

Czech University of Life Sciences Prague

Faculty of Economics and Management

Department of Management



Diploma Thesis

Identification of IT startup investment strategy

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CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

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DIPLOMA THESIS ASSIGNMENT

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Economics and Management

Thesis title

Identification of IT startup investment strategy

Objectives of thesis

The aim of the thesis is to assess the influence of an investment strategy on the future development of startups.

Methodology

The theoretical part of the thesis provides an overview of key terms, basic ideas, different opinions and facts connected to startups. The Russian venture market is also briefly reviewed to provide an insight to the topic.

The practical part of the thesis is based on the analysis of historical developments on Russian venture markets, identification of conditions of startup funding and assessment various investment strategies on the future development of startups. Based on the analysis future development of Russian venture market is forecasted and appropriate strategies for startup funding are identified.

The proposed extent of the thesis

60-80 pages

Keywords

startup, funding, Russian venture market

Recommended information sources

DRUCKER, P. Innovation and Entrepreneurship, L, Routledge, 2014

KOHLER, T., Corporate accelerators: Building bridges between corporations and startups, Business Horizons, Vol. 59, Issue 3, May–June 2016,

RIES, E. The Lean Start-up: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. 1st edition, New York: Crown Business, 2011

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Declaration

I declare that I have worked on my diploma thesis titled “Identification of IT startup investment strategy” by myself and I have used only the sources mentioned at the end of the thesis. As the author of the diploma thesis, I declare that the thesis does not break copyrights of any third person.

In Prague on 31st March 2018

Viktoriiia Bubentsova

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Identification of IT startup investment strategy

Summary:

This research is focusing on the main conditions of investments as influential factors, which define the future success of IT startups. Stage and sum of investments are also evaluated according to their contribution to the resulting price of sale in case of exit. The startup investment deals on the Russian venture market were selected as a basis of this research. The data about the investments made from 2008 to 2017 were primarily taken from the database RUSBASE. The aim of diploma thesis is to check and reveal the degree of influence these factors have and to propose the preferable conditions for success of the venture. The study gives recommendations developed on the basis of research results in the most beneficial funding strategy for future IT startup development in the Russian venture market.

Key words: Startup, investments, venture market, startup development, investment strategy, stages of startup, parameters of startup funding, startups in IT industry, exit cases.

Identifikace IT startupové investiční strategie

Souhrn:

Tento výzkum se zaměřuje na hlavní podmínky investic jako na významné faktory, které definují budoucí úspěch začínajících IT. Etapa a součet investic jsou také hodnoceny podle jejich podílu na výsledné ceně prodeje v případě výstupu. Zahájené investiční obchody na ruském trhu s rizikem byly vybrány jako základ výzkumu. Údaje o investicích uskutečněných od roku 2008 do roku 2017 byly převzaty především z databáze RUSBASE. Cílem diplomové práce je zkontrolovat a odhalit míru vlivu těchto faktorů a navrhnout přednostní podmínky pro úspěch. Studie uvádí doporučení vypracovaná na základě výsledků výzkumu v nejužitečnější strategii financování budoucího rozvoje startování IT na ruském trhu rizik.

Klíčová slova: začínající podnikání (startup), investice, trh s rizikem, vývoj startování, investiční strategie, fáze začínajícího podnikání, parametry startovacího financování, začínající podniky v oblasti IT, výstupní případy.

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1 Introduction

In a modern world of information technologies, the result of all advancements and changes affects not only people and their lives but also the speed and character of business processes. Such a famous phenomenon as startups is mostly developed and topical in the context of IT and internet business.

Active modernization of Russian economy provided the trend of IT startups' development as well as in the world economy. There is also observed an enhanced growth of venture capital investments. In 2012, Russia entered the top five leaders in investing in IT-development.

IT startups are newly emerged entrepreneurial ventures, fast-growing businesses that aim to meet a marketplace need by developing or offering an innovative product, process or service in IT industry. Founders of each new startup strive to invent new ways of capitalization and scaling. However, the statistics of successful startups is not so inspiring. There are a lot of failures for different reasons.

The initial phase of launching a startup is the basis for its further development and the choice of tools, funding strategy and direction of development can be crucial and really decisive in a highly competitive environment.

Primary sources that were used in the research are statistical data about the state and tendencies of Russian venture market, IT infrastructure, IT industry and IT market in Russia and in the world.

The object of research is the IT startups invested and/or purchased on the Russian venture market.

The subject of research is the choice of IT startup investment strategy in accordance with current conditions and future prospects of the Russian venture market.

In world practice, management of innovative entrepreneurship was examined by P. F. Drucker, R. Cantillon, F. von Hayek, J. A. Schumpeter, J. -B., Say, F. Walker and others.

The problem of startup funding and investment is being discussed more often nowadays and more and more attention is paid to it. There are such prominent authors as Eric Ries with his methodology of lean startup, Guy Kawasaki, who writes about the launch of startups and pays attention to principles of startup's development, careful identification of fundraising methods and Steve Blank, who proposes scientific approaches to the definition of "startup", its evaluation and general management. However, the level of scientific knowledge of such phenomena as startups and tools of increasing its efficiency and investing effectiveness is not very high.

Brief content.

The literature review is focused on the theoretical foundations of startup development in relation to certain funding stages and factors defining future survival and success of IT startups.

The analytical part provides comprehensive analysis of the Russian venture market state and size, IT startup infrastructure in the Russian Federation, estimation of the successful startups' past experience and analysis of the sample, which is further used for modeling.

In the practical part there was conducted an econometric modeling of the IT startups exit cases with investment history, recommendations for the beneficial investment strategy of IT startups were developed and the preferable strategy of IT startup funding was formulated.

2 Objectives of the thesis and methodology

2.1 Objectives of the thesis

The aim of diploma thesis is to evaluate the influence of the investment conditions (stage and sum) and reveal the most beneficial funding strategy for future IT startup development in the Russian venture market.

Objectives:

- to study the theoretical foundations of the IT startup development, funding stages and factors defining future success;
- to conduct a comprehensive analysis of the Russian venture market and IT startup infrastructure;
- evaluate the perspective directions for improvement;
- create an econometric model of the IT startups exit cases;
- formulate the preferable strategy (based on past experience, internal and external influential factors).

Research questions are the following:

How do parameters of funding influence the future success of IT startup development in the Russian venture market?

What investment scheme is more preferable for the future survival of IT startups in the Russian venture market?

The hypothesis of this work is that there are differences in IT startups future success depending on the stage of their investments and there is a possibility to propose a preferable investment strategy in the Russian venture market.

2.2 Research methodology of the preferable startup investment strategy

Methodology of research is the following:

1. Collection of historical data (2008-2017) of IT startup investments and purchases on the Russian venture market (sums/prices and stages of development when companies were funded or purchased). Selected time period is explained by the fact that 2008 is the first year of rise of the Russian venture market in terms of startup investments. In addition, the information for previous years is extremely limited and includes only occasional bargains, lacking declared sums and especially the information for different rounds of investments.

Limitations of the data base (RUSBASE):

- Not all sums of investments and purchases are declared, some of them are under non-disclosure agreements;
- Sometimes, not all investments for particular company may be included in the database;
- It is impossible to identify the presence or absence of previous financing at the Pre-seed stage.

2. Search and identification of the outcome for each case of investments by the manual checking of current companies' development, presence in the market. This can be done through the Internet because of the IT sphere projects' specifics, and all active companies can be identified by the state of their websites and other activities on the Internet.

3. Statistical characterization of data (using SAS and MS Excel) and revelation of investment patterns on the basis of results.

4. SWOT analysis of the Russian IT startups infrastructure.

5. Econometric modelling (multiple linear regression with dummy variables, using SPSS) of the IT startups exit cases with investment history. This model is supposed to reveal the presence or absence of the influence of previous investments, their sums and structure on the resulting sum of purchases (exit cases).

The research presented in this Diploma Thesis is nonrecurring, selective, factual, machine-aided. And it was done with application of the following methods: sector analysis, classification analysis and comparison of investment stages and conditions of funding, regression analysis.

Construction of multiple linear regression model is different from the process of simple linear regression modelling. There are several regressors in multiple linear regression model (x_1, x_2, \dots, x_n) and not only the equation and the elements of this model are different from simple regression but also its interpretation takes another form. The equations of fitted regression line for multiple regression is presented in formula 1:

$$y = b_1 + b_2x_1 + b_3x_2. \quad (1)$$

The true regression line for multiple regression model is usually unknown. However, this line can be estimated by the coefficients b for an observed data set. The multiple linear regression model for quantitative data will be constructed using the following form:

$$y = \beta_1 + \beta_2x_1 + \beta_3x_2 + u, \quad (2)$$

where β_1, β_2 and β_3 are multiple regression coefficients that can be obtained if all the variables are brought to the mean of 0 and standard deviation of 1. It means that the magnitude of β -coefficients allows to compare the relative contribution of each independent variable to the dependent variable. Parameter u is the standard error of estimate that can be described as the standard deviation of the sampling distribution (most commonly of the mean) (Dougherty,2011).

In other words, standard error depicts the dispersion of sample means around the population mean. B.S. Everitt defines it as error made by using the equation of a regression line to estimate the values of the dependent variable from those of the independent variable.

For the model with qualitative data the multiple linear regression model will take the form, presented in formula 3:

$$y = a + \gamma_1 D_1 + \gamma_2 D_2 + u \quad (3)$$

where y is dependent variable,

a – the free, constant element (regression coefficient) of the regression equation;

γ_1, γ_2 – the coefficient that shows the significance of excluded variable in comparison with D_1 and D_2 respectively;

D_1, D_2 – the dummy variables in the form of coded qualitative factors;

u – the standard error of the estimate.

This model can be built only for comparison of significance between categorical variables. For that the comparison category should be chosen and left outside of the model in order to check the hypothesis. Afterwards, it is needed to code each of other categories and create dummy variables (D) for them (Skrivanek, 2009).

Estimation and testing of the models and their equations, checking of several hypotheses and revealing of the significance of each model and their parameters are necessary. The F-test which is the analysis of variance will be used to assess whether the expected values of a quantitative variable within several pre-defined groups differ from each other. P-value is an important indicator of significance within a statistical hypothesis test. The p-value is used as an alternative to rejection points to provide the smallest level of significance at which the null hypothesis would be rejected. T-statistics will be used to test the significance of each factor of the regression model. It can be described as a ratio of the deviation of an estimated parameter from its notional value and its standard error (Kennedy, 2008).

All these tests will give a clear understanding of the quality of constructed models, help to make the description and interpretation of results. The technical tools that will be used in calculations for econometric modelling are MS Excel and SPSS programs.

3 Literature Review

3.1 Theoretical foundations of the startup development, funding stages and factors defining future success

3.1.1 Startup theory and development process

The exact definition of a “startup” is widely debated and a huge amount of different terms and attempts to define a “startup” from one or another point of view proves it. The most popular and often quoted are Steven Blank’s and Eric Ries’s definitions.

According to Steven Blank, startup is an organization formed to search for a repeatable and scalable business model (Shontell, 2014). This Stanford professor’s definition simply and fully reflects the main characteristic of startup (the search which includes uncertainty) and its purpose (working, productive, “repeatable and scalable” business model).

Eric Ries, an entrepreneur and author of the New York Times bestseller *The Lean Startup*, defines startup as a human institution designed to deliver a new product or service under conditions of extreme uncertainty (Ries, 2011). In other words, startup is an entrepreneurial venture which is typically a newly emerged, fast-growing business that aims to meet a marketplace need by developing or offering an innovative product, process or service.

Startups are businesses that are typically technology oriented and have high growth potential. That is why IT startups are popular, and at the stage of active development. Members of startup team are usually forgoing stability in exchange for the promise of tremendous growth and the excitement of making immediate impact (Robehmed, 2013).

The initial phase of launching a startup is the basis for further development of firm and the choice of tools, approach and direction of development can be crucial and really decisive in terms of highly competitive environment. It is very important to reveal influential factors that really contribute to the outcome of a new venture in IT-industry and to be invested on time with a right amount is one of the most important of these factors.

Now, it is also necessary to realize the process of startup development. In general, the development of a startup can be divided into four stages. In some sources, scientists also use more detailed structuring and describe five or six stages. For the purposes and in the scope of this Diploma thesis work, the author combined several approaches to make a review of the startup development milestones.

The first stage is the stage of idea. It is also the stage of concept development. It implies the process transformation of a business idea into an executable business plan. This is the very

beginning of the business lifecycle, it starts even before startup is officially in existence (Petch, 2016).

This initial stage is usually done by one or more of the startup founders for no salary. It is necessary to access the degree of startup viability at this stage of development (Robehmed, 2013). The focus here should be market research and gathering data that will allow the startup founders to aim the new business startup at a differentiated market niche where resistance to market entry will be the lowest or where the new venture will be able to compete by particular advantages and sales can be achieved most easily. Founders consider the feasibility of their business idea, and also ask themselves if they have what it takes to make it a success.

The second stage of a launch (or a startup itself) begins the transition of the company into a legal entity with product development, patent filing and/or, as soon as possible thereafter, a real customer. Once the business idea is tested, it is time to make it official and launch a startup. This step is believed to be risky, partly because the mistakes made at this stage impact the company's future, and are the primary reason why 25% of startups do not reach their fifth birthday (Petch, 2016).

The first shift in management style is needed to begin following a plan, and dealing with other complexities that start to build with the product development efforts. It is not likely that company has formulated and working competitive advantage yet, as founders are still experimenting with what the market and customers want, how much they will pay for it and how to get to the customer for an efficient sales and marketing plan and process that can generate a profit (StartUpPort).

The funding "stage" is not a separate one and it is not an allocated part of the startup development process because it can start while the business is moving through any the other stages and stop when it is not needed any more. For example, it can start when it is clear there is an established revenue and/or customer base, or even earlier, depending on the sources of funding and founders' success in searching then (Blank and Dorf, 2012).

At this point the business is arguably sustainable with a proven value proposition to customers, pricing and both sales and operations processes that work, albeit not necessarily very efficiently (Oranburg, 2016). The business is likely not yet profitable (otherwise, the financing would not probably be needed), but there is a clear path to profitability with fewer unknowns and, as usually happens, substantial risks. There is still a lot to improve and many processes to optimize, and the management is usually still stretched too far executing, instead of managing (Startup Professionals Inc.).

At the stage of growth and establishment the business is scaled. A venture is already generating a consistent income and regularly taking on new customers. Cash flow should start to

improve as recurring revenues help to cover ongoing expenses, and profits are expected to improve slowly and steadily.

Time must be divided between a whole new range of demands requiring founders' attention – managing increasing levels of revenue, attending to customers, dealing with the competition, accommodating an expanding workforce and other important things. Hiring smart people with complementary skillsets is necessary to make the most of the company's potential during this phase, and so any good founder will be spending a lot of time directly involved in the recruitment process (Petch, 2016).

When there comes a time for **expansion stage**, all the operations are clear and even routine and companies are starting capitalizing on this certain level of stability by broadening their horizons with expanded offerings and entry into new markets. Businesses in this stage often see rapid growth in both revenue and cash flow. However, there are always several risks, connected with expanding too carelessly. It is necessary to take into account available resources, be realistic about the effort and cost and potential returns, and always keep an expert eye on how expansion might impact the current quality of service, which company provides to existing customers.

Another important thing is that having a successful business model is not a guarantee that it will work for other markets, or that new offerings will result in the same success. It is crucial for founders to do their best to secure the company for all eventualities. It is achieved when the company has defined a business model that works and realized its key competence and competitive advantages. At this stage company expands this model to address the large opportunity, outside the local geography, nationally, or globally (Shontell, 2014). During this management style and focus must be changed again.

When a company starts to see stable profits annually, it moves to the **maturity stage**. While some companies continue to grow the top line at a decent pace, others struggle to enjoy those same high growth rates. It could be said that entrepreneurs here are faced with two choices: push for further expansion, or exit the business. In case of startup business cycle terminology, the exit case is the same as closing the company.

Many founders at this stage also look to move their company on through a sale. This could be a partial or full sale, and depending on the company type (public or private), negotiations might become a new challenge.

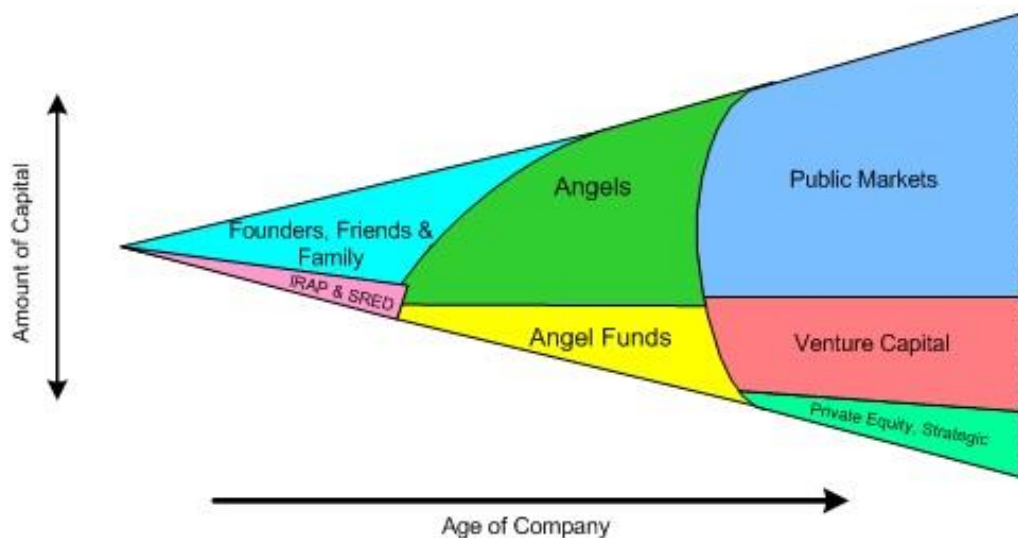
3.1.2 Sources of startup funding

Over 90% of successful IT companies are financed in a similar way, moving through the funding process:

1. Startup funding (from Friends and Family investors or Self-funding);
2. Angel Investors and Angel Funds;
3. Venture Capital or Public Venture Capital (Angel Investor report).

This sequence of steps provides a clear example of progress and evolution, which is connected with the development and natural growth of a company. This dependence and interconnection of investment stages with company's age is demonstrated in figure 1.

Figure 1 – The interconnection of the amount of invested capital and the age of the company



Source: Angel Investor Report. Startup Funding - Sources and Sequence. [online]. Available at http://www.angelblog.net/Startup_Funding_Sources_of_Financing.html

It should be taken into account that the age is a relative measure here, because some companies are able to move through this funnel much faster than others and achieve better results within the same time period. Therefore, the “age” must be viewed in terms of the degree of company's maturity. These stages of startup funding will be described in the next chapter.

3.1.2.1 Self-Financing

Self-funding (also called bootstrapping) from personal savings of founders is preferred most often because there is no need to search for investors and waste time and energy to make them interested. Founders that can finance their ideas by themselves are more independent and can have total control of their venture, without the need to report to external investors (Zwilling, Top 10 Sources Of Funding, 2010).

It is, therefore, the most popular source of funding to start a business. Many people get the start-up money they need by mortgaging their houses or selling property. It can be even an option for those who do succeed in getting a start-up business loan (Ward, 2016).

3.1.2.2 Family, friends and fans/fools

As most ventures are invested with the money of founders and the stage of idea, only some of them may never require further shareholder investment. The profits are usually re-invested to fund additional working capital as the business expands, however, funds for expansion are often limited as the founding team usually exhaust their personal savings and in some cases they can even lack resources to move to the stage with first profit. To keep the enterprise going and to fund the next stage of development, founders can address their family and friends.

There are also fans (or fools) usually added to this source. According to Tom McKaskill, “fans or fools are investors who throw their money in on the off chance that it might make a return, but generally don’t risk very much and have low expectations of getting the money back”.

However, while family, friends and fans may not have the same ROI requirements as an Angel, investment from family and friends (close money) has its own issues. Before proceeding to invest, the Investor must be satisfied on the following issues:

- Issue of decision-making (Will the family, friends and fools interfere in the negotiation for the investment, the management of the company or the decision on the exit strategy?);
- Issue of participation and trust (Do the family and friends who helped start and grow the company form part of a management team? Is there a mutual trust (especially from the side of investor) to expect managers to grow the business and achieve its potential?) (McKaskill, 2009).

3.1.2.3 Crowdfunding

A crowdfunding campaign can be an option and this source is rapidly becoming the major source of funding for seed-stage startups. According to recent statistics, there are already over 500 website crowdfunding platforms, available; and over \$5 billion was raised this way last year (Zwilling, 7 Seed-Stage Funding Sources, 2015).

There are two models of crowdfunding. One of them is **traditional** crowdfunding model operated by such companies like Kickstarter (online platform) is known as reward crowdfunding, allowing people to pre-purchase goods and services, in exchange for select rewards.

Another model is **equity** crowdfunding and it allows individuals to invest small amounts of capital in exchange for a small share in equity. Some of such equity crowdfunding platforms allow anyone the chance to invest. Others are based on the principle of the expert experience and crowd-sourced funding combination, providing opportunity to contribute to angel or VC-lead rounds. As a result, it turns into a **hybrid** funding model (Law, 2017).

3.1.2.4 Angel financing

Angel investing is a type of equity financing. In return for an individual investing in a company, such investors take a percentage of ownership in it.

According to Brian S. Cohen and John Kador, “an angel investor is an individual who, using his or her own money, provides early stage startup capital to a new business and expects a percentage of ownership equity in return with the expectation of a sale or exit (Cohen and Kador, 2013).”

The definition given by Tom McKaskill is wider and claims that Angel investors (business angels) are high net-worth, non-institutional, private equity investors who have the desire and sufficiently high net worth to invest part of their assets in high-risk, high-return entrepreneurial ventures in return for a share of voting, income and capital gain (McKaskill, 2009).

For startups looking for \$25,000 to \$250,000, angel networks can become useful. Networking is critical for this source and it is necessary to address angels who understand the industry and share the interest and passion of founders in their field (Zwilling, Top 10 Sources Of Funding, 2010).

There is a new term “super angel” and it is applied to angels who invest their own money in a portfolio of startups (20 or more) and are willing to lead multiple rounds, usually starting with a seed round. For example, Ron Conway, of SV Angels, and Reid Hoffman, LinkedIn’s founder, are names often mentioned in this category (Zwilling, 7 Seed-Stage Funding Sources, 2015).

Angel investing dropped during the recession but is making somewhat of a comeback. Angel investors:

- provide either start-up or second-tier financing for small businesses;
- typically don't make really large investments so their percentage of ownership may not be large;
- they are often interested in having input in how the company is operated (Peavler, 2016).

There are general sources where startup founders may be able to find angel investors to help finance a startup. There are such networks as www.AngelSoft.net working for angels and investment seekers.

3.1.2.5 Venture capital

The term Venture Capital (VC) is used to refer to the form of private equity most often raised by emerging enterprises, that is, those seeking funds from business Angels or Venture

Capital Funds to develop their business concept or to support the initial growth phase (McKaskill, 2009).

Venture capital is not designed for earlier stages and it is preferable for startup, which already needs more than \$1 million. VCs take their part of equity and control. It is also rather slow process and companies usually spend at least six months searching for and closing the deal (Zwilling, Top 10 Sources Of Funding, 2010).

Micro venture capital firms, by definition, are firms that invest institutional money (meaning other people's money) in projects that are at the seed stage or are too small to attract the attention of more traditional venture capitalists. A new venture capital seed market has been emerging, especially over the past five years. Over the past several years, one of the most significant trends in venture market has been the rise of micro VCs (Zwilling, 7 Seed-Stage Funding Sources, 2015).

Venture capital firms and angel groups have moved to later stages in the financing process because their evaluation and investment processes are poorly suited to making small investments at low valuations. As a result, the demand for early stage investments is growing much faster than the supply of pre-seed stage financing. Their slow decision making processes and large amounts of capital are making it difficult for them to deploy money at the pre-seed stage (Shane, 2017).

3.1.2.6 Private equity

Private equity is mostly connected with medium-term and even long-term funding in exchange for a share of capital of the particular company. Investment is made into projects with potential for value creation and steepest growth of market share. There are various forms of independent private equity:

- Angels typically provide finance for very immature ventures;
- Formal Venture Capital funds tend to undertake deals in the business expansion to late stage of venture development;
- The Large Private Equity funds invest in mature businesses which are undertaking a reorganization through a management buyout or are aiming for a public listing.

In some markets the term venture capital refers to any independent private equity investment, especially from investment funds, while in others the term refers to different types of investments. In more established markets, such as the USA, Venture Capital refers to seed, early stage and some expansion capital, while Private Equity normally refers to late stage, mezzanine, buy out and management buy-out or leveraged larger scale investments. Collectively the term

Private Equity (PE) can be used to cover all forms of independent investments (McKaskill, 2009).

3.1.2.7 Other opportunities

There are much more different opportunities for startup funding and founders should choose among them depending on the needs and conditions.

1) **Small business grants** can provide support even at the stage of idea and be helpful and stimulating for the startup team.

2) **Loans or lines of credit** from banks can be used, for example, if a company needs only a temporary or small infusion of cash. However, commercial banks are often do not give loans to startups unless founders have personal collateral at risk. Lending institutions and investors usually expect the person starting a business to make a personal financial commitment (Zwilling, Martin, Top 10 Sources Of Funding, 2010).

3) **Business accelerators** like YCombinator and TechStars, (AddVenture and IIDF, in Russia), are sometimes able to help startups looking for seed-stage funding. Most accelerators provide small seed investment in the range of \$25,000, as well as mentoring, workspace and professional services, in exchange for an equity stake in the company, providing support, if it starts growing. Accelerator offers a specific program to startups for a fixed period of time, usually 90 days to four months.

4) **Startup incubators** support new ventures during the idea stage, providing access to the infrastructure and environment required for developing a Minimum Viable Product, (resources, laboratories, office space, consulting, cash, marketing) usually, with no offer of funding (and no expectation of equity in return) (Law, 2017). Startup seed funding incubators tend to be more open-ended, than accelerators and can collaborate with their participants from a few months to several years. Sometimes they provide similar small seed investments, similar to those of accelerators (Zwilling, Top 10 Sources Of Funding, 2010).

5) **Corporate seed funds for startups**. A lot of mature companies, including Intel, Google and FedEx, offer seed funding to promising startups working on innovative technologies which might be good acquisition candidates later (Zwilling, 7 Seed-Stage Funding Sources, 2015).

6) **Bartering**. Exchanging goods or services as a substitute for cash can help to create an initial budget. Martin Zwilling, an American business executive, entrepreneur, and author, gives an example of trading free office space by agreeing to be the property manager for the owner. He also proposes to use this technique with legal, accounting and engineering services (Zwilling, Top 10 Sources Of Funding, 2010).

7) **Partnership.** A more established company may have a strategic interest in helping to develop a new product and be willing to advance funding to make it happen or to work in partnership on a joint project (Zwilling, Top 10 Sources Of Funding, 2010).

8) Finally, there is a possibility to **commit the funding to a major customer.** Some customers would be willing to cover startup's development costs in order to be able to buy their product before the rest of the world can. Their advantage: control over production process (to make sure it meets their requirements) and the promise of dedicated support. Even large companies look to their best customers to fund new projects (Zwilling, Five Smart Exit Strategies, 2011).

3.1.3 Stages of startup financing

3.1.3.1 Pre-Seed Investments

A pre-Seed round of financing is for early stage product development of an idea or a concept and for this reason, the amount of money is usually relatively small (\$50 thousand - \$250 thousand range). Startup which had received funding at this level is more likely to increase its future fundraising opportunities through better testing, having an effective core team and prototype development. Funding for Pre-seed business usually comes from the 3F's (Friends, Family and Fans/Fools), such money can also come from the founders themselves or even angel investors that are interested and want to participate (Liddle, 2016).

According to the definition of Rob Go, cofounder of a seed stage investment firm focused on internet enabled innovation, at a Pre-seed early round a company is supported to achieve certain intermediate milestones prior to the combination of strong product/market fit plus meaningful traction (Go, 2016).

Some of possible milestones may be: recruiting a critical team member, creating a product that demonstrates the likelihood of product/market fit, but they are unique and different according to each special case or startup.

Pre-seed investment for founders should result in a working alpha or in an initial proof of concept stage (Liddle, 2016). It is usually characterized by light term sheet, convertible note, SAFE (Simple Agreement for Future Equity) and pre-money valuation is less than \$2 million. In case a startup gets money they can be used as a driver to get to the next stage within 12-24 months (Go, 2016).

The very idea of Pre-seed funding and its essence had been changing during the last decade. In recent years, the cost of bringing new software products to market has fallen and it influenced the early stage financing for IT companies in several ways:

1. Pre-seed investments are still very risky and investors prefer to choose at least a seed stage.
2. Evaluations of this stage have fallen, despite of the raise in the later stage valuations.
3. Pre-seed stage investors have changed the core of companies' evaluation from potential to traction, which is actual progress and certain movement towards a profit making business.
4. Accelerators and not angels are now recognized as the main source of financing for Pre-seed stage companies (Shane, 2017).

3.1.3.2 Seed Investments

This investment round is the first type of possible entering of external investors (strategic or others) to a startup. It can be viewed as a preliminary investment stage because startup founders are still working on the direction and goals of their business (Whitehouse, 2015). The main idea of external investments at this stage can be described as a general support and interest to the project. This support is aimed at creating the opportunities for a newly emerged venture to become relatively stable and start its main operational activities. Such investments may result for founders in working beta stage or a least a proof of the startup concept (Butin, 2013).

Most often, the sums of investing still represented by small sums of capital provided for further development, however, it depends on the type of company, its niche and the general investors' attitude to and evaluation of the project. Depending on these parameters, sums vary from \$500 thousand to \$2 million (Liddle, 2016).

It becomes possible for founders to attract more attention, popularity and achieve better results than at the previous stage. Seed investments are usually obtained from angels or super angles (refers to angels investing over \$1M of their private money), but a lot of venture capitalists and companies also invest seed money.

Seed investments are not always necessary as many startup founders have much of the infrastructure before seeking capital. However, it happens mostly in countries with well-developed IT-infrastructure and for Russia it is still not the case. In 2011 it had the 46th place in the Ranking of countries by the IT industry competitiveness index (BSA, Software Alliance, 2011). Sometimes this type of investment can be critical to start realizing the idea. There will not be a working prototype yet, but seed investment is supposed to provide just enough money to move from the early conceptual phase towards a product. Startup founders use it to get to the

next level of funding and for that they need to find true product/market fit, scale, growth and become a competitor in the current market place (Liddle, 2016).

Seed investment should aim to achieve one of the following:

- Product Identification: (decide on the design elements, a defined product for launch);
- Marketplace Orientation (to conduct a research of a marketplace, evaluate a competition level, define how best to sell a product or service within that niche);
- Demographic Targeting (to identify the specific demographic or target audience);
- Team Creation (to establish a working team beyond the founders of the startup, for instance, in order to bring the right expertise needed to create or launch a product) (Whitehouse, 2015).

3.1.3.3 Round A Investments

By this stage, enterprises are supposed to have clearly identified concept and idea behind their product or service. They should be already tested at the previous stage and in some cases can be already launched commercially. Series A financing tends to occur when a startup is generating strong revenue from its business model, but rarely will the business be generating net profits at this point. This round is to scale a product/market fit nationally and potentially internationally (Liddle, 2016). However, this type of investment can even be the first encountered, for instance, if the seed stage did not require outside funding. Round A investment is supposed to grow the company into a serious business. Investments at this level are viewed as institutional (Whitehouse, 2015).

This stage of development and financing correspond with a stage of growth in the startup development life cycle (Petch, 2016). Each company should set their realistic goals in accordance with the invested amount. A resulting, working business can be defined in terms of client base or revenue. At the point when a company has a prototype, they can seek funding from a venture capital group to work toward bringing the product to market.

The series A funding will be larger than the seed round (usually between \$3 and \$7 million), and can offered in exchange for a portion of the company. Startup founders prefer using series A funding to define the best business model for their company and to move the product into the actual marketplace (Forteran global, 2017). Most series A investors are venture capital funds or angel investors who are willing to accept the high levels of risk found in these early-stage company investments.

Series A investments should achieve one of the following:

- Distribution (optimizing the way that advertising is disseminated and products/services are distributed, lower overall costs, increased sales, or both);

- New markets can be opened up using this injection of capital, engaging with different demographics and furthering brand visibility in the process;
- To take a company to the next level (capital raised during this round is often used to implement a new business plan geared towards meeting defined business goals);
- To Cover a Shortfall (a startup may still be a promising investment opportunity, but unforeseen expenses can use up available funds, and so another round of investment might be required to offset this) (Whitehouse, 2015).

3.1.3.4 Round B Investment

This type of investments is usually requested by working businesses, which are already established and manage their production and advertising, and customers or users are actively purchasing an associated product or service as planned (Whitehouse, 2015). By the time startups reached series B, they have a product and a business model and need enough capital to bring the product to a broader market, to scale it even much and extend further. This represents a significant increase in the funding, from \$7 million to upwards of \$50 million (Forteran global, 2017).

Series B investments is usually aimed to achieve one of the following:

- Team Expansion (As the company grows more employees will be required for the business (pay salaries, new equipment, office space for employees to perform effectively)).
- Globalization (A startup might be selling in one or two regions, but this is often the stage where capital is needed to establish a company on the global stage).
- Acquisitions (If a startup has grown sustainably, it may be in a good position and in the need to acquire another business: a competitor, a related technology or patent could be incorporated into the company and for this purpose it can be beneficial to pursue new investment) (Whitehouse, 2015).

3.1.3.5 Round C Investment and Beyond

All the following rounds are optional and aimed mostly at a fast growth, if a company can afford such a rapid development. For such cases, with series C funding, companies might continue their actions from series B and move toward international markets or focus on diversifying their product for multiple different platforms (Griffel, 2015).

Decisions, opportunities and needs are unique and should be taken into account for each startup individually because there is no technical limit to the number of investment rounds a startup can pursue. As each investment round progresses more and more equity from the

company is released, so they are normally not entered into lightly from both investor and founder perspectives (Maeder, Paul).

Understanding the various machinations of each investment round will help a potential investor decide on the most appropriate course of action.

3.1.3.6 Mezzanine/bridge/pre-public stage

When the business model works, or is at least credible, there are two ways for further development scenarios:

- to sell the startup to a giant (Google, Facebook, Apple, etc.);
- to go public and try becoming one of the “unicorns”.

Only in this way it is possible to acquire the huge resources that the brand will need to continue growing, renewing its products, and reinventing itself constantly in order to confront a dynamic market (Prive, 2015).

After reaching this point, the company may be looking to go public, given that its products and services have found suitable traction. Funds received here can be used for activities such as:

- Mergers and acquisitions;
- Price reductions/other measures to drive out competitors;
- Financing the steps toward an initial public offering.

If all goes well, investors may sell their shares and end their engagement with the company, having made a healthy return. Many tech IPOs (Facebook, Twitter and Yelp) were only possible after years of Venture Capital funding that ensured user and revenue growth. (Goldstein, 2016).

3.1.3.7 Exit cases

The company is said to become mature when it is seeing stable profits year-on-year. While some companies continue to grow, others may opt for exit. Many companies change leadership here, bringing in a seasoned CEO who is more fit to navigate the new challenges. At this stage many companies are prepared to exit.

Exit cases for a startup happens when the original founders quit by selling their equity, the whole company or its major part, to others and leave the business. Successful exit of the firm can have at least two forms.

One is to sell the firm (by either partial or full sale):

- to another business (trade sale), usually a corporation in a similar or related field;

- to another Angel or Venture Capital Fund (secondary buy out);
- to a wealthy individual.

The second path is to list the firm on the stock exchange, an initial public offering (IPO) (Mc.Kaskill, 2009).

An initial public offering (IPO) is the first time that the stock of a private company is offered to the public. Often called a stock market launch, in practical terms this means transforming from a privately held company into a public one, selling shares to institutional investors (banks, insurers and hedge funds) who then make the shares available for purchase on the public stock exchange.

It becomes possible and preferable when a company reaches a certain size and continued growth requires a serious injection of capital: too much even for VCs to contribute. At this point some companies consider an Initial Public Offering, and transform into an organization that anyone can invest in (Law, 2017).

While IPOs were once the natural exit for tech companies after a few years of operations, the dynamic has changed towards longer tenures as private companies. VC-invested companies now tend to stay private longer. This happens because of the abundance of capital (and high valuations) in private markets, the costs of becoming (and remaining) a public company and the rise of liquidity alternatives. After the changes, in 2015 at IPO the average startup:

- is 11 years old;
- raised \$63 million during last funding rounds;
- has annual revenues of \$394 million;
- goes on to raise \$190 million from the IPO (Lange, 2015).

The initial public offering shares purchase for a startup was described by Brad Feld and Jason Mendelson as a “nice problem to have”. These authors also emphasize that actions taken pursuant to this section shall be made in accordance with all federal and state securities laws, without limitations and exceptions (Feld and Mendelson, 2012).

In fact, entrepreneurs have more options for exit or further development:

- choose further expansion (for example, with merger and/or acquisition);
- use this business as a “cash cow” (hire a manager and use a steadily remaining profit to develop the next idea);
- exit the business by liquidation and closing (Zwilling, Five Smart Exit Strategies, 2011).

But the first two are not actually the exit cases and the last is not the preferable or beneficial one.

3.1.4 Factors defining future success

The table below shows the types of characteristics which best suit an Initial Public Offering and sets the requirements for internal factors which should be managed and improved according to the company's goals. Having established such a minimal level of the listed parameters, a company may also expect proposals of its purchase and find buyers easily (if the decision is made) and according to statistics, the purchase is even more often the case.

Table 1 – Characteristics required for success at the IPO stage

№	Factor	Required level or characteristics for attractive public listing
1	Revenue	\$20 million plus (\$100 million plus - for the most successful).
2	Net profit	Profitable for three years with minimum of \$2 million in the year prior to listing. Projected profits growing over next few years.
3	Scope	National or international markets
4	Portfolio	Range of products with some in different markets
5	Potential	Major national leadership or global markets
6	Management	Majority with public corporation experience and some with experience in larger corporations
7	Board	Significant industry and public corporation experience
8	CEO	Able to deal with market analysts, institutions and shareholders
9	R&D	Products in various stages of development to ensure continued market leadership.
10	Cash	Sufficient funds to meet forecast plans without further capital raisings
11	Funds use	Funds raised to be used for market development, innovation, overseas expansion, acquisitions, working capital, repayment of debt.
12	Advantage	Clear competitive advantage based on strong intellectual property and/or proven innovative business model.
13	Public awareness	Products and their benefits are easily understood by the public.
14	Support	Listed shares are large enough in value and number in institutional and public ownership to encourage market analysts to track the stock (a market capitalization of at least \$100 million)

Source: McKaskill, Tom. Raising Angel & Venture Capital Finance - An entrepreneur's guide to securing venture finance, Breakthrough Publications, 2009.

Since few companies in private ownership can meet these requirements, an exit strategy at an IPO is not a viable option for most privately held firms. Usually, the smaller companies cannot exit through an IPO, but the table provides the best foundations for success (Mc.Kaskill, 2009, p.76).

Performance and success of any IT startup can be measured by various parameters:

- indicators of the effectiveness for the society as a whole;
- indicators of business efficiency in terms of different resources utilization;
- existence of opportunities for future scaling;

- profitability and growth speed;
- indicators of participation benefits and profit for investors;
- indicators of dividends yields from shares of the company – for shareholders, participants of the latest stages of startup development;
- performance indicators for higher level structures;
- budget efficiency – to the budgets of all levels.

It depends on the project, type of startup and its subject area, which indicator is the most important. Startup managers and founders should take all peculiarities of their startup or project and interests of all stakeholders into account.

In terms of investment factors, it is necessary to raise enough to go to the next stage. The usual rule was an investment amount that would last for 18 months. The reason is that at early stages of a startup, each year the company would undergo a serious change in its phase: from an idea or concept to a beta stage, from beta to growth, etc. (Mc.Kaskill, 2009, p.81).

However, times have changed and phases are evolving more rapidly. While the described strategy still holds true, investors now are accustomed to rapid phase changes. Companies can now show very fast growth within a very short amount of time, even within a beta stage.

Investors normally want to see a proof of the businesses growth before investing in stages and are more willing to do it if they see relevant reports. Therefore, it is imperative for founders to define the timeframes within which their startup is supposed to reach each of the phases (Butin, 2013).

3.2 Startup support and infrastructure for development

Startup communities refer to entrepreneurial ecosystems that drive innovation, new business creation, and job growth. The whole system working together forms the infrastructure with the internal environment and the external one (whose influence is significant and must be taken into account).

Startups and founders in such conditions are supported by a strong community of entrepreneurs. Entrepreneurial ecosystems include planning and programming that improves access to early-stage mentorship and executive talent, reduces barriers to accessing capital, making marketing research and analyzing their ideas and concepts, testing products. All of these support early-stage businesses physically and not only in terms of advice and direction orientation.

Moreover, through the startup infrastructure and its resources there is usually provided some help in accessing working space and equipment as companies are starting their main

operations. A strong startup ecosystem also creates opportunities for startups to engage in support programs, interact with potential clients, investors, and each other.

The joint and integrated (sometimes called “Startup City”, realized through the clusters of startup infrastructure) approach does this through:

- hosting education sessions and events dedicated to helping startups access funding, financing, talent, or digital tools;
- connecting and convening groups of businesses around common challenges such as policy development, space finding, or research and development;
- helping direct local and international attention to startup community through marketing and communications efforts.

For example, a Startup Village takes place in Russia every year. It is the largest conference of startups in Russia and is organised by the Skolkovo Foundation. It is attended by startup companies and teams from Russian regions, CIS and other countries, investors, as well as delegates from development institutions, large tech companies, business communities and students.

The Startup Village international competition of startups and investors is held in the format of the best foreign startup fairs, such as TechCrunch (US), PioneersFestival (Austria) and SLUSH (Finland). One element of the fair is that it provides an informal atmosphere that helps startup businesspeople network with investors. In the year 2014, 250 projects in four areas were selected for the Startup Village competition. 80 of them were presented within the framework of the Russian Startup Tour, which was held from 20 January to 24 April in 27 Russian cities and included about 9,000 participants (The Russian Government portal, 2014).

Accelerators and incubators usually provide the same benefits to founders. First of all, it is much easier to improve the business with provided access to investments, tools, talent of other specialists (who can even join the team), and mentorship of experienced entrepreneurs. Access to these resources can be made easier through a combination of events and programs for startups, which without such opportunities it has proved to be some of the biggest challenges startups are facing.

Industrial startup spaces are usually in high demand – including maker spaces, prototyping spaces, small-run manufacturing spaces and others. New policies and public-private partnerships are needed to bring these spaces online and it will help to lower costs of spaces for startups. All of these directions for improvement can be elaborated on the basis of well-developed IT-infrastructure, with proper support and attention from the government.

3.3 Approaches to the startup funding depending on the stage of its development

After the theoretical basis was studied and startup development and funding processes were structured, it is possible to create a step-by-step scheme with appropriate corresponding parameters and investors involved. Such a scheme was created and presented in table 2.

Table 2 – A scheme of startup development with corresponding investment rounds, typical parameters of each stage and common investors

Stage of development	Investment round	Typical funding amount, \$, mln.	Typical company valuation, \$, mln.	Common investors
Idea (concept development)	Pre-seed	<1	1-3	Friends and family, early-stage angels, startup accelerators
Launch (startup itself)	Seed	0.5-3	3-6	Angels, early-stage VCs, startup accelerators, “super” angels
Growth and establishment	Round A	3-10	10-15	Venture Capitalists (VCs)
Expansion	Round B	10-50	30-60	VCs, late-stage VCs
Maturity	Round C or Mezzanine (pre-public)	50-70 and more	100-120	Late-stage VCs, private equity firms, hedge funds, banks

Sources: Law, Ryan, Startup Funding Rounds; Liddle, Jeremy, Pre-seed, Seed and Series A funding round means what exactly?; Own combination and matching, on the basis of 3.1-3.2.

Table 2 provides an example of a startup’s growth and depicts some peculiarities of its way through the stages. It is possible to conclude that to obtain a required and need sum of investment, it must achieve certain level of valuation to be attractive for participants to prove that it has resources and power for further development and that it is not stagnating but has a tendency to grow.

One of the specialties is a clear change in stakeholders’ structure and the increase of the number of interested parties involved (because those who invested at earlier stages continue to have their shares in a company). This can lead to disagreements and make company’s management harder because it becomes necessary to take into account several opinions and interests, which can be different.

These and other difficulties and complications in startup management and development process also differ at each stage as new ones can be encountered at the sequential levels.

Apart from the external conditions, there are a lot of obstacles that should be taken into account and managed properly by the founders.

While **Seed deals** have the lowest legal costs and usually involve the least contentious negotiations, they often allow for the most potential mistakes. Given how important precedent is in future financings, if founders reach a bad outcome on a specific term, this might follow their financing path in the future, for the life of their company.

However, it is necessary to be careful with requirements, choice of and negotiations about funding conditions. If founders cannot confirm and justify the financing conditions with performance when a startup raises next round, they may find themselves in a difficult position with original investor.

If at the next round company does not get a higher valuation, it can disappoint the original shareholders – the investors who took a big risk to fund a startup during the Seed stage. They can even vote to block the new financing. This is especially true in cases with unsophisticated seed investors who were expecting that, no matter what, the next round price would be higher.

As well as with Seed deals, precedent is also important in **Early stage deals (Round A)**. The terms received in the first round with Venture Capital will be projected to all future financings. While it may not seem serious and important to agree to a participating preferred feature, given that most early stage rounds are not large dollar amounts, if founders plan to raise larger rounds later, these participation features can drastically reduce return characteristics for the common stockholders.

Later stage deals (Rounds B, C and etc.) tend to have two tough issues – board and voting control. The voting control issues in the early stage deals are amplified when each lead investor per round wants a board seat because it becomes harder for founders to keep control of their board. Either founders can increase company's board size to seven, nine, or more people (which will negatively affect its functioning), or the board can be dominated by investors.

If a startup raises subsequent rounds, its board will likely expand and in many cases the founders will lose control of the board, unless founders have worked hard to manage this earlier, in advance (Feld and Mendelson, 2012).

It is also important to realise the essence of main actions at each stage and to see how the cash flow is going and when the revenue and profit is generated by the company (the preferable, or ideal case). These main characteristics are presented in table 3 and divided by three periods according to the business model creation stages.

Table 3 – Parameters of startup development and cash flow description for each period of business model creation

Period Parameter	Search of business model		Business model growth and development	Further development	
Financing stage	Pre-Seed		Seed	Round A	Rounds B,C, etc.
Main actions	Idea and concept development	Customer discovery	Customer validation	Scaling	Growth
Possible stakeholders	Family, friends and fans, founders, government (grants)	Angel investors, Accelerators, government (grants and funds)	Super-angels, micro funds, venture funds, government (grants and funds)	Venture funds and government (grants and funds)	The same as in previous round, mostly venture funds, government
Cash flow	Negative (-)		First revenue (-)	Operational breakeven (-/+)	Profit (+)

Source: Annual report on the activities of the Internet Initiatives Development Fund 2016

The possible conclusion here is that before the Round A investment, VCs will wait to see the proof of revenue generated to ensure that startup has enough traction and opportunities for profit generation.

In early investments (Pre-seed and Seed) valuation does not matter. Each round of early investments takes between 25% to 35% of the company. The purpose is to maintain an equilibrium of power and a proper decision-making mechanism, a constitutional balance. In the next stage, round A, an investing VC may obtain 30% of the company, thus leaving the remaining partners with 17.5% each. The founders still maintain a collective 52% of the vote.

It is imperative to sustain a balance of powers for many reasons. Here are a few:

1) The entrepreneurs/founders are the heart and soul of the company and steer it with love, intuition, knowledge and vision. However, they may lack the vast experience it takes to run a growing, large scale company.

2) An investing partner brings in knowledge, talent and connections, but may get into emotional battles over the company's financial decisions.

3) It is simply unhealthy to have the same shareholders as board members and as partners throughout the growth of company, as they are often locked into a particular perspective and would do well to have the occasional fresh outsiders take.

Thus, it is not the valuation that should drive founders, but rather the basic allocation of power and the decision-making process within the company (Butin, 2013).

The valuation is the important thing to consider at the pre-public, pre-exit stage. In addition to the problems of Seed stages, closer to the exit, there are usual cases with deals that have been too good and have forced the VCs to vote for and insist on a huge exit price. The effect is that by raising money at such a high valuation, the entrepreneurs forfeited the ability to sell the company at a price they would have been satisfied with, because of the inherent valuation-creation desires of the VCs who paid such a high price (Feld and Mendelson, 2012).

4 Practical part

4.1 Comprehensive analysis of the Russian venture market and IT startups development

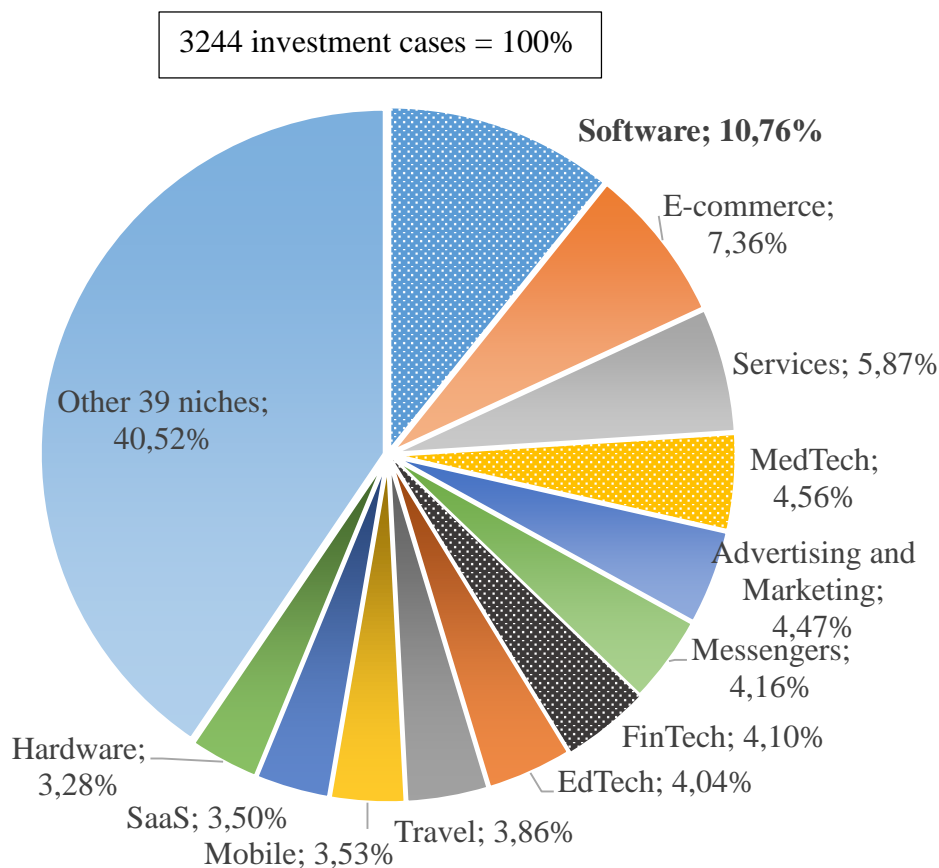
For the purposes of this diploma thesis, venture market analysis includes possible and most frequent sources of funding, stages of investments, their terms and outcomes and also the data about character and frequency of exit cases for some major sectors.

It is reasonable to examine all the stages of funding. The data for main stages and characteristics were used in analysis and the results will be presented further, but the data about investments from the very first source (Pre-seed stage) are not accessible, hard to trace and get and their relative importance in comparison with other sources and stages is much lower.

4.1.1 Analysis of the Russian venture market state

There are 52 niches in the Russian venture market for IT companies and projects. The following picture represents the structure of the Russian venture market.

Figure 2 – The structure of the Russian venture market by the number of investment cases, divided by niches, 2008-2017



Source: own computation on the basis of the database RUSBASE, 2008-2017

It is possible to assume that the niche of software is an undisputed leader on the Russian venture market in IT sphere. Almost 11% of all investment bargains were made in this segment. E-commerce lags slightly behind and its share is 7.36%. The third in the top is IT services (5.87%).

All these three directions have some distinguishing features in comparison with others. First, they are not narrow oriented and not so specific as, for example, MedTech and FinTech. Another determining factor is the increasing consumer demand for software and IT services, while e-commerce is one of the most profitable features and more and more companies are using it for work, or operate fully on its basis (online shops and virtual offices).

However, not only the number of bargains matters, but also the sums of investments and future outcomes of the startups depending on the time of support (different investment rounds). The investment patterns were analyzed and presented in table 4.

Table 4 – Analysis of investment patterns, 2008-2017

Investment stage	State	Sum,\$	Share by sum, %	Number	Share by number, %
Seed	Active	252,324,099	77.68	383	67.67
	Not active	72,502,910	22.32	183	32.33
Total		324,827,009	100	566	100
Round A	Active	3,363,693,529	94.40	359	80.94
	Not active	198,566,122	5.60	85	19.06
Total		3,563,109,651	100	446	100
Rounds B, C, etc.	Active	2,368,247,000	98.95	75	93.75
	Not active	25,080,514	1.05	5	6.25
Total		2,393,327,514	100	80	100

Source: own computation on the basis of the database RUSBASE, 2008-2017

The data about investments for all niches were put together and divided to three main investment stages. It is logical and predictable that Round A investments exceed other rounds by the total sum of investments. This is because at this round companies and their projects require larger sums of financial support, as they have tested their concepts and ready to start generating net profits and to scale a product/market fit, in comparison with Seed stage (when a newly emerged venture is only becoming relatively stable).

Comparing Round A with the following rounds, it is necessary to say that though the sums are much higher, fewer enterprises achieve this level, and it can be seen from the table, where the number of Rounds B, C investments is only 80, which is 5.5 times less than the

number of Round A investments. While, the total sum for Rounds B,C is only 1.5 times less than the total sum invested at Round A.

However, the main idea of this table is its characteristic of a sample, which allows to judge about the risk involved in investments at each stage. It is possible to assume that the investments in startups that are “not active” now, which means losses for investors (in absolute terms) are \$198,566,122 for Round A investments which is 2.7 times higher than total losses from investments at Seed stage projects. At the same time, the number of closed startups, funded at Seed stage is 183 and it is 2.2 time higher than the number of failed projects funded at Round A. The probability of failure is much higher at the very early Seed stage and it is decreasing with every following round. But, the increased sums of financing influence the “price” of failure, making it more serious and expensive for investors.

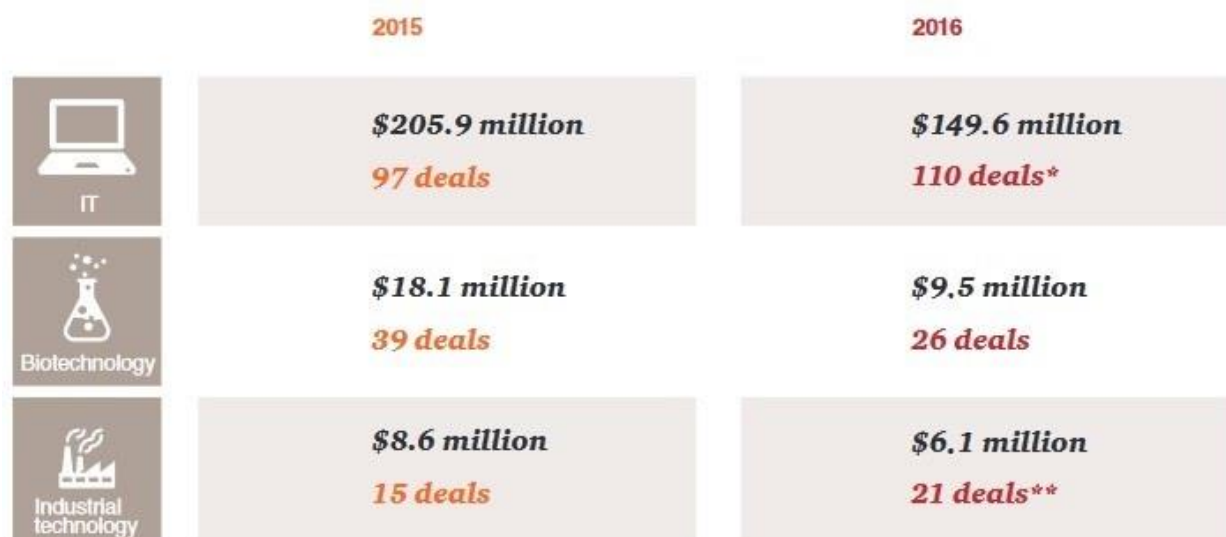
After calculation of absolute values of failure for each stage (total sums of investments in “not active” startups were divided by their total number), for Seed it is \$396,190, for Round A – \$2,336,072, and for Rounds B,C, etc. it is \$5,016,103.

Certainly, the average sum spent on investments in one failed project at Rounds B,C, etc. is twice higher than that for Round A investment. However, the share of projects “not active” later after financing at Round A is 19.06%, while for those funded at Rounds B,C, etc. it is 6.25%, which is 3 times less frequent failure. All these conclusions put together let us decide that Round A investments are the riskiest of all as the losses are almost 6 times higher (in absolute terms (\$)) for one failed project on average) than for projects invested at Seed stage and the failure happens 3 times more frequently than at later stages.

PwC and RVC presented the sixth annual overview of the venture industry in Russia “MoneyTree™: The Navigator of the Venture Market” for 2016. According to this report, the total number of venture transactions in 2016 remained at the same level (184 transactions in 2016 against 180 in 2015). At the same time, in dollar terms, the venture market decreased by 29% against the indicator for 2015 and amounted to USD 165.2 million (USD 232.6 million in 2015). The total volume of transactions in the venture ecosystem amounted to 0.41 billion US dollars, compared with 2.19 billion US dollars in 2015.

The study notes that the main reason for the decline was a decrease in the average transaction size to \$ 1.1 million, compared to \$ 1.5 million in 2015. Significant pressure on the Russian venture market in 2016 was caused by a general decline in business activity, uncertainty about the forecasts of key macroeconomic indicators and depreciation of the ruble (-10% at the average annual value of 2016 related to 2015). The sectoral structure of the market in 2016 remained unchanged, the leading role in the total volume of investments was retained by the IT sector and amounted to 90%.

Figure 3 – Venture capital deal by sectors, 2015-2016



* excluding 26 deals with an unknown value

** excluding one deal with an unknown value

Source: MoneyTree: Venture Capital Market Navigator. Overview of Russian venture capital deals in 2016

The number of deals in the IT sector has increased by 13% compared to the level of 2015. This trend is due to the growing role of IT technologies in all business areas and the willingness of investors to invest in projects related to the use of IT to improve the efficiency of business processes. Segments of biotechnologies and industrial technologies totaled about 10% of the total investment volume. The sector of industrial technologies demonstrated significant growth in 2016: from 15 to 21 transactions. In the biotechnology sector, there has been a decline both in the number of transactions (from 39 in 2015 to 26 in 2016) and the volume of attracted investments from \$ 18.1 million to \$ 9.5 million. The volume of investments in the biotechnology sector was largely formed by state funds and venture funds with state participation. The most active were the funds with the capital of RVC.

According to the report, in 2016, no major transaction worth more than \$ 100 million was made. In 2015, there were 2 such deals, the total amount was \$ 200 million a year earlier. In 2016, the number of investors' exits increased by 4 deals. At the same time, the total cost of exits decreased 13 times and amounted to \$ 120 million, compared with \$ 1,573.5 million in 2015. Also, in accordance with the survey methodology, grants are considered separately in the review. According to the results of 2016, the number of grants awarded was 4651. Traditionally, most of the grants were awarded by the Foundation for Assistance to Small Innovative Enterprises in the scientific and technical sphere (Innovation Support Fund or Bortnik Fund) - 4,075 grants worth \$ 92.3 million. The Skolkovo Foundation issued 576 grants worth \$ 29.1 million.

4.1.2 Distribution of the types of investments by IT sectors

It is reasonable that some of the IT sectors have priorities over others among venture investors. This can be explained by the different profitability and market share of various sectors and niches.

Besides, investors and investment funds usually have particular interests in some of the fields, for example, business angels investing only in FinTech or Education projects, or areas related to or potentially useful for their own businesses and its extension. There are also can be modern trends, fashion for investments or confident rise of particular sectors, after technical breakthrough or increased demand from final consumers.

Russian Capital Venture Agency publishes annual reports, presenting the data of venture investments. It is useful for this scientific work to analyse the venture investment tendencies in IT sector of the last three years more thoroughly (VC-Venture Capital and PE-Private Equity).

Table 5 – Investments by major IT sub-sectors, 2015-2016

Sub-sector	2015			2016		
	Number of deals	Total deal value, \$ mln.	Average deal size, \$ mln.	Number of deals	Total deal value, \$ mln.	Average deal size, \$ mln.
Cloud technologies, software	11	34.4	3.1	19	14.8	2.2
Financial technologies	6	9.8	1.6	9	15.0	1.7
Reference services/social media	8	43.2	5.4	7	15.0	2.1
Other services	11	2.8	0.3	16	13.9	0.9
Tourism	6	11.1	1.8	4	12.1	3.0
Telecommunications	3	3.3	1.1	4	10.9	2.7
Medical services	3	2.4	0.8	5	10.3	2.1
E-commerce	17	73.0	4.3	13	10.3	0.8
Media	1	0.2	0.2	3	6.1	2.0
Advertising technologies	2	11.0	5.5	13	4.9	0.4
Electronics and hardware	9	6.5	0.7	10	4.2	0.4
Educational services	7	4.1	0.6	4	2.9	0.7
Mobile applications	3	1.5	0.5	3	2.2	0.7
Total	87	203.3	-	110	122.6	-

Source: MoneyTree: Venture Capital Market Navigator. Overview of Russian venture capital deals in 2016

In 2016, the cloud technology and software sub-sector raised the largest share of total investments (\$ 41.8 million, or 28% of the total value), while in 2015, e-commerce was the leading IT sub-sector (with a total investment value of \$ 73 million). This change within the industry sector can be explained by the fact that e-commerce technologies are already fairly

advanced, while software, cloud technologies, data migration and related cybersecurity issues have become some of the hottest topics for business executives.

Financial technologies (FinTech) and reference services/social media share second place in terms of investment value, with each sub-sector raising \$ 15 million and accounting for 10% of the total value of investments.

In terms of the number of deals, the sub-sector of cloud technologies and software ranks first again, with 19 deals (8 more than in 2015). The e-commerce and advertising technologies sub-sectors tied for the second place with 13 each. In the sub-sector of advertising technologies, the number of deals grew substantially, from 2 to 13 deals. This supports the notion that investors are showing more interest in sectors where they can promote goods in the new era of digital business.

Tourism is the leading sub-sector in terms of the average deal size, with 4 deals worth \$ 3 million. The telecommunications sub-sector ranks second, with 4 deals worth \$ 2.7 million. The sub-sector of cloud technologies and software rounds out the top three in this category with 19 deals worth an average of \$ 2.2 million.

After that, it is also useful to evaluate the exit cases by sectors. The distribution of them is presented in table 6.

Table 6 – Distribution of number and volume of exits with participation of VC- and PE-funds by industry sectors, 2014-2016

Industry sector	Number of exits			Volume, mln. \$			Changes, % (2016/2014)		Average sum of 1 mln., \$
	2014	2015	2016	2014	2015	2016	Number	Volume	
IT	13	27	23	1675	1624	116	76.92	-93.07	54.21
Biotechnology /Medicine	4	1	1	1	0	0	-75	-100	0.17
Industrial equipment	1	6	11	0	28	475	1000	47400	27.94
Other	12	10	11	1184	275	5	-8.33	-99.58	44.36
Unknown	11	6	0	903	1	0	-100	-100	53.18
Total	41	50	46	3763	1927	595	12.20	-84.19	45.88

Source: Market review, private equity and venture investments in Russia, RVCA, yearbook, 2016, own computation

The sector of Industrial equipment demonstrated rapid growth both by the number and the volume of exit deals. This can be partly explained by the increased demand and interest to this field because of the State program of import substitution, which influences production increase. However, the exits in IT sector in 2015 and 2016 accounted for the half of all exits in the Russian venture market and it proves the significance of its position. Although there was a decrease in the volume of deals, IT sector still has the highest average sum of 1 exit case deal.

After the analysis of IT sector exits in the structure of the Russian venture market, it is possible to evaluate the most frequent and less popular ways of exits chosen by companies in the Russian venture market.

Table 7 – Distribution of number and volume of exits with participation of VC- and PE-funds by exit ways, 2014-2016

Industry sector	Number of exits			Volume, mln. \$			Changes, % (2016/2014)		Average sum of 1 mln., \$
	2014	2015	2016	2014	2015	2016	Number	Volume	
IPO	1	0	0	952	0	0	-100	-100	952
SPO	0	2	1	0	265	0	100	0	88.33
Stock trading	4	4	0	361	382	0	-100	-100	92.88
Sale to strategic investor	16	14	22	207	26	110	37.5	-46.86	6.6
Sale to financial investor	4	6	6	1640	1240	480	50	-70.73	210
MBO	5	5	5	0	0	0	0	0	0
Write-off	4	5	0	0	0	0	-100	0	0
Full/part asset sale	4	2	0	1	0	0	-100	-100	0.17
Other	0	1	9	0	0	0	800	0	0
Unknown	3	11	3	602	14	5	0	-99.17	36.53
Total	41	50	46	3763	1927	595	12.2	-84.19	45.88

Source: Market review, private equity and venture investments in Russia, RVCA, yearbook, 2016, own computation

The way of selling to the strategic investor has the leading position judging by the number of exits. At the same time, the volume of deal at such situation is rather small and the average sum of 1 exit was estimated at \$ 6.6 million. This can be partly explained by the fact that for the moment of exit strategic investors already have a large part of a company as a result of previous investments. As strategic buyers are operating companies that are often competitors, suppliers, or customers of a firm, their main goal is to identify companies whose products or services can synergistically integrate with their own ones, increasing value. Such buyers can also be looking to grow in a certain market to diversify their revenue sources. While the sale to financial investor is not as popular as the sale to strategic one, it generates voluminous deals, accounting in total for more than a half of the whole market among other exits and having the largest average sum of 1 exit – \$ 210 million. Financial buyers include private equity firms, venture capital firms, hedge funds, family offices, and high net worth individuals. So these two categories of buyers have fundamentally different goals and they are the main players in the venture market. MBOs (Management buyouts) were the third popular way of exit in the last three years. They are favored exit strategies for large corporations who wish to pursue the sale of divisions that are not part of their core business (Barber, Gold, 2007).

4.2 Startup infrastructure in the Russian Federation

Infrastructure for startups can be viewed in two different senses, depending on the view and approach. In a broad sense it includes all the facilities and supporting organisations, governmental measures and regulations that are all taken together provide a particular level of opportunities for startups to get funding, equipment, advices and mentoring and thus allows achieving easier and more effective launch.

In the narrow sense it relates to the specific hardware, software, communication in the team and its organisation for each specific startup. In this case, the universal needs are hard to formulate and meet because such type of infrastructure should be built depending on the peculiarities and goal of each particular project. It can be called “internal” startup infrastructure. For example, for storing databases there is no need in resources for mining and analyzing data, or using the application to support a data archive, performance is a far lower priority than if users are regularly accessing the application.

Different level of protection is required for data used, for example, in FinTech and Media projects. Each team should therefore decide and check if their project has appropriate security protocols. Clearly employee details or financial results must be kept under heavy encryption but your organisation is unlikely to require the same level of protection for its canteen menu or Christmas party plans, for example.

Finally, the recovery needs also can be very different and they need to be considered when building an “internal” startup infrastructure. It is important to consider not only impact to revenue but also reputational damage, for example, prioritising the recovery of a customer onboarding system over the existing accounts of current users is likely to harm in the long term (Kohler, 2016).

Having the right infrastructure is crucially important to the future of all organisations, regardless of sector or size. Ultimately, businesses run on IT and nowadays that means apps and applications – both traditional and agile. Currently, IT startups even build virtual “internal” infrastructure, but the “external” one cannot be fully substituted by IT and web services (although there are some attempts, like startup online co-working places, startup stock exchanges and a lot of online investment opportunities (micro stocks, etc.)).

Infrastructure in a broad sense relies mainly on governmental and public support and, especially speaking about production, it is very often impossible to substitute the equipped offices and small plants with social networks and even cloud storages. Besides, the trust to online investments is much lower and the number and variety of investors is usually very limited. Respectful companies and funds organize their own incubators, accelerators, conferences, meetings and hackathons rather than look for projects and startups online.

Table 8 – Incubators in Russia, 2014

Incubator	Foundation date	Opportunities	Results
Business incubator in the Academy of National Economy	2010	- a chance to meet key players and experts from different industries. - get finance to present startup products at the exhibitions, file patent and further research and development.	More than 120 startups have been connected to the incubator. Every year seven teams are selected to be residents and boost their startups.
Business incubator in Higher School of Economics	2006	Startups have opportunity to get funding from the University, help with PR and marketing, as well as take part at different exhibitions.	Every year 4 to 6 teams become residents of the incubator. However, around 50 startups get possibility to participate in different events.
Incubator “Ingria”	2008	- a space of 2400 m ² (up to 190 workspaces), a high-tech place, where teams are dealing with engineering solutions, - startups get consultations and help with such issues as, intellectual property protection, production organization, etc.	over the year more than 180 projects have been involved in the incubator’s activities. More than 40 projects resided in the incubator. Investments account to more than 64 million euros (64% - private investments, 36% - public sector).
Business incubator in Lomonosov Moscow State University	2004	The incubator is supported by the British Council and The Foundation for Assistance to Small Entreprises in Science and Technology.	Attracted investments - about 33 million euros. The market valuation of resident and graduate companies - about 67 million euros. Annually 20 projects are selected and 5 of them get further funding.
Business incubator in Plekhanov Russian University of Economics	2009	- incubator constantly collaborates with corporate private investors, industrial parks. -works with incubators of technical institutions.	Every year 40-45 projects are being developed in the incubator. 6 startups have been already launched to the market and got profitable.

Source: Startup Communities around the World: Incubators in Russia. In: Startup Commons [online]. 2014

All of the incubators are less than 20 years old and provide similar opportunities with a small amount of differences. Table 8 mostly contains university incubators and most of them are located in Moscow. Lack of progressive institutions and sufficient startup infrastructure in other regions is one of the greatest problems in Russia. This leads to uneven distribution of information technologies, their development opportunities and IT specialists. One feature that slightly soften this problem is that IT specialists are not restricted and can collaborate from different regions through a virtual environment.

Along with the changes taking place in the world, over the past few years the Russian innovative ecosystem has developed rapidly. Moreover, a variety of Russian programs not only adapted to the latest trends, but also developed their own often very successful innovation strategies. Taking into account such developments, there is nothing surprising in that the rating of startup ecosystems of 2015 by Compass company put Moscow on the 13th place among the best startup ecosystems in the world.

One of the factors that can affect the survival of the residents of the incubator is the initial quality of the projects, which then become residents. Quality largely depends on the competition for the place in the incubator and on how carefully the selection is conducted. The degree of rigor of selection is characterized, by the share of companies whose application for obtaining the status of a resident in a business incubator was successful.

Table 9 – Statistics of competition and strictness of selection in startup incubators, 2016

Incubators	Share of successful applications, %	Description
European level	11	Average innovative business-center in 2012 converted 263 applications in 28 startups.
Most successful Russian	9	Incubators in total worked on 1880 applications; 178 became residents.
Other Russian	37	Incubators in total processed 974 applications and 363 startups became their residents.

Source: Challenges and solutions: business incubators and technoparks in Russia [online]. Moscow: E&Y and RVC, 2016.

Based on the data from the survey, the following can be noted:

- Five of the most successful incubators processed over the past year, almost twice as many applications as all the others combined.

- In the most successful Russian incubators, the share of projects accepted as residents corresponds to the European level, while in other facilities this share is four times higher.

Thus, the most successful business incubators in Russia conduct a much more stringent selection of residents. The higher quality of residents positively affects the survival rate both in the process of functioning in the incubator and after its exit from it.

Russian accelerators and their conditions of participation:

1. Skolkovo Startup-Academy

Programme: the educational program, which is based on the Skolkovo management school, is designed for 10 weeks, during which startups move from idea to launch. During the training, startup teams work with mentors, business trainers and representatives of the Skolkovo community.

Conditions and prices: the cost of training is 630 thousand rubles for the course, which includes a trip to the Silicon Valley, and 420 thousand rubles without a trip to the US. In addition, when completing the application for training it is necessary to pay an application fee of 50 euros. Usually no more than 25 people, upon completion of the training are issued with the Skolkovo corporate diploma.

Experts and Mentors: among the experts of the Academy there were Russian and foreign businessmen, investors and business angels, including Steve Blank, Bob Dorf, Dmitry Plushchevsky and John Deal, but these foreign experts later switched to another Russian accelerator, LaunchGurus.

History and results: this Academy was opened in June 2012. As stated by the organization, following the results of the first year of training with the help of program, 67 people registered their companies and attracted a total of \$4 million of investments, creating 190 jobs. The total estimated value of the companies was \$ 35 million.

2. Accelerator GVA LaunchGurus

Programme: in Moscow classes are held in the evenings on weekdays twice a week and on weekends. In addition, personal meetings with business coaches and mentors are held at students' convenience.

Conditions and prices: the cost of the program is 11.5 thousand euros, not including the cost of flight and accommodation in the US. There are opportunities for training on credit.

Experts and Mentors: among the experts of LaunchGurus are people from the Skolkovo Academy - for example, Bob Dorf, Steve Blank and Stan Yakatan.

History and results: Former head of the Skolkovo startup academy, Lawrence Wright, together with professor of marketing and a graduate of Stanford University Gary Fowler, launched the LaunchGurus project in the spring of 2014. The new organization includes an accelerator, an academy of venture investors and business angels, a seed fund and a business development agency that will advise companies that are undergoing training.

LaunchGurus records in its statistics and achievements of participants of the startup academy "Skolkovo", formerly headed by Lawrence Wright - in the brochure of the accelerator, the data according to which the accelerator helped 97 founders of start-ups who attracted \$ 5 million of investment, created 400 jobs, and their companies are estimated at \$ 50 million.

3. Accelerator of the Internet-Initiatives Development Fund (IIDF)

Programme: this accelerator assumes a three-month business development program (search or development of a business model) with the help of invited market experts. Startups can expect to receive financing of up to 1.4 million rubles. A prerequisite is to move to Moscow and work in the IIDF co-working.

Conditions and prices: at the first stage, the fund takes a 7% stake in the company - for this 800 thousand rubles are transferred for business development and 600 thousand for the cost of the accelerating program itself. Projects that have confirmed their business model during the acceleration program, a month and a half after its launch, can receive a proposal for additional Seed-round investment of 14 million rubles. Upon completion of the program, projects that have shown good results can also make a request for Seed investments. To do this, a startup must perform all the tasks that were set before the beginning of work in the accelerator. Projects that reached Round A, can expect to receive 275 million rubles from the IIDF, bypassing the accelerator.

Experts and Mentors: well-known investors, entrepreneurs, brand managers, marketers, interface designers and PR specialists. These include the founder of Liveinternet, German Klimenko, the investment director of iTech Capital, Nikolay Davydov, the investment partner of InVenture Partners, Evgeny Timko, the founder of Webinar.ru, Alexander Alpen and the sales manager of the social network Odnoklassniki, Alexander Danilov.

4. Moscow State University (MSU) Business Accelerator

Programme: the program is designed for four months. Projects are selected by the expert council who evaluates the startup team, the idea and prototype of the product, the size of the potential market, the competition and the terms of the project implementation. As a result, 30-50 projects are selected, after new selection, 5-10 of them can become residents. During training, startup teams get information about work with users and product creation, investing, and building a brand.

Conditions and prices: startups are provided with legal support when registering documents, legal entity and providing seed investments. Financing terms are not disclosed and negotiated with the team of each project individually. A new company begins work in the Moscow State University co-working.

Experts and Mentors: each project has a curator from among the accelerator experts, under the guidance of which startups develop their products and present them on the demo-day after the completion of the acceleration program. Among the experts are Igor Ryabenky (Altair Capital Management), Dmitry Galperin (Runa Capital), Alexander Chachava (Leta Group) and other well-known entrepreneurs and investors.

5. QIWI-Universe accelerator

Programme: in this accelerator, participants can receive funding of \$20 thousand. To participate in acceleration program, startups have to pass qualifying rounds that are held in Minsk, Novosibirsk, Moscow and Kazan. In addition, the team with the existing prototype of the product could directly get into the accelerator.

Conditions and prices: Teams that have been selected have received initial investment and the right to participate in a four-month program. Startups are given a place in co-working and a free package of services from partners of the organizers of the accelerator for up to \$100 thousand. All trainings and master classes are free of charge. Assistance is provided for a stake in the company of 8%, and if a startup has not yet acquired a legal entity, the accelerator administration helps to register it.

Experts and Mentors: the shareholders and top managers of QIWI as well as Russian and foreign entrepreneurs and representatives of the IT market were invited as teachers and mentors.

History and results: QIWI-Universe accelerator was launched by QIWI Venture jointly with MSU business incubator.

6. ABRT-Mangrove CEO Camp

Programme: startups that are at the stage of a prototype or an existing product that is used by a certain number of people could count on participating in a 10-week accelerator program from ABRT and Mangrove called CEO Camp. The companies that have joined the program, together with invited experts from among the CEOs of well-known companies, are working on building sales, marketing and financial management processes.

Conditions and prices: 20 projects that have been selected will be able to take part in the Russian part free of charge and 10 projects will be able to pass the program free of charge in the valley, for others workshops and joint work with experts will cost 90,000 rubles for the program in St. Petersburg and an additional 110,000 rubles for a stretch in the Silicon Valley.

Experts and Mentors: Among the mentors of the project are such people as Mangrove Capital partner David Varokie, founder of Veeam Software and co-founder of the ABRT venture fund Ratmir Timashev, as well as general director of Softkey Felix Muchnik.

7. iDeal Machine

Programme: The accelerator iDeal Machine, created by RSV Venture Partners in St. Petersburg, helps with the development of domestic IT projects. Selection takes place according to the following scheme: after filling in the application, the most promising teams are given the right to a five-minute pitch before the experts who choose projects for the pre-accelerator.

This selection phase lasts four weeks, during which the team's potential is assessed and work is done on business model. The result of the pre-accelerator becomes Pre-Demo Day, which results in the selection of projects for the acceleration program.

Conditions and prices: Startups-finalists receive investments, office space and support from accelerator experts for 15 weeks of work on the project. The result of the program is Demo Day with performances of teams. The best of them receive investments of the next level. The

share that the accelerator requires in the project is not disclosed on its website, but Slon.ru published information about 15-20%. The amount of investments offered to startups, is \$ 25 thousand (pre-seed round).

Experts and Mentors: Managing partners of iDeal Machine are the founder of UNIF/X, w-Technologies and DynoPlex companies Sergey Fradkov and the founder of Ectaco and MobiDealer Michael Averbakh (VC.RU, Russian startup accelerators, 2014).

According to the results of survey from an UBI global agency, four out of five (83%) Russian startups participating in business incubation and acceleration programs physically took part in the selected programs. As for startup participants among European and global colleagues, on the contrary, only 67% and 72% were physically registered, and a growing number of entrepreneurs were inclined to virtual participation.

The average number of created work places is one of the assessments of startup incubators. According to the report on UBI global, the world average is 493, European level is 342 and Russian average is 314 work places. Russian universities' incubation programs have managed to create a 376 work places in the year 2016-2017, which is more than the level of European incubators.

The average number of events organized by or for startup incubators in Russia (48) in 2016-2017 exceeds the European level (33) and the global level (31). However, it does not improve the situation with the average amount of investments attracted. Their level in Russia (\$5.1 mln) is rather low in comparison with world (\$23 mln) and European (\$27 mln) levels. It should be mentioned, however, that the average number of investors in the Russian incubation program networks (13) is also much lower than in European (55) and global (64).

Popularity of incubators and accelerators and activity of their participants is at a high level in Russia. It is represented by the average number of applications per year. In Russian Federation it is 181, while in Europe it is amounted to 153 and the world average is only 145 (UBI global, 16/17 report).

There is an annual awarding ceremony for leaders of the best Russian accelerators and business incubators rating under the UBI Global version. In the year 2016 it was held in Sochi and the following **best university incubators** were rewarded:

- Business Incubator of ITMO University; St. Petersburg;
- Business incubator of Irkutsk National Research Technical University;
- Interuniversity business incubator "Friendship"; Tomsk State University of Control Systems and Radioelectronics.

The best incubators associated with universities are:

- Technopark "Zhigulevskaya Dolina";

- Zelenograd Development Corporation;
- Business incubator “Ingria”; St. Petersburg.

The best university accelerators are:

- “Captains of Russia”; Russian Economic University named after GV Plekhanov;
- iDealMachine; Saint Petersburg State University of Information Technologies, Mechanics and Optics; St. Petersburg;
- Accelerator UrFU; Ekaterinburg.

The best accelerators associated with universities are:

- Acceleration Program Pulsar Venture Capital;
- FREI Accelerator; more than 100 university partners; Moscow;
- NUMA Moscow (UBI Global, 16/17 report, 2017).

4.2.1 Problems of IT startup incubators and accelerators

Education and Human Resources

Incubators and techno-parks are forced to provide a significant part of educational services, attracting their employees, who do not have sufficient experience of entrepreneurial activity, to this work, or during single events with invited lecturers.

Experienced entrepreneurs, to whom startups could have access on a permanent basis (called: mentor in residence) are absent in the ecosystem. External mentors work within their programs not implying close contact with entrepreneurs and constant monitoring of the results (E&Y and RVC, 2016, report).

Lack of technical specialists at almost all qualification and skill levels or their high cost limit the number of new startups and the possibilities of incubators, techno-parks in terms of hiring staff for development.

Due to the lack of education and experience, entrepreneurs face considerable difficulties in dealing with foreign partners and investors, which impedes the entry of companies into international markets.

This is due to the following main reasons:

- weak knowledge of English;
- lack of presentation skills;
- poor understanding of the core principles of doing business in international markets;
- lack of understanding of the venture market principles (E&Y and RVC, 2016, report).

Infrastructure

Absence of laboratories, production and storage facilities or insufficient technological equipment of incubators and techno-parks prevents the creation or slows down the development of resident companies.

Entrepreneurs are forced to purchase expensive equipment, independently look for opportunities to rent equipment outside of incubators or move to incubators or techno-parks where this problem is solved. All this diverts time and money from solving the main tasks of business development.

Provided infrastructure does not contribute to the creation of communication and information exchange ecosystem between residents. In many facilities there is no special space for events and communication in an informal environment.

For some incubators, the problem of providing their residents with basic office equipment of the level that they need is still topical. Sometimes, provided computers are quite modern, but they do not have standard software installed. Residents lose time and money to adapt to new operating systems and applications or to purchase more familiar software (E&Y and RVC, 2016, report).

Demand

The level of demand for innovative solutions by large and medium-sized Russian enterprises remains low in general and this is a major problem for residents of incubators and techno-parks. Governors of most regions do not support residents and do not motivate large potential customers to interact with management of these organisations.

Entrepreneurs focus their efforts on performing popular, widely discussed tasks, ignoring issues that really require solutions, for which there is an effective demand. This is a consequence of the lack of information about real problems, especially with large-scale advertising of successful startups in such areas as tourism, social networks, mobile applications and other.

The majority of techno-parks and incubators do not support international contacts, they do not interact with foreign partners and representatives of the business environment. It limits the ability of residents to move to international markets (E&Y and RVC, 2016, report).

Investments

Lack of financing for companies at the pre-seed stage is a key deterrent to development, especially for high-tech enterprises that are not IT startups. In order to reduce risks, existing venture funds and a few business angels tend to invest at later stages. Grants, which startups can claim at an early stage, are very limited in terms of the amount of money.

Another key factor is the lack of “smart money” at an early stage. For many entrepreneurs, the problem lies in the absence of experienced investors who actively support the project team due to their knowledge and business contacts, not only with money.

In regions, these factors are aggravated by the fact that a significant proportion of experienced investors is concentrated in Moscow. In this regard, for regional startups it is more difficult to get “smart money”. The activities of state institutions that could partially compensate for the limited initial funding are not coordinated. As a result, a significant amount of time is spent on obtaining financing, during the most difficult and uncertain period of the company’s existence (E&Y and RVC, 2016, report).

Goals and key performance indicators

The main problem is absence of a unified, properly constructed system of key performance indicators (KPIs) for business incubators and technology parks, established and functioning primarily through public funds. The situation:

- does not allow to evaluate the results of work, to objectively determine the most successful and to reject ineffective business models, to allocate financing taking into account these estimates;
- prevents negotiations with financial and supervisory authorities, as well as with investors and partners, from the position of results achieved;
- prevents planning and goals setting.

The development of the KPI system should be based on existing international analogues and the accumulated operational experience of the most successful Russian facilities (E&Y and RVC, 2016, report).

4.2.2 Possible solutions for incubators and accelerators of IT startups in Russia

Business incubators and technology parks are organizations where entrepreneurs come to gain access to infrastructure, education, business services of higher quality, assistance in finding financing and establish useful contacts.

The best objects successfully solve a significant part of these tasks, creating and setting up an ecosystem of support for innovative entrepreneurship. At the same time, a lot of participants understand that certain key problems remain unresolved, including systematic ones.

The speed and effectiveness incubators and technology parks development in Russia will depend on their decision (E&Y and RVC, 2016, report).

Possible solution of these problems revealed by E&Y and RVC are presented below:

1. Incubation policy

Elaboration of more adequate selection criteria and presentation of more stringent requirements to it. Creation of an expert council or expansion of its functions and influence. Provision of quality additional services, important for successful development of resident companies' business (better - on a fee basis).

2. Education and staff

Creation of educational centers (for all ages) based on public private partnership (PPP); creation of a federal center for the international exchange experience; organization of federal events on specific topics and trends in regional incubators.

3. Infrastructure

Implementation of the information system of high-tech infrastructure; formation of private (or PPP) engineering centers, including those based on the capacities of large enterprises; creation of a convenient space for communication of residents.

4. Supply and demand

Organization of business meetings with customers; monitoring of current problems and their resolution; use of metrics to convince customers in the benefits of work with residents of incubators.

5. Investments

Creation of regional funds with attraction of private capital, aimed at pre-seed financing; training of private investors; systematization of resources within the framework of financial support of innovative entrepreneurship; introduction of the KPI system.

6. Goals and KPIs

Development and implementation of the KPI system for business incubators and technology parks, based on the best international practices and experience of the most successful Russian facilities operation; linking public funding to KPI implementation (E&Y and RVC, 2016, report).

The KPI system should be created taking into account different roles of objects that are parts of innovation infrastructure. In particular, there are at least two basic versions of the role of incubators for which KPIs cannot be identical:

- Incubators as an instrument for accelerated development of startups with high potential for rapid growth, initially focused on the creation of large international brands with involvement of venture capital;

- Incubators as a tool for support of small innovative companies with high potential for sustainable growth, which are then integrated into existing (at the first stage, usually regional or federal) value chains.

There is a need for a broad discussion of the problems mentioned above, involving all participants of the business incubation system in order to reach a consensus on the role of business incubators, development of a unified system of KPIs for them and a change in the system of control/distribution of financing in accordance with KPIs (E&Y and RVC, 2016, report).

4.3 Evaluation of perspective directions for improvement

The development level and possible improvement areas of IT infrastructure can be revealed from the level and pace of development of the IT industry.

To evaluate and compare the competitiveness of Russian IT industry with different countries, it is possible to use the index that includes the assessment of business, legal and research and development levels. It also takes into account the IT infrastructure, existing support for IT industry development and human capital. The value of this indicator called “IT Industry Competitiveness Index” for each country is calculated in accordance with the estimates of these characteristics.

Several countries and their estimates are presented in table 10 for comparison.

Table 10 – Ranking of countries by IT Industry Competitiveness Index in 2011

Rank	Country	Overall Index Score	Business Env.	IT Infrastr.	Human Capital	R&D Env.	Legal Env.	Support for IT Industry Development
1	United States	80.5	95.3	76.5	74.1	74.3	92.0	87.2
2	Finland	72.0	98.2	71.0	52.1	67.3	89.5	78.6
3	Singapore	69.8	91.0	65.2	51.8	67.2	81.5	82.3
4	Sweden	69.4	90.1	83.3	46.4	54.9	85.0	81.6
5	United Kingdom	68.1	93.2	74.0	57.5	46.7	88.5	80.0
6	Denmark	67.9	95.1	87.2	47.9	42.0	90.5	79.0
12	Switzerland	65.4	72.0	98.2	71.0	52.1	67.3	89.5
14	Norway	64.3	69.4	90.1	83.3	46.4	54.9	85.0
15	Germany	64.1	68.1	93.2	74.0	57.5	46.7	88.5
16	Japan	63.4	82.9	69.9	50.7	56.9	79.0	58.9
21	France	59.3	82.4	65.8	44.1	40.6	87.0	68.3
23	Italy	50.7	74.7	50.0	47.0	25.4	80.0	63.2
27	Czech Republic	46.1	77.3	45.8	43.0	20.4	71.0	56.4
46	Russia	35.2	48.4	32.0	52.4	15.4	50.0	31.1

Source: BSA, Software Alliance. The IT Industry Competitiveness Index 2011.

The most developed IT industry is the United States and it contributes to the progress of IT market there.

Russia takes the 46th place in the rating of the IT industry competitiveness. It has very low assessment of research and development environment. The assessments of IT infrastructure and the level of support for IT industry development are also too low.

It means that the level of these two factors is not enough to significantly contribute to the competitiveness of the Russian IT industry and development of the IT market in Russia.

To analyze the tendency of the Russian IT market two main market indicators were chosen and presented in table 11.

Table 11 – Main indicators of the Russian IT market, 2010-2015

№	Indicator	Units	2010	2011	2012	2013	2014	2015	Growth rate,%
1	Volume of sales in Russian IT-market	bln. rub.	518.2	595.2	658.5	745.7	667.2	712.6	37.5
2	Export of software and IT-services from Russia	bln. USD, \$	3.3	4	4.6	5.4	6	7	112

Source: Russian Federal Service of State Statistics (Rosstat), Retrieved 23 December, 2017, from: <http://www.gks.ru>

The growing volume of sales shows that market is almost constantly developing and growing. There was a temporary decline in the year 2014, but now the market recovers. The second indicator – the export volume of software and IT-services from Russia – did not change its upward movement and the trend is rapidly growing.

The Russian IT market is growing and it is preferable for Russian IT companies to get and keep the most significant share. It will let the consumer market of IT products and IT services to be less dependent on foreign supplies and currency fluctuations.

The growth rate of export shows that the Russian IT services and software was becoming more and more demanded and we can conclude that competitiveness of these Russian items has been growing in last six years.

Investments in IT infrastructure, active support of IT industry development from governmental and non-governmental sources, and creation of enabling environment of research and development in the field of IT in Russia are those necessary activities that will contribute to further growth of Russian performance indicators of IT industry and IT market.

The promising prospects of the Russian economy development allow expecting the increase in government' attention to IT industry and its problems. Different forums of young entrepreneurs are held annually, as well as conferences for small and medium sized business people from different IT areas.

To analyze and estimate prospects of Russian IT infrastructure, it is possible to use SWOT analysis which will help to see the internal and external factors that may contribute to the development or restrain it.

The results of analysis and proposed directions for strategic development are presented in table 12.

Table 12 – SWOT analysis of the Russian IT startups infrastructure

		Opportunities	Threats
		External	<ol style="list-style-type: none"> 1. Development of international scientific cooperation. 2. Advances in the protection of intellectual property rights. 3. Increased domestic needs in advanced information technologies. 4. Establishment and development of modern, huge scientific and educational centers and clusters (i.e. Innopolis).
Internal	Strengths	<ul style="list-style-type: none"> - Development of state programs for the IT industry development, production and distribution of more innovative industrial products; - Strengthening the role of the government as the largest consumer of IT products and services and investor in the IT industry. 	<ul style="list-style-type: none"> - Centralization of founders’ activity from regions; - Toughening of control over illegal distribution of IT products; - Development of the education level in regional technical universities.
	Weaknesses	<ul style="list-style-type: none"> - Usage of public private partnership programs for infrastructure development and equipment purchases; - Support of scientific IT innovations at a national level; - Creation of a system that integrates young inventors in the community of scientists, where they can get advices and detailed information about actions for patent registration. 	<ul style="list-style-type: none"> - In case of sufficient level of governmental, venture and foreign investments in the Russian IT industry and infrastructure, it will be able to overcome threats and minimize weaknesses because its mechanism is organized well enough.
	<ol style="list-style-type: none"> 1. High level of founders’ activity. 2. Fast pace of changes, development and improvements according to the world trends. 3. Wide range of incubators, accelerators and funds. 4. Competitive system of engineering education. 		

Despite of the challenges and lag between the development levels of Russian and European IT startup infrastructures, there are several opportunities that can lead to further success and minimize threats. Thorough planning, attention from government and sufficient support are required to achieve these goals.

4.4 Econometric modeling of the IT startups exit cases with investment history

Using the data from the database RUSBASE, information on 20 cases of exits through purchases with their investment history were obtained. The table with characteristics of the sample is presented below.

Table 13 – The data set for a model, characteristic of a sample

№	Name	Purchasing information		Investment history	
		Price, \$	Stage of sale	Seed, \$	Round A, \$
1	Actio.tv	100 000	Seed	0	0
2	МойСклад	1 200 000	Seed	0	0
3	Adreal	150 000	Seed	0	0
4	Finparty	1 000 000	Seed	0	0
5	ЛитРес	10 000 000	Round A	0	5 000 000
6	ShoppingLive	1 000 000	Round A	0	1 000 000
7	Подорожники	1 000 000	Round A	100 000	0
8	AdCenter	400 000	Round A	350 000	0
9	UniSender	3 000 000	Round A	100 000	0
10	Дари Подарки	5 000 000	Round A	250 000	0
11	Группон (ДарБери)	50 000 000	Round A	1 000 000	0
12	Метабар	5 000 000	Round A	1 000 000	0
13	Qik	100 000 000	Round A	5 500 000	0
14	Огород	1 000 000	Round A	250 000	0
15	Sapato	60 000 000	Round A	3 000 000	17 000 000
16	Pixonic	30 000 000	Round B,C,etc.	1 000 000	5 000 000
17	Delivery Club	100 000 000	Round B,C,etc.	0	11 000 000
18	Eskey.ru	18 800 000	Round B,C,etc.	0	6 000 000
19	WebMediaGroup	18 000 000	Round B,C,etc.	0	10 000 000
20	Flocktory	14 360 000	Round B,C, etc.	1 130	1 500 000

Source: Venture market database, startup deals information, RUSBASE

The most popular stage of sale from the sample is Round A (50% of cases). There are only 3 cases out of 20 that were financed both at Seed and Round A stages. Investment at Seed stage is the most frequent case in terms of startups' investment history.

The lowest price of sale included in a sample is \$100 000. The highest price in this data set, achieved in two different cases is \$100 000 000.

Now it is possible to check the influence of several investment and purchasing parameters of startups on the price of purchase. For that we can build a multiple linear regression model with dummy variables included for two qualitative parameters – stage of sale and stage of investment. Several hypotheses were formulated:

H₁ – startups funded at Seed stage get larger sums for exit;

H₂ – startups purchased at later stages are priced higher;

H₃ – the larger the invested sums, the higher the price of sale.

H₄ – startups with several investment rounds are purchased at higher prices as a result.

First qualitative indicator – stage of investment – has four possible alternatives: Seed stage (category 1), Round A (category 2), both Seed and Round A (category 3).

Second qualitative indicator – stage of sale – has three possible alternatives: Seed stage (category 1), Round A (category 2), Rounds B, C, etc. (category 3).

According to the general rule of modeling, we must use three dummy variables for the first indicator (stage of investment) and two dummy variables for the second indicator (stage of sale). For the stage of investment, the comparison category is 1 – Seed stage and it will be left outside of the model in order to check hypothesis 1. It means that we need to code each of other categories and create dummy variables for them. For each variable code 1 represents that category and code 0 represents all others.

D₁ – Round A =1, all others = 0;

D₂ – both, Seed and Round A =1, all other variants = 0.

For the stage of sale, the comparison category is 3 (Rounds B, C, etc.). It will be left outside of the model in order to check hypothesis 2.

V₁ – Seed =1, all others = 0;

V₂ – Round A, all other variants = 0.

After the coding it is possible to create a multiple linear regression model in a form:

$$Y = a_0 + a_1x_1 + a_2x_2 + \gamma_1D_1 + \gamma_2D_2 + \gamma_3V_1 + \gamma_4V_2 + u, \quad (4)$$

where Y is the price of sale (startup's exit);

a_0 – the free, constant element of the regression equation;

a_1, a_2 – coefficients that show the degree of influence in changes of parameters x_1, x_2 on the dependent variable Y;

x_1 – independent parameter representing sum invested at Seed stage;

x_2 – independent parameter representing sum invested at Round A stage

γ_1, γ_2 – coefficients that show the significance of excluded variable in comparison with D_1 and D_2 respectively;

γ_3, γ_4 – coefficients that show the significance of excluded variable in comparison with V_1 and V_2 respectively

D_1, D_2 – the coded stages of investment;

V_1, V_2 – the coded stages of sale;

u – the standard error of estimate.

This model was built in SPSS program. For the purposes of this model and its interpretation, the ANOVA table (Table 15) and the regression coefficient table (Table 16) are presented further. Parameters of dummy-variables will be interpreted in a different way than parameters of quantitative, numerical variables.

Table 14 – Model Summary

№	Parameters of model estimation	Value
1	Correlation coefficient - R	0.857
2	Determination coefficient - R Squared	0.734
3	Adjusted R Squared	0.611
4	Standard error of the estimate	19835269.85
5	Durbin-Watson coefficient	2.436

Correlation coefficient allows to assume that there is a strong degree of dependency between explanatory variables and the dependent one. As its value is higher than 0.8, the relation is both strong and positive, or direct. Determination coefficient shows that 73.4% of variation and changes in y can be explained by changes in explanatory variables.

Adjusted R Squared also demonstrates how well do the explanatory variables fit a model, but adjusts it for the number of terms. It can be decreased because of the useless variables in the model. Durbin-Watson coefficient slightly exceeds the norm but it can be explained by the small sample size and it is impossible to rely on this indicator in such conditions.

Table 15 – The ANOVA table for the model with dummy variables

№	Indicator	df	SS	MS	F	Significance F
1	Regression	6	14113169006501846	2352194834416974.50	5.979	0.003
2	Residual	13	5114693088498150	393437929884473.06		
3	Total	19	19227862094999996			

The ANOVA table splits the sum of squares into its components and also shows the results of F-test. The significance level of the model is high, as its p values is equal to 0.003 and it is less than 0.05. It means that the model is statistically significant at the significance level of 0.05. The last column of the regression coefficients table (Table 16) has the associated P-values. The regression coefficients and other parameters are presented in table 16.

Table 16 – The regression coefficients table for the model

<i>Nº</i>	<i>Variables</i>	<i>Meaning, predictors</i>	<i>Coefficients</i>	<i>Standard Error</i>	<i>t-statistics</i>	<i>P-value</i>
1	a_0	Constant	32349402.596	16237805.375	1.992	0.068
2	a_1	Invested sum (Seed stage)	17.592	4.060	4.333	0.001
3	a_2	Invested sum (Round A)	2.374	1.497	1.586	0.137
4	γ_1	Invested at Round A	-6265475.378	18454423.411	-0.340	0.740
5	γ_2	Invested both at Seed and Round A	-29461141.066	20520932.442	-1.436	0.175
6	γ_3	Seed stage of sale	-31736902.596	19026975.741	-1.668	0.119
7	γ_4	Round A stage of sale	-30476155.152	14925016.847	-2.042	0.062

Column t-statistics describes the regression coefficients divided by standard errors. For further interpretation of the model we need to check the significance at first.

The Invested at Round A parameter is insignificant in terms of this model. There is a need to modify the model, and include only significant explanatory variables.

It is needed to calculate the number of degrees of freedom $t = n - k = 20 - 7 = 13$.

The next step is the evaluation of P-value and its comparison with the value of Student's t-test at $\alpha = 0.05$ and calculated number of the degrees of freedom. One of indicators is t and it means the t-distributed random variable with n-k degrees of freedom and t-statistics is the computed value of the t-statistics given in the column of the regression coefficients table. The comparison of the calculated t-statistics with the critical Student's t-test value from the Student's table for the required level of significance ($p=0.05$) and the number of degrees of freedom 13 is presented in Table 17. t-critical (from Student's table, $\alpha = 0.05$, $t = 13$) is equal to 2.160.

Table 17 – The interpretation and comparison of the regression coefficients

t	Comparison	t-statistics	t-critical	Comparison	t-statistics
13	>	1.992	2.160	>	1.992
	>	4.333		<	4.333
	>	1.586		>	1.586
	>	-0.340		>	-0.340
	>	-1.436		>	-1.436
	>	-1.668		>	-1.668
	>	-2.042		>	-2.042

Values of all t-statistics are less than the number of degrees of freedom. The t-statistics of the coefficient a_1 is lower than the critical value of t (from the Student's table). It means that the differences of the compared values are statistically insignificant. Other coefficient parameters are higher than the value of the calculated Student's t-test, and it is possible to assume the statistically significant differences between compared values. The fitted line cannot be created for model with qualitative variables because such model is built for comparison of significance. The model can be represented in the form of equation 2 and it can be described as follows:

$$Y = 32349402.6 + 17.6 x_1 + 2.4x_2 - 6265475.4D_1 - 29461141.1D_2 - 31736902.6V_1 - 30476155.2V_2 + 19835269.9, \quad (5)$$

Each dummy variable is compared with the variable that was left out. It can be made after the formulation of dependencies, using coefficients γ , and then by checking the statistical significance of results at the significance level 0.05. Analyzing the results of the investment terms and stages, it is possible to conclude that investment at Round A helps to achieve a higher price of sale than joint investments as its coefficient is -6265475.378 which is almost 5 times greater than the coefficient of the variable representing investments both at Seed and Round A - 29461141.066. However, the investment at a Seed stage contributes more to the beneficial sale, as in comparison with it other options have coefficients that are less than 0, but the difference in results is not very statistically significant. Describing the results of comparison for stages of sale, the outcome is that the later the stage of sale, the more the price. In the example of the model described above, the excluded variable representing sale at Rounds B,C, etc. is expected to have greater positive influence on the final price of sale than other two options (because the coefficients γ_1 and γ_2 are less than zero).

Dummy variables obscure the results and interpretation of the numerical variables. Now there is a need to improve the model and leave only significant variables in it to clarify the statistically significant influence of numerical explanatory variables on the dependent one.

Using stepwise procedure of variables' selection, the resulted model included only 2 numerical variables.

Table 18 – Model Summary (second model)

№	Parameters of model estimation	Value
1	Correlation coefficient - R	0.783
2	Determination coefficient - R Squared	0.613
3	Adjusted R Squared	0.567
4	Standard error of the estimate	20930100.24
5	Durbin-Watson coefficient	2.136

Correlation coefficient R demonstrates a strong degree of dependency between explanatory variables and the dependent one. As its value is close to 0.8, the relation is medium, but close to strong and it is positive, or direct. Determination coefficient shows that 61.3% of variation and changes in y can be explained by changes in explanatory variables.

Adjusted R Squared also demonstrates how well do the explanatory variables fit a model, but adjusts it for the number of terms. It can be decreased because of the useless variables in the model. Durbin-Watson coefficient slightly exceeds the norm but it can be explained by the small sample size which doesn't allow to rely on this indicator.

Table 19 – The ANOVA table for the model with dummy variables (second model)

N ^o	Indicator	df	SS	MS	F	Significance F
1	Regression	2	11780687462667300	5890343731333650.0	13.446	0.000
2	Residual	17	7447174632332696	438069096019570.4		
3	Total	19	19227862094999996			

The ANOVA table splits the sum of squares into its components and also shows the results of F-test. The significance level of the model is high, as its p values is equal to 0.000 and it is less than 0.05. It means that the model is statistically significant at the significance level of 0.05.

The last column of the regression coefficients table (Table 20) has the associated P-values. The regression coefficients and other parameters are presented in table 20.

Table 20 – The regression coefficients table for the second model

N ^o	Variables	Meaning, predictors	Coefficients	Standard Error	t-statistics	P-value
1	a_0	Constant	4543724.129	5748868.459	0.790	0.440
2	a_1	Invested sum (Seed stage)	14.423	3.606	3.999	0.001
3	a_2	Invested sum (Round A)	2.621	1.012	2.590	0.019

Column t-statistics describes the regression coefficients divided by standard errors. For further interpretation of the model we need to check the significance. This model includes only statistically significant explanatory variables.

The number of degrees of freedom in this case is $t = n - k = 20 - 3 = 17$.

The next step is the evaluation of P-value and its comparison with the value of Student's t-test from the Student's table at $\alpha = 0.05$ and with the calculated number of the degrees of freedom 17. The comparison is presented in table 21 t-critical (from Student's table, $\alpha = 0.05$, $t = 17$) is equal to 2.110.

Table 21 – The interpretation and comparison of the regression coefficients (second model)

t	Comparison	t-statistics	t-critical	Comparison	t-statistics
17	>	0.790	2.110	>	0.790
	>	3.999		<	3.999
	>	2.590		<	2.590

Values of all t-statistics are less than the number of degrees of freedom. The t-statistics of the coefficient a_0 (constant) is lower than the critical value of t (from the Student's table). It means that the differences of the compared values are statistically insignificant.

Other coefficient parameters are higher than the value of the calculated Student's t-test, and it is possible to assume the statistically significant differences between compared values.

The model can be represented in the form of equation 2 and it can be described as follows:

$$Y = 4543724.129 + 14.423x_1 + 2.621x_2 + 20930100.24, \quad (6)$$

Now, with a high degree of certainty, supported by the model and variables' significance, it is possible to say that a \$1 shift in investments made at a Seed stage can lead to the shift of \$14.4 in the final price of purchase. At the same time, a \$1 deviation in a sum invested at Round A, can lead to only \$2.5 change in a final price of purchase.

4.5 Development of recommendations for the beneficial investment strategy of IT startups

To develop recommendations for preferable investment strategy, it is first needed to put together the results of hypothesis testing revealed after the econometric modelling.

The first hypothesis **H₁** – startups funded at Seed stage get larger sums for exit, **was proven to be right**. According to the comparison of dummy variances' influence on the dependent variable, the investment at a Seed stage contributes more to the beneficial sale. Other options were assigned with coefficients that are less than 0 after comparison.

H₂ saying that startups purchased at later stages are priced higher **was proven** as there was revealed a direct relation – the later the stage of sale, the higher the price. Variable representing sale at Rounds B,C, etc. was excluded from the model for comparison and others got with negative values of coefficients. At the same time, coefficient for the Seed stage of sale was lower than for the sale at Round A stage.

The next hypothesis was **H₃** – the larger the invested sums, the higher the price of sale. This **was proven** by the results of econometric modelling in both models and with a **high degree**

of significance. The model in which the results were not obscured by dummy variables revealed that a \$1 positive shift in investments can lead to the increase of \$14.4 in the final price of purchase (if they are made at a Seed stage) and at the stage of Round A they can result in \$2.5 positive change in a final sum. Each additional invested dollar brings more than \$1 of changes in the resulting exit sum, despite of the stage of investments. However, earlier investments at Seed stage are 5.76 times more effective.

Finally, **H₄** – startups with several investment rounds are purchased at higher prices as a result, **was disproven**, though it has a **low statistical significance**.

Investment at Round A helps to achieve a higher price of sale than joint investments both at Seed and Round A (which means longer investment history of a startup) because.

It must be taken into account that the proportion of startups with investment history in the sample was very low. It means that the result of this hypothesis testing is not very reliable and require further elaboration.

However, the idea of lower prices of exit for startups with several rounds is very logical. First of all, there might be strategic investors involved and in this case, they already own a part of the company, which they buy out gradually as it develops. In other cases, founders normally own the smaller part of their venture after each additional round. As a result, the final purchase of a company that went through several investment rounds implies smaller share of company available for sale.

The low significance of several parameters from the first model can also be a cause of small sample. It is recommended to continue observations and data collection and to add more cases in the sample over the next several years. Maybe, it is also possible to search for additional databases containing more data about deals from the past and it is recommended to check

Taking all the results into account, founders and startup managers should choose the way of investment stage selection depending on their aims. It is also possible to formulate the best steps to be taken if the goal is to sell the company at the highest price possible.

4.6 Formulation of preferable strategy

Taking into account all the results of econometric modelling, it is possible to generalize them in a beneficial scenario that startup funders may choose if they aim to exit with the highest possible price.

First of all, it is recommended for startup founders to strive to get financing at earlier stages, preferably – at Seed stage. Each dollar invested at this stage will have a higher impact on the price of sale.

Moreover, it was revealed from the analysis of startup investment cases sample and the statistics of survived companies that the Round A investments are the riskiest. This knowledge will make the interests of founders and investors closer at meeting each other and agreeing at the Seed stage financing.

To make the earlier stage investments more accessible, it may be preferable for a company to join an incubator or accelerator, if founders are to make such a decision. This makes the attraction of public attention and promotion of IT startups' products and services easier and implies connections with investors. For this purpose, it is recommended to choose the incubator from the top of successful Russian programs. The selection among applicants is hard, and applicants must have their plan elaborated and sometimes even their concept checked, so the previous work and thorough preparation is required.

One of the drawbacks of early stage financing is the skepticism of investors, but the business angels are more willing to pay attention to the Seed stage projects. At the same time, the sums are lower and once the investment is made, the first results and progress must be reported to first investors as well as to potential investors for further stages.

However, founders must be careful with giving agreement to get investments as even though the stage is early, investors often require a share in the company, which must not be sold cheap. It is better to set the goals for a company, define a baseline of a price for venture's shares and a minimal investment sum to agree on, in exchange for a share of a startup.

The importance of this carefulness is proven by the H3 saying that the larger the invested sums, the higher the price of sale. By agreeing to get a low sum at an early stage, hoping at a better deal when reaching Round A, founders put their venture in a weak and risky position.

Finally, it is better to wait with selling till the later stages because startups purchased at later stages are priced higher. However, there is a danger to abandon good proposals at an earlier stages and never get them again. That is why, first of all, founders must be clear about the position and prospects of their venture, conducting a continuous market analysis, checking the level of investors' interest to the sphere of their startup, the number of newly emerged competitors and prices of similar deals, in order to choose a right time and conditions to sell their IT startup.

5 Results and Discussion

As a result of comprehensive analysis of the sample from Russian venture market, including investment deals of startups in IT sphere, there was revealed that the niche of software was ranked the highest, as an undisputed leader (almost 11% of all investment bargains). It is followed by startups specialized in E-commerce (7.36%) and IT services (5.87%). Distinguishing features of these activities are that they are not as specific as MedTech and FinTech. Increasing consumer demand for software and IT services, while e-commerce is one of the most profitable features and companies use it for profit maximization, or operate fully on its basis (online shops and virtual offices).

There are several conclusions made after comparison of different invested rounds. In Round A the invested sums are much higher, but fewer enterprises achieve this level. The number of startups in Rounds B,C,etc. is 5.5 times less than the number of Round A investments. While, the total sum for Rounds B,C,etc. is only 1.5 times less than the total sum invested at Round A. The risk involved in investments at each stage was evaluated on the basis of sample, for which the future success of invested startups was checked. Investments in startups that are “not active” now and resulted in investors’ losses are 2.7 times higher for Round A investments than total losses from investments at Seed stage projects. At the same time, the number of closed startups, funded at Seed stage is 2.2 times higher than the number of failed projects funded at Round A.

The probability of failure is much higher at the very early Seed stage and it is decreasing with every following round. But the increased sums of financing make it more serious and expensive for investors. The average sum spent on investments in one failed project at Rounds B,C, etc. is twice higher than that for Round A investment. However, the share of projects “not active” later after financing at Round A is 19%, while for later stage investments the failure is 3 times less frequent.

All these conclusions put together let us decide that Round A investments are the riskiest of all as the losses are almost 6 times higher (in absolute terms (\$) for one failed project on average) than for projects invested at Seed stage and the failure happens 3 times more frequently than at later stages.

As a result of market dynamic’s analysis, the increased attention to the cloud technology and software sub-sector was noticed. These sub-sectors raised the largest share of total investments and had the first place by the number of deals in 2016, while in 2015, e-commerce was the leading IT sub-sector. The assumption here is that e-commerce technologies are already fairly advanced, while software, cloud technologies, data migration and related cybersecurity

issues have become some of the hottest topics for business executives. Financial technologies (FinTech) now take the second place in terms of investment value. This supports the notion that investors are showing more interest in sectors which help them to enter the new era of digital business. Tourism is the leading sub-sector in terms of the average deal size, the telecommunications sub-sector ranks second and the sub-sector of cloud technologies and software rounds out the top three in this category.

In addition to separate startups' specialization patterns of popularity, there was revealed a general trend of rapid growth in the sector of Industrial equipment both by the number and the volume of exit deals in the whole venture market. There is an increased demand and interest to this field. However, the IT sector still holds the leading position as exits in this sector accounted for the half of all exits in the Russian venture market 2015 and 2016. There was a decrease in the volume of deals but IT sector still has the highest average sum of 1 exit case deal.

As a result of analysis of exit ways, the way of selling to the strategic investor has the leading position by the number of cases. At the same time, the volume of deal at such situation is rather small (the average sum of 1 exit is \$ 6.6 million). While the sale to financial investor is not as popular as the sale to strategic one, it generates voluminous deals, accounting in total for more than a half of the whole market among other exits and having the largest average sum of 1 exit – \$ 210 million.

There was also conducted an analysis of IT infrastructure, Russian incubation and acceleration programs for startups. They have not only adapted to the latest trends, but also developed their own often very successful innovation strategies. The rating of startup ecosystems of 2015 by Compass company put Moscow on the 13th place among the best startup ecosystems in the world. The most successful business incubators in Russia conduct a much more stringent selection of residents. The higher quality of residents positively affects the survival rate both in the process of functioning in the incubator and after its exit from it. The amount of investments involved and the number of investors, participating in the programs of Russian incubators lags behind the levels of Europe and world average, but the number of active founders and promising projects is rather high.

On the basis of the data from the survey and report on challenges and solutions of business incubators and technoparks in Russia, prepared by the E&Y and RVC agencies in 2016, the main problems of Russian IT infrastructure were studied and also, the most relevant and interesting possible solutions were discussed. As there is no sufficient KPI system, it should be created taking into account different roles of objects that are parts of innovation infrastructure. There was proposed a reasonable idea of two dimensional systems with different scales of KPI for two different roles. Incubators must be viewed from two different aspects, or roles: an

instrument for accelerated development of startups with high potential for rapid growth (the aim is global presence), and as a tool for support of small innovative companies with high potential for sustainable growth (integrated at the first stage, usually regional or federal value chains).

In the rating of the IT industry competitiveness Russia takes the 46th place and it has very low assessment of research and development environment. The assessments of IT infrastructure and the level of support for IT industry development are also too low. It means that the level of these factors is not enough to significantly contribute to the competitiveness of the Russian IT industry and its development in Russia. Investments in IT infrastructure, active support of IT industry development from governmental and non-governmental sources, and creation of enabling environment of research and development in the field of IT in Russia are those necessary measures that should be taken and that will contribute to further growth of Russian performance indicators of IT industry and IT market.

All of the above mentioned results of external and internal factors influencing the IT startup infrastructure in the Russian Federation and conclusions were put together in the rich SWOT and several possible strategies and steps for improvement were proposed. As the IT infrastructure as a whole can be influenced only by the government, most of the proposals relate to their actions.

Starting from the toughening of control over illegal distribution of IT products, the government should then strengthen its role as the largest consumer of IT products and services and investor in the IT industry. It is also possible to use public private partnership programs for infrastructure development and equipment purchases. To overcome the problem of founders' and opportunities' fragmentation and uneven distribution by regions, centralization of founders' activity from regions is required. Possible solution is creation of a system that integrates young inventors in the community of scientists, where they can get advices and detailed information about actions for patent registration and further IT products and startup development.

In case of sufficient level of governmental, venture and foreign investments in the Russian IT industry and infrastructure, it will be possible to overcome threats and minimize weaknesses because its mechanism is organized well enough.

Taking all the results of econometric modelling and statistical analysis into account, the preferable investment strategy was developed as a set of recommendations for IT startup founders striving to sell their company at a highest possible price. It is beneficial to get financing at earlier stages, if there is a need to join the incubator, it is crucial to choose one from the top of successful Russian programs, listed in this thesis. Finally, it is better to wait with selling till the later stages because startups purchased at later stages are priced higher.

6 Conclusion

After the theoretical foundations of the IT startup development, funding stages, sources and factors having influence on future success were studied thoroughly. All the necessary terms and prerequisites for further elaboration were described and introduced in the theoretical part of the work.

Comprehensive analysis of the Russian venture market helped to reveal several important patterns like the trends in most popular and actively invested sub-sectors of IT startup, the character and volumes of venture deals and the ways of exit preferred by companies.

IT startup infrastructure level in Russia was reviewed both from the point of view of incubators' and accelerators' and from its contribution to the IT industry development. Perspective directions for improvement were studied and several possible measures that can help to develop Russian IT industry's competitiveness and achieve further progress in the level of IT infrastructure effectiveness were discussed.

An econometric model (multiple regression with dummy variables) of the IT startups exit cases was created to check several hypotheses of the study and several hypotheses.

The preferable investment strategy for IT startup founders striving to get the highest possible price of exit was formulated based on past historical data from the database with startup deals, internal and external influential factors.

Now it is possible to answer the research questions:

How do parameters of funding influence the future success of IT startup development in the Russian venture market?

It was proven by the results of econometric modelling that startups funded at Seed stage get larger sums for exit, startups purchased at later stages are priced higher and also the dependency meaning that the larger the invested sums, the higher the price of sale was confirmed. Finally, it was disproven that startups with several investment rounds are purchased at higher prices as a result, though it has a low statistical significance.

What investment scheme is more preferable for the future survival of IT startups in the Russian venture market?

It is beneficial to get financing at earlier stages, if there is a need to join the incubator, it is crucial to choose one from the top of successful Russian programs. Finally, it is better to wait with selling till the later stages because startups purchased at later stages are priced higher. However, founders must conduct a continuous market analysis, monitoring the external environment and marketing conditions, as well as searching for investor or buyer in order not to miss the right time and not to abandon the best possible proposal.

The hypothesis of this work was that there are differences in IT startups future success depending on the stage of their investments and there is a possibility to propose a preferable investment strategy in the Russian venture market. It was proven to be true as there were revealed several patterns and dependencies between the conditions of investment and sale and the future development of IT startups. As a result of this research, a beneficial investment strategy was proposed with a set of recommendations made on the basis of all the conclusions derived from the comprehensive analysis conducted throughout the practical part of the thesis.

Investment conditions (stage and sum) were evaluated by their influence and the most beneficial funding strategy for future IT startup development in the Russian venture market was proposed, which means that the aim of this diploma thesis is achieved.

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