main hypotheses of this master thesis came out of the empirical analysis. Companies were asked if there are any indicators that could characterize their success, and here the response was quite positive. They indicated both financial and non-financial indicators such as earnings and revenue value, divisible profits, number of customers, company publicity, active R&D, and participation on large projects.

Such identification led to the possibility of modeling the success rate among the sample of answers. The ratio of earnings per employee as the first indicators of a company's success was chosen from the studied literature. Secondly, based on results from the descriptive section, the average returns value is quite significant. Finally, the gravity of R&D is the last model to have been constructed.

The first model logically depends, for the most part, on the historical value of earnings and expected decline in employee expenditures. The upside for this success rate is that the company is able to cover its expenditures on operations from either

previous sales or from domestic investments. On the downside, bank loans discriminate against the success valuation.

The second model is based on the total costs in an observed period. If an enterprise does not regard revenues as important, it has a negative influence on the model. If not, it is considered to be an unintended effect. Similarly, young directing managers do not contribute to revenue performance positively.

The last prediction concerning the magnitude of research and development in a company is determined by which ICT sphere said company operates in. The most favored companies are from the hardware-development sphere. It is also dependent on historical R&D investments and divisible earnings.

The rationale of individual models is than discussed in the result interpreting section, where the proper specifications of answers on the stated hypotheses are presented.

Overall, results from this analysis could be used in consultancy as well as in banking. Those institutions would then be able to identify enterprises which tend to perform better on the Czech market. Via such analysis, they would be able to maintain a rationale-supported attitude in different situations. In addition to this, models on the success rate of ICT companies would be appropriate to be used by the government, because these processes might enhance possibilities of financing individual projects and spheres. All the above-mentioned models could then serve as starting points for wider research among ICT companies to be enhanced by a wider range of observations, and thus help this recently stagnating sector to show its real importance.

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Appendix

1 List of economic activities in ICT sector (CZ-NACE classification)

The activities (industries) in the ICT sector can be grouped into the following four main categories: ICT manufacturing industries, ICT trade industries and ICT services industries. ICT sector involves all businesses whose dominating activities belong to the CZ-NACE groups as follows:

ICT manufacturing industries:

- Manufacture of electronic components and boards (26.1)
- Manufacture of computers and peripheral equipment (26.2)
- Manufacture of communication equipment (26.3)
- Manufacture of consumer electronics and media (26.4 and 26.8)

ICT trade industries (ICT wholesale):

- Wholesale of information and communication equipment (46.5)

Telecommunications:

- Wired telecommunications activities (61.1)
- Wireless telecommunications activities (61.2)
- Satellite and other telecommunications activities (61.3 and 61.9)

IT services industries:

- Software publishing; Computer programming, consultancy and related activities (58.2 and 62.0)
- Data processing, hosting and related activities; web portals (63.1)
- Repair of computers and communication equipment (95.1)

Source: ČSÚ: Information economy in figures 2012

2 Tables for ICT sector comparison

Table 1. ICT sector active enterprises (quantities)

	2005	2006	2007	2008	2009	2010	2011
ICT total	28 379	28 815	30 544	31 780	33 288	33 058	32 443
SME in ICT	28 325	28 761	30 477	31 708	33 220	32 992	32 369
Large	54	54	67	72	68	66	74

Table 2. Legal personalities employed in ICT

	2005	2006	2007	2008	2009	2010	2011
Employed in ICT	116 669,52	123 930,97	135 847,27	147 916,33	141 067,75	138 596,38	140 592,30
SME in ICT	72 784,61	77 544,79	81 032,60	86 710,31	85 134,20	86 429,25	84 230,01
per one SME	2,57	2,70	2,66	2,73	2,56	2,62	2,60

Table 3. R&D expenses in ICT sector (CZK mill.)

	2005	2006	2007	2008	2009	2010	2011
ICT R&D costs total	3 380,58	3 781,67	4 176,95	4 713,61	4 288,09	4 790,23	5 643,41
ICT SME R&D costs	2 084,60	2 078,58	2 487,11	3 018,49	2 949,96	3 223,06	3 344,72
large enterprises ICT	1 295,98	1 703,08	1 689,84	1 695,12	1 338,13	1 567,17	2 298,68
per one SME in ICT	0,07	0,07	0,08	0,10	0,09	0,10	0,10
per company in ICT	0,12	0,13	0,14	0,15	0,13	0,14	0,17
percentage from SME reve	0,89%	0,83%	1,00%	1,23%	1,25%	1,24%	1,33%

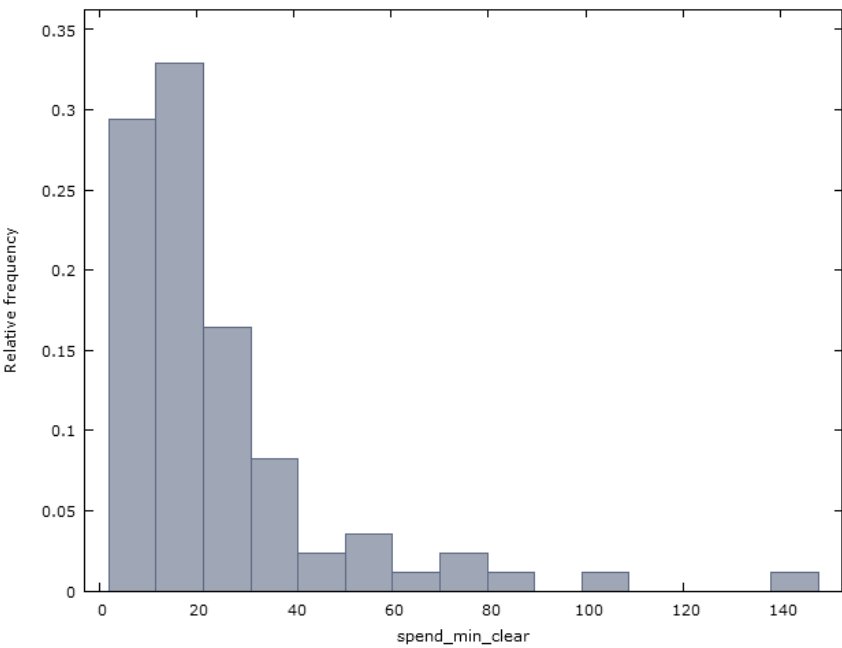
Table 4. Value added in ICT sector (CZK mill.)

	2005	2006	2007	2008	2009	2010	2011
value added total	254 284,89	279 535,79	283 713,73	287 882,46	268 718,70	281 817,62	287 743,58
ICT SME value added	159 365,13	165 087,00	159 317,48	159 882,45	151 022,36	167 229,17	163 879,24
large ICT	94 919,77	114 448,80	124 396,25	128 000,01	117 696,34	114 588,46	123 864,34
per one SME in ICT	5,63	5,74	5,23	5,04	4,55	5,07	5,06
per company in ICT	8,96	9,70	9,29	9,06	8,07	8,52	8,87

Table. 5 Production consumption in ICT (CZK mill.)

	2005	2006	2007	2008	2009	2010	2011
ICT sector	277 525,92	315 229,80	369 756,97	386 931,02	359 786,37	382 704,61	361 774,52
ICT SME	75 438,28	84 998,53	88 407,12	85 380,23	85 429,16	91 768,25	87 797,59
large ICT	202 087,64	230 231,27	281 349,85	301 550,79	274 357,21	290 936,36	273 976,93
per one SME in ICT	2,66	2,96	2,90	2,69	2,57	2,78	2,71
per company in ICT	9,78	10,94	12,11	12,18	10,81	11,58	11,15

3 Figure - distribution of time spend on questionnaire



Frequency distribution for spend_min_clear, obs 1-105
number of bins = 15, mean = 24.8367, sd = 22.818

interval	midpt	frequency	rel.	cum.	
< 11.661	6.8000	25	29.41%	29.41%	*****
11.661 - 21.384	16.523	28	32.94%	62.35%	*****
21.384 - 31.107	26.245	14	16.47%	78.82%	*****
31.107 - 40.829	35.968	7	8.24%	87.06%	**
40.829 - 50.552	45.690	2	2.35%	89.41%	
50.552 - 60.274	55.413	3	3.53%	92.94%	*
60.274 - 69.997	65.136	1	1.18%	94.12%	
69.997 - 79.720	74.858	2	2.35%	96.47%	
79.720 - 89.442	84.581	1	1.18%	97.65%	
89.442 - 99.165	94.304	0	0.00%	97.65%	
99.165 - 108.89	104.03	1	1.18%	98.82%	
108.89 - 118.61	113.75	0	0.00%	98.82%	
118.61 - 128.33	123.47	0	0.00%	98.82%	
128.33 - 138.06	133.19	0	0.00%	98.82%	
>= 138.06	142.92	1	1.18%	100.00%	

Missing observations = 20 (19.05%)

4 Transcription of individual questions in the questionnaire

Part 1 - Basic information

Information from this part will help to categorize an enterprise into the correct analyzed category.

1. Name of the company (optional)
2. Identification number of company (optional)
3. Into which category would you categorize the main subject of business of your company?

Software development

Hardware development

SW Distribution

HW Distribution

Other (fill in)

4. What is the owner structure of your company? (Possible to choose more)

Legal personality CZ

Legal personalities (more than 1 owners) CZ

Legal entity CZ

Legal entities (more than 1 owner) CZ

Foreign owner

Other (fill in)

5. How many employees do you employ?
6. How many employees are on the managerial function?

Part 2 - Financial indicators

Financial indicators are one of a few units that can be easily quantified, and which could be precisely analyzed, this it is important to calculate with them in the analysis. Please, fill your calculations even if their look up could be time demanding.

7. Financial indicators* (in thousands CZK per year 2010, 2011, 2012)
(Fill in amounts)

Revenues from services and product sales

Marketing costs

R&D costs

Employee training costs

Total costs

Earnings

* Projection is sufficient

8. Expectations. What development in following items do you expect in given year? (2013, 2014)

(Pick one of these: Considerable growth, Growth, Stay, Drop, Considerable drop)

In revenues from services and product sales

In marketing costs

In R&D costs

In employee training costs

In total costs

In earnings

9. What are the main financial resources of company's operations?

Domestic investments

Foreign investments

Earnings from previous years

Bank loans

Financial subsidies, grants

Other (fill in)

10. What is the share of equity on enterprise liabilities? (In % 0 - 100)

11. Do you share company's earnings with employees?

Yes x No

12. What do you consider as a relevant financial indicator of success?

Rate: 10 – the most important, 0 – does not have any significance

Earnings

Turnover per year

Divisible profit from business

Comparative advantage gained from R&D investments

Other (fill in)

Part 3 - Non-financial indicators

Finally, it is important to get information about company's non-financial indicators, which could come up with significant value for the whole analysis.

13. What is the age of enterprise?

14. How many inhabitants have a city that the company operates in?
(Residence is headquarters.)

+1 000 000

1 000 000 - 500 000

500 000 - 200 000

200 000 - 50 000

50 000 -

15. Is the owner of the company also a part of management?

Yes x No

15b. In case that the owner is not in the management, does he/she actively participate on company's usual processes?

Yes x No

16. Into which age category does the CEO belong?

18 - 25

26 - 30

31 - 35

36 - 45

46 - 55

56 - 65

66 +

17. What is the highest obtained education level of the CEO?

Basic

High

Academic 1st degree level (Mgr., Ing., Bc., ...)

Academic 2nd degree level (CSc., Ph.D., ...)

18. On what types of markets does the company operate on? (fill in % 0 – 100)

Regional domestic market

Domestic market (Czech market)

Market of EU

Global market

19. Did the company obtain some of the special honors? (If yes, which one?)

Yes x No

20. In what aspects do you see the company's competitive advantage?

Fill in the key words (e.g. original product, exclusive supplier, personal approach ...)

21. Is it possible that the company will walk through a proprietary change in the nearest future (like 5 years)

Yes x No

22. What variable do you consider as an important factor of success?

Rate: 10 – significantly important, 0 – has no value

Active R&D

Publicly known company

Large projects

Age of a company

Headquarters in big city

Profitable sale of company in future

Operating on global market

Many customers

Other (fill in)

23. What represents the main distribution channel of company?

The internet

Small business (Retail)

Wholesale

Direct contact with a customer

Other (fill in)

24. How many customers did the company had in following years?

(Fill in number for: 2010, 2011, and 2012)

25. How many direct competitors did the company have in following years?

(Fill in number for: 2010, 2011, and 2012)

26. What is the expecting number of customers in this year (2013) (pick one)

Growing by more than 5%

Growing less than 5%

The same

Decreasing by less than 5%

Decreasing by more than 5%

27. Did your company ever gain a special development grant? (Start-up subsidies, EU subsidies, government subsidies ...)

Yes (If yes, which one?) x No

28. If the company obtained such a grant, what did it mean to it?

Essential financial injection

Help with the company development

Fractional benefit on company's operations

Other (fill in)

29. What represents the main barriers of company development?

Rate: 10 – significantly important, 0 – has no value

High competition

Low competition

Lack of original services or products

Innovation costs

Political situation

Insufficient education of employees or their qualification

Low demand for services or products

Low global demand for services or products

Employee expenses

Technical equipment

R&D costs

Lack of finances

Taxes and fees

Other (fill in)

30. How actual are the documents about the enterprise in the business register?

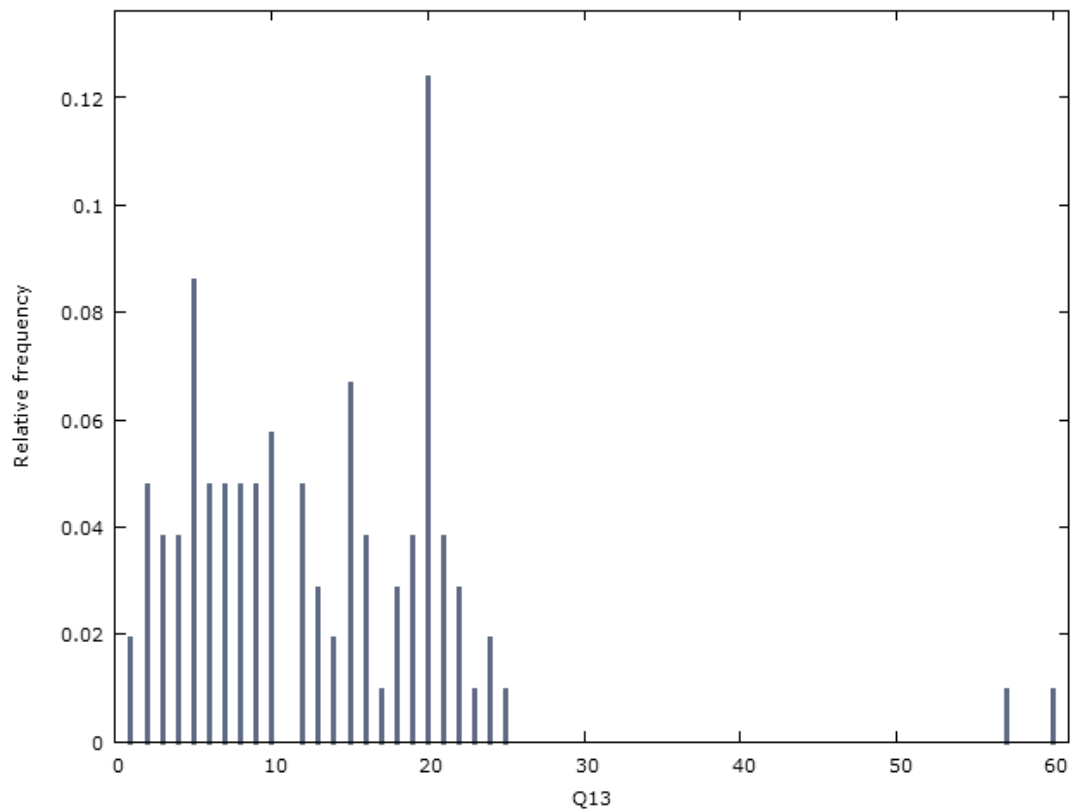
Documents are periodically uploaded and always actual

We upload necessary documents only if needed

We publish only obligatory information about enterprise

We do not publish any information or documents

5 Age distribution of companies in the sample



Frequency distribution for Q13, obs 1-105

	frequency	rel.	cum.
1	2	1.90%	1.90%
2	5	4.76%	6.67% *
3	4	3.81%	10.48% *
4	4	3.81%	14.29% *
5	9	8.57%	22.86% ***
6	5	4.76%	27.62% *
7	5	4.76%	32.38% *
8	5	4.76%	37.14% *
9	5	4.76%	41.90% *
10	6	5.71%	47.62% **
12	5	4.76%	52.38% *
13	3	2.86%	55.24% *
14	2	1.90%	57.14%
15	7	6.67%	63.81% **
16	4	3.81%	67.62% *
17	1	0.95%	68.57%
18	3	2.86%	71.43% *
19	4	3.81%	75.24% *
20	13	12.38%	87.62% ****
21	4	3.81%	91.43% *
22	3	2.86%	94.29% *
23	1	0.95%	95.24%
24	2	1.90%	97.14%
25	1	0.95%	98.10%
57	1	0.95%	99.05%
60	1	0.95%	100.00%

6 Customers and competition development among companies

Table 1. Distribution of customers in 2011 and 2012

	2011	2012
Increase	45.71%	49.52%
Stay	31.43%	22.86%
Decrease	22.86%	27.62%

Table 2. Distribution of direct competition in 2011 and 2012

	2011	2012
Increase	23.81%	20.00%
Stay	68.57%	73.33%
Decrease	7.62%	6.67%

Table 3. Distribution of expected growth of customers in 2013

	2013
Increase more than by 5%	35.24%
Increase less than by 5%	19.05%
Stay the same	32.38%
Decrease less than by 5%	8.57%
Decrease more than by 5%	4.76%

7 Old and younger companies expectations distribution

Table 1. Distribution of younger companies expectations

		Considerable growth	Growth	Stay the same	Drop	Considerable drop
2013	Revenues	5.71%	27.62%	15.24%	5.71%	0.95%
2013	Marketing costs	3.81%	16.19%	30.48%	4.76%	0.00%
2013	R&D costs	1.90%	9.52%	38.10%	5.71%	0.00%
2013	Employee training costs	0.00%	11.43%	40.95%	2.86%	0.00%
2013	Total costs	1.90%	22.86%	22.86%	7.62%	0.00%
2013	Earnings	4.76%	27.62%	17.14%	4.76%	0.95%
2014	Revenues	4.76%	27.62%	14.29%	8.57%	0.00%
2014	Marketing costs	3.81%	9.52%	35.24%	6.67%	0.00%
2014	R&D costs	0.95%	11.43%	37.14%	3.81%	1.90%
2014	Employee training costs	0.00%	12.38%	38.10%	2.86%	1.90%
2014	Total costs	1.90%	23.81%	20.95%	8.57%	0.00%
2014	Earnings	2.86%	28.57%	12.38%	11.43%	0.00%

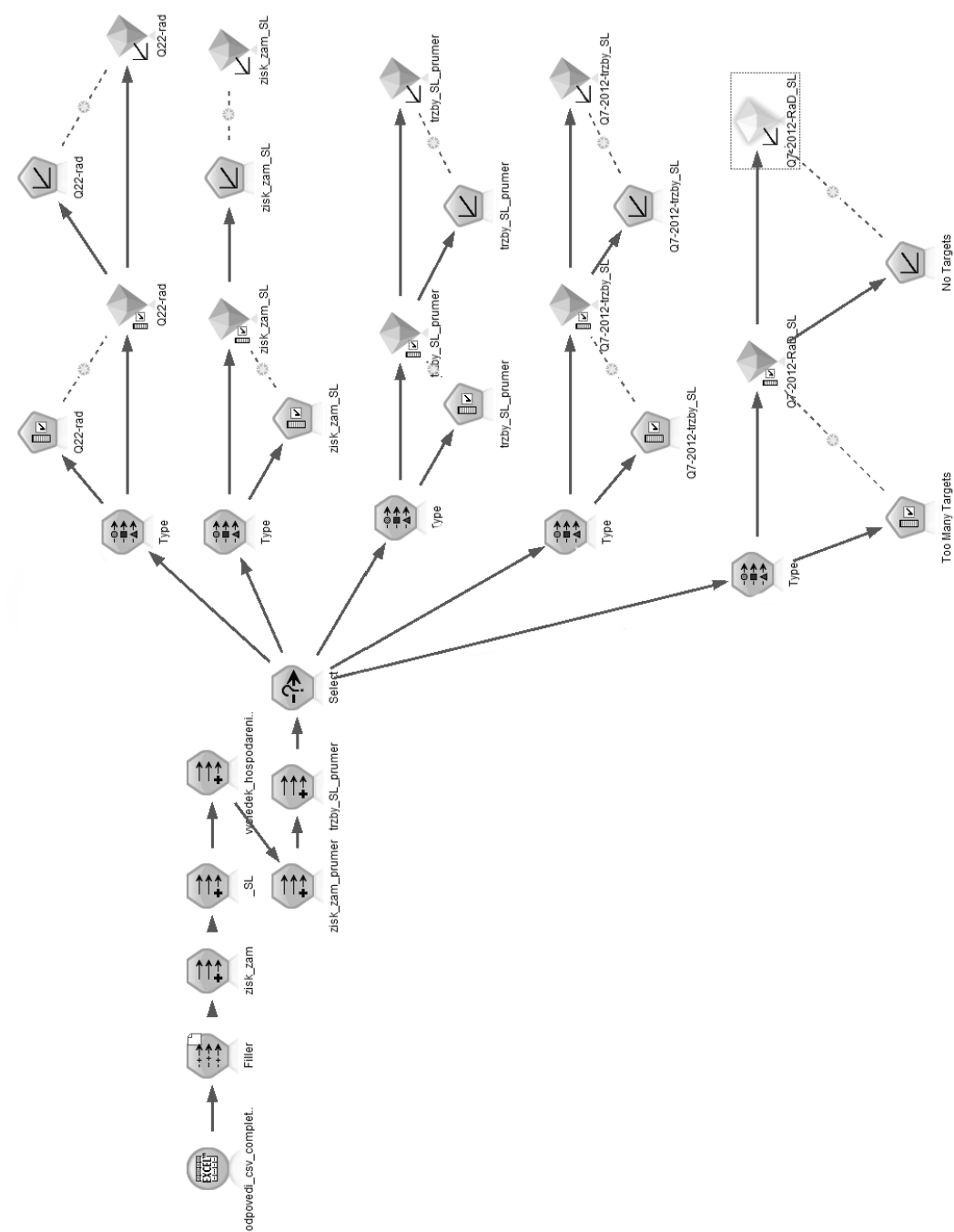
Table 2. Distribution of older companies expectations

		Considerable growth	Growth	Stay the same	Drop	Considerable drop
2013	Revenues	1.90%	16.19%	16.19%	10.48%	0.00%
2013	Marketing costs	0.00%	6.67%	31.43%	6.67%	0.00%
2013	R&D costs	0.00%	8.57%	32.38%	3.81%	0.00%
2013	Employee training costs	0.00%	5.71%	33.33%	5.71%	0.00%
2013	Total costs	0.00%	15.24%	20.95%	8.57%	0.00%
2013	Earnings	1.90%	12.38%	20.00%	9.52%	0.95%
2014	Revenues	0.00%	10.48%	16.19%	15.24%	2.86%
2014	Marketing costs	0.00%	4.76%	32.38%	7.62%	0.00%
2014	R&D costs	0.00%	5.71%	31.43%	5.71%	1.90%
2014	Employee training costs	0.00%	2.86%	32.38%	7.62%	1.90%
2014	Total costs	0.00%	10.48%	20.00%	14.29%	0.00%
2014	Earnings	0.00%	11.43%	17.14%	15.24%	0.95%

8 Main barriers of ICT SME development distribution

	0	1	2	3	4	5	6	7	8	9	10
High competition	21,9%	1,0%	2,9%	5,7%	1,9%	16,2%	3,8%	6,7%	14,3%	5,7%	20,0%
Low competition	72,4%	6,7%	4,8%	4,8%	1,9%	7,6%	0,0%	0,0%	1,0%	0,0%	1,0%
Lack of original services or products	46,7%	2,9%	4,8%	5,7%	2,9%	13,3%	5,7%	5,7%	6,7%	2,9%	2,9%
Innovation costs	37,1%	1,0%	8,6%	4,8%	5,7%	21,9%	5,7%	2,9%	6,7%	1,0%	4,8%
Political situation	42,9%	4,8%	2,9%	3,8%	2,9%	13,3%	1,9%	2,9%	10,5%	1,0%	13,3%
Lack of education or qualification	48,6%	1,9%	8,6%	9,5%	5,7%	14,3%	1,9%	3,8%	1,9%	0,0%	3,8%
Low demand for services or products	27,6%	3,8%	2,9%	5,7%	3,8%	20,0%	7,6%	10,5%	11,4%	1,0%	5,7%
Low global demand for services or products	43,8%	3,8%	1,9%	3,8%	7,6%	11,4%	8,6%	3,8%	6,7%	2,9%	5,7%
Expenses on employees	31,4%	0,0%	4,8%	6,7%	3,8%	16,2%	8,6%	2,9%	14,3%	2,9%	8,6%
Technical equipment	29,5%	4,8%	16,2%	12,4%	5,7%	13,3%	6,7%	5,7%	2,9%	0,0%	2,9%
R&D costs	31,4%	4,8%	12,4%	13,3%	5,7%	11,4%	0,0%	8,6%	4,8%	5,7%	1,9%
Lack of finances	28,6%	1,9%	1,9%	15,2%	1,9%	16,2%	5,7%	3,8%	8,6%	2,9%	13,3%
Taxes and fees	21,0%	1,9%	4,8%	6,7%	3,8%	17,1%	7,6%	7,6%	7,6%	4,8%	17,1%

10 Illustration of nod process in forming used models



11 Model results illustrations

Figure 1. Predictor importance of Earnings per employee model

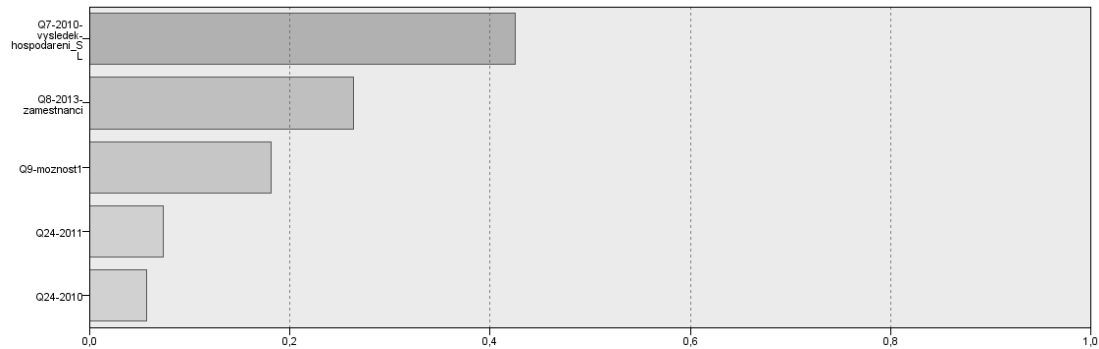


Figure 2. Studentized residuals distribution of Earnings per employee model

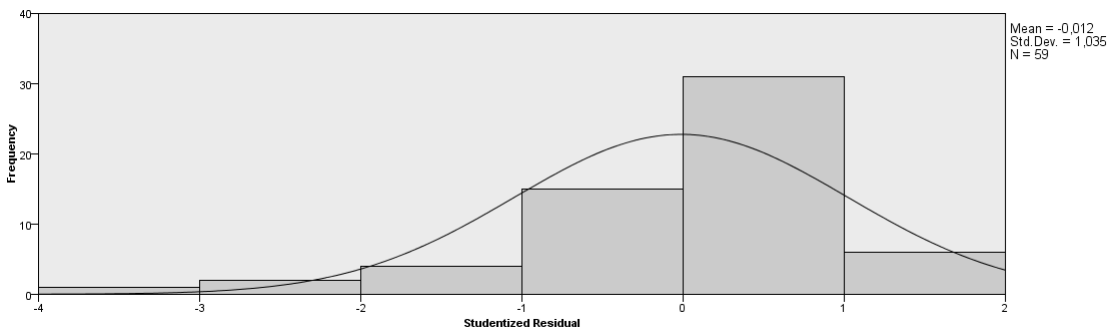


Table 1. Coefficients analysis of Earnings per employee model

Model Term	Coefficient ▼	Std.Error	t	Sig.	95% Confidence Interval		Importance
					Lower	Upper	
Intercept	0,123	0,832	0,148	,883	-1,548	1,794	
Q7-2010-vysledek-hospodareni_SL	0,282	0,062	4,565	,000	0,158	0,405	0,426
Q8-2013-zamestnanci=2	-1,257	0,567	-2,216	,031	-2,397	-0,118	0,264
Q8-2013-zamestnanci=3	-0,039	0,518	-0,075	,940	-1,080	1,002	0,264
Q8-2013-zamestnanci=4	0,000 ^a						0,264
Q9-moznost1=1	0,870	0,672	1,294	,202	-0,480	2,220	0,181
Q9-moznost1=3	1,326	0,673	1,970	,054	-0,026	2,679	0,181
Q9-moznost1=4	-0,278	0,980	-0,283	,778	-2,246	1,690	0,181
Q9-moznost1=5	0,000 ^a						0,181
Q24-2011	-0,002	0,001	-1,897	,064	-0,004	0,000	0,073
Q24-2010	0,002	0,001	1,665	,102	-0,001	0,005	0,057

^aThis coefficient is set to zero because it is redundant.

Figure 3. Predictor importance of Average revenues model

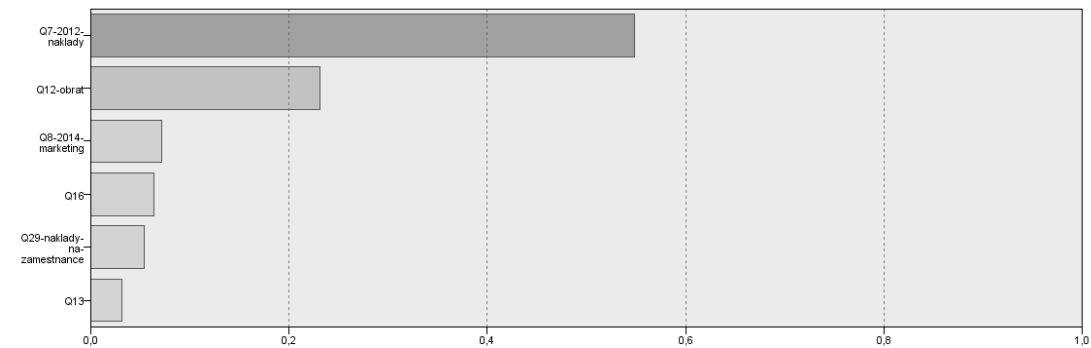


Figure 4. Studentized residuals distribution of Average revenues model

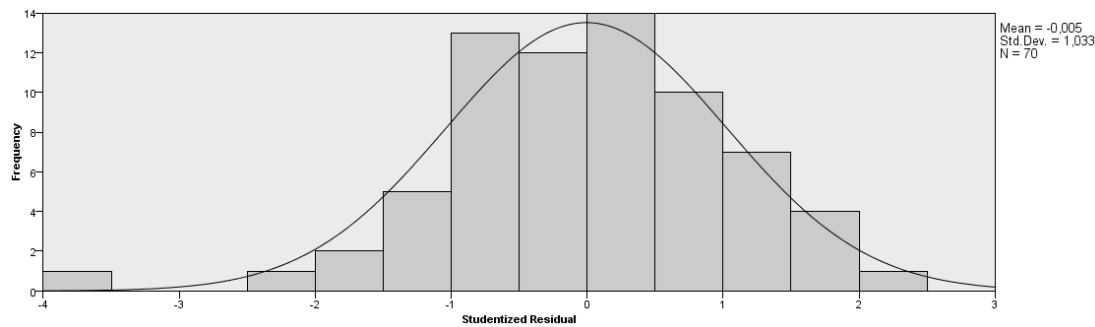


Table 2. Coefficients analysis of Average revenues model

Model Term	Coefficient ▼	Std.Error	t	Sig.	95% Confidence Interval		Importance
					Lower	Upper	
Intercept	2,926	0,233	12,532	,000	2,459	3,393	
Q7-2012-naklady_transformed	0,000	0,000	6,926	,000	0,000	0,000	0,549
Q12-obrat_transformed=0	-1,332	0,349	-3,817	,000	-2,030	-0,634	0,231
Q12-obrat_transformed=1	0,174	0,263	0,662	,511	-0,352	0,700	0,231
Q12-obrat_transformed=2	-0,866	0,353	-2,457	,017	-1,572	-0,161	0,231
Q12-obrat_transformed=3	0,000 ^a						0,231
Q8-2014-marketing_transformed=0	-0,907	0,363	-2,501	,015	-1,633	-0,181	0,071
Q8-2014-marketing_transformed=1	0,000 ^a						0,071
Q16_transformed=0	-0,920	0,397	-2,321	,024	-1,714	-0,127	0,064
Q16_transformed=1	-0,208	0,165	-1,257	,214	-0,538	0,123	0,064
Q16_transformed=2	0,000 ^a						0,064
Q29-naklady-na-zamestnance_transformed	0,045	0,021	2,169	,034	0,004	0,087	0,054
Q13_transformed	0,019	0,011	1,660	,102	-0,004	0,042	0,031

^aThis coefficient is set to zero because it is redundant.

Figure 5. Predictor importance of Revenues model

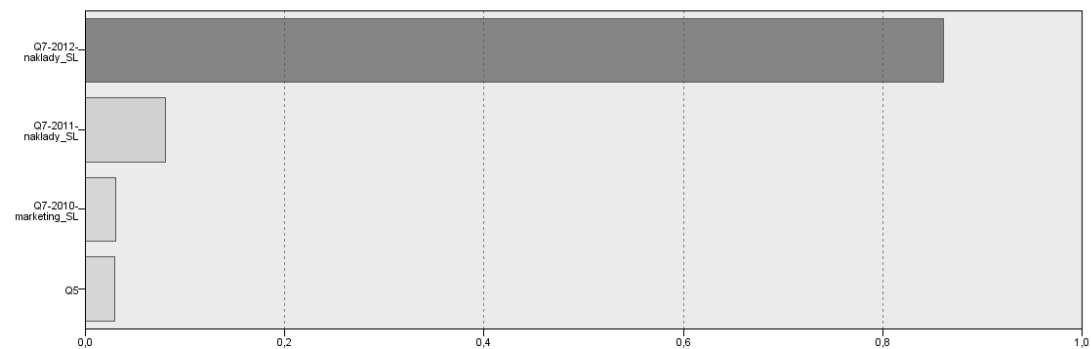


Figure 6. Studentized residuals distribution of Revenues model

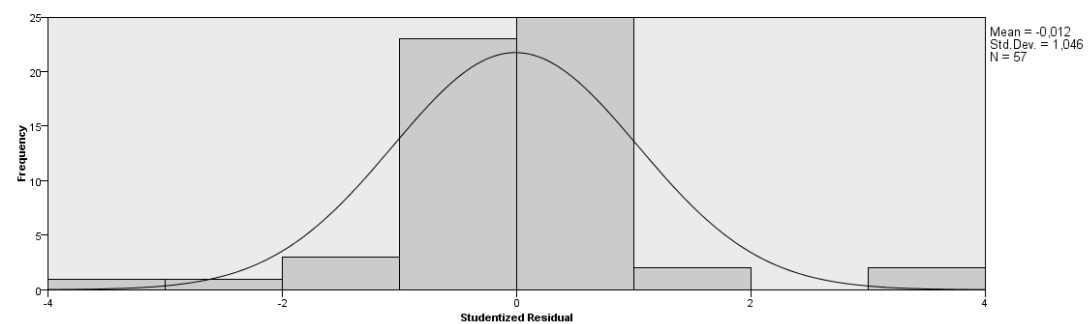


Table 3. Coefficients analysis of Revenues model

Model Term	Coefficient ▼	Std.Error	t	Sig.	95% Confidence Interval		Importance
					Lower	Upper	
Intercept	1,227	0,224	5,482	,000	0,778	1,676	
Q7-2012-naklady_SL	0,941	0,104	9,061	,000	0,732	1,149	0,861
Q7-2011-naklady_SL	-0,331	0,120	-2,761	,008	-0,571	-0,090	0,080
Q7-2010-marketing_SL	0,122	0,072	1,687	,098	-0,023	0,267	0,030
Q5	0,007	0,004	1,674	,100	-0,001	0,016	0,029

Figure 7. Predictor importance of R&D importance model

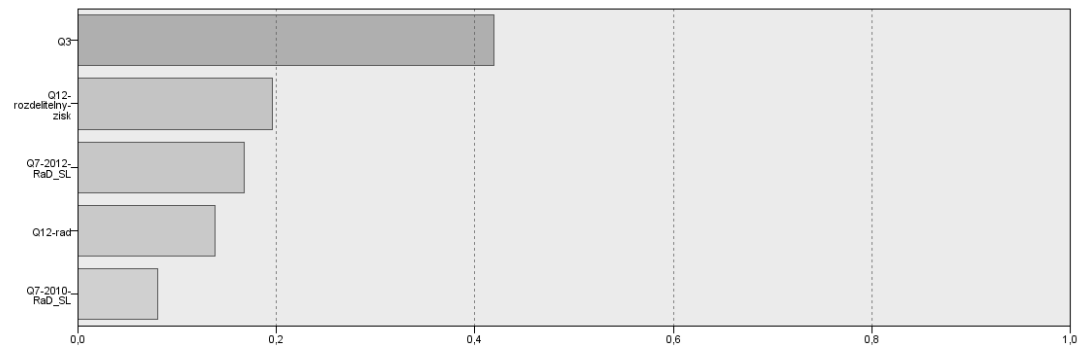


Figure 8. Studentized residuals distribution of R&D importance model

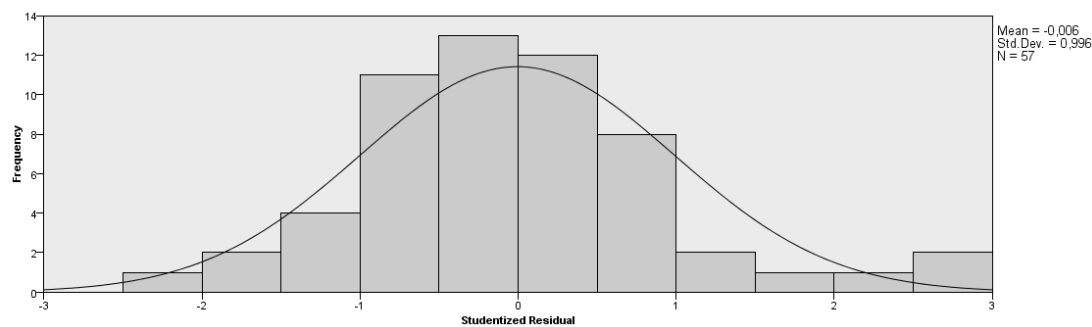


Table 4. Coefficients analysis of R&D importance model

Model Term	Coefficient ▼	Std.Error	t	Sig.	95% Confidence Interval		Importance
					Lower	Upper	
Intercept	-1,032	0,816	-1,265	,212	-2,672	0,608	
Q3=1	3,122	0,836	3,733	,000	1,441	4,802	0,420
Q3=2	6,518	1,505	4,331	,000	3,494	9,542	0,420
Q3=3	2,448	1,002	2,444	,018	0,435	4,461	0,420
Q3=4	0,000 ^a						0,420
Q12-rozdelitelny-zisk	0,307	0,095	3,243	,002	0,117	0,497	0,195
Q7-2012-RaD_SL	2,435	0,812	2,999	,004	0,803	4,066	0,167
Q12-rad	0,306	0,112	2,722	,009	0,080	0,532	0,138
Q7-2010-RaD_SL	-1,700	0,819	-2,075	,043	-3,346	-0,053	0,080

^aThis coefficient is set to zero because it is redundant.

Figure 9. Predictor importance of R&D investments model

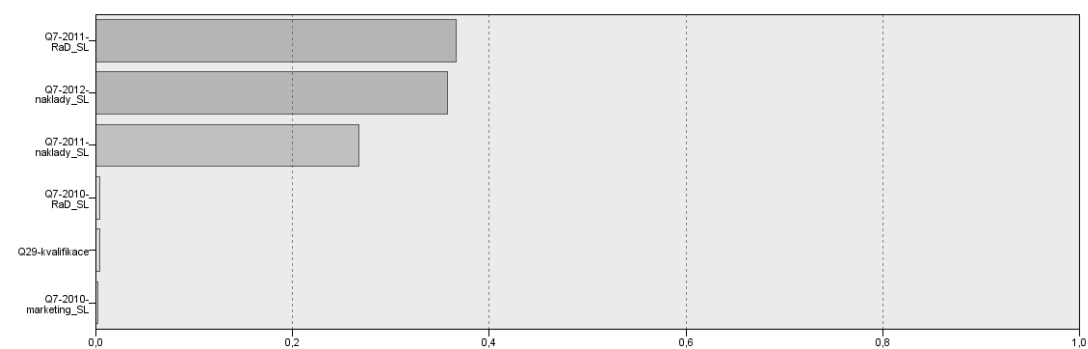


Figure 10. Studentized residuals distribution of R&D investments model

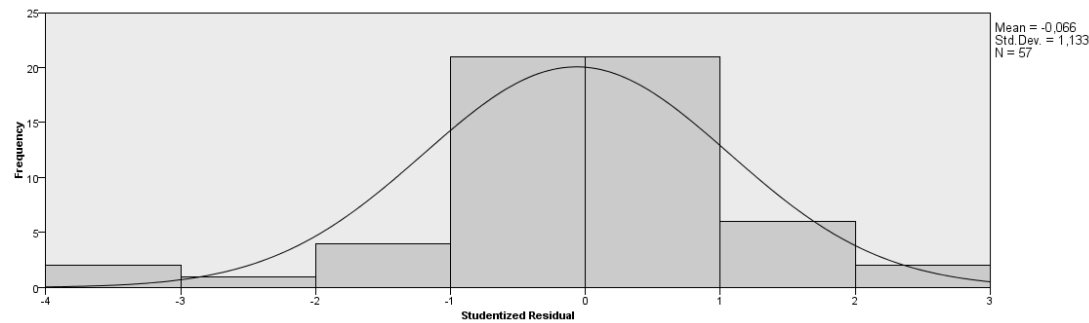


Table 5. Coefficients analysis of R&D investments model

Model Term	Coefficient ▼	Std.Error	t	Sig.	95% Confidence Interval		Importance
					Lower	Upper	
Intercept	0,014	0,043	0,333	,741	-0,072	0,101	
Q7-2011-RaD_SL	1,102	0,049	22,441	,000	1,003	1,200	0,366
Q7-2012-naklady_SL	0,472	0,021	22,185	,000	0,429	0,515	0,358
Q7-2011-naklady_SL	-0,474	0,025	-19,182	,000	-0,523	-0,424	0,267
Q7-2010-RaD_SL	-0,108	0,049	-2,201	,032	-0,207	-0,009	0,004
Q29-kvalifikace	0,011	0,005	2,200	,032	0,001	0,021	0,004
Q7-2010-marketing_SL	-0,025	0,016	-1,577	,121	-0,056	0,007	0,002

Figure 11. Predictor importance of Customer amount model

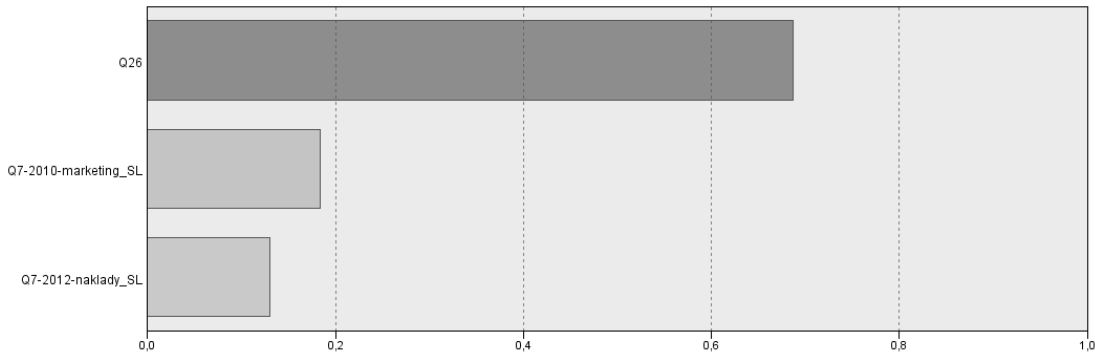


Figure 12. Studentized residuals distribution of Customer amount model

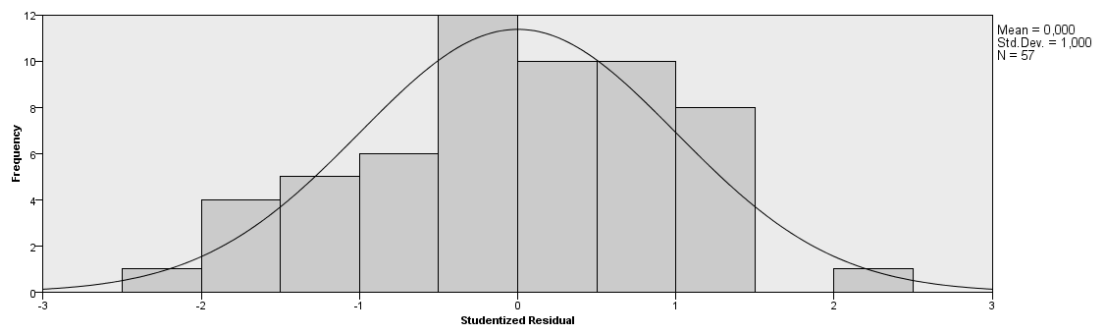


Table 6. Coefficients analysis of Customer amount model

Model Term	Coefficient ▼	Std.Error	t	Sig.	95% Confidence Interval		Importance
					Lower	Upper	
Intercept	0,836	0,374	2,234	,030	0,084	1,588	
Q26=1	-0,347	0,362	-0,958	,343	-1,074	0,380	0,687
Q26=2	0,662	0,369	1,793	,079	-0,079	1,403	0,687
Q26=3	-0,332	0,365	-0,910	,367	-1,065	0,401	0,687
Q26=4	0,178	0,393	0,452	,653	-0,611	0,967	0,687
Q26=5	0,000 ^a						0,687
Q7-2010-marketing_SL	0,237	0,084	2,836	,007	0,069	0,405	0,183
Q7-2012-naklady_SL	0,190	0,080	2,389	,021	0,030	0,350	0,130

^aThis coefficient is set to zero because it is redundant.