

Strategies for Creating Technology Businesses by Serial Entrepreneurs as a Source of New Industrialization

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Abstract. The demand for new industrialization makes the lack of innovation in Russia a topical issue. Serial entrepreneurs are a promising source of innovation. Basing on empirical data (SPARK database), we considered the hypothesis that mass strategies for establishing a technology business are less effective. The aim of the article is to develop a theoretical and methodological approach to serial technology entrepreneurship as a source of new industrialization. The authors identified 4 dominant strategies used by serial entrepreneurs to set up technology businesses. The necessity of a new term "serial potential" of an entrepreneur is substantiated. The research novelty refers to the development of the methodological approach "The Effect of serial technology entrepreneur", which allows evaluating the performance of serial technology entrepreneurs in setting up technology companies. It has been found that the strategy "From services in technology field to production" is the most advantageous in terms of total efficiency for new industrialization.

1 Introduction

The research is aimed at solving the urgent problem of enhancing the serial technology entrepreneurship potential. On the one hand, among the working-age population with entrepreneurial intentions in Russia, about 60% are already functioning entrepreneurs who are planning to open another business [1]. It means that technology entrepreneurs have serial potential. On the other hand, this potential is still insufficiently realized, even though the state and public demand for "accelerating technological development" is growing.

The methodological basis of the research is the systemic and socio-economic approaches, which are based on the dialectical study of the role of entrepreneurs in technological innovations implementation. These approaches make it possible to identify, analyze, classify and predict serial behavior and evaluate its effectiveness both for serial entrepreneurs themselves and for the entire entrepreneurial ecosystem.

Scientific research of entrepreneurship in recent decades has experienced a qualitative rise. In line with this trend, only a few areas are developing most actively. The problem

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under consideration is located between two sufficiently developed scientific directions: technology entrepreneurship and serial entrepreneurship.

The first scientific direction "technology entrepreneurship" has traditionally considered an entrepreneur as a source of innovation. A review of foreign and Russian studies of technology entrepreneurship shows that their relevance is caused by technological structures changes. As Joseph Schumpeter stated [2]: the example of technological revolutions proves that it was entrepreneurs who, through the launch and implementation of new technologies, destroyed old industries and launched new ones. The main generators of innovations for most of the XX century were TNCs, but by the beginning of the XXI century they essentially exhausted their breakthrough resource [3]. In addition, improved conditions for starting a business allowed technology entrepreneurs of the new generation to occupy the niche of generating innovations.

In general, in the context of increased interest, technology entrepreneurship remains an insufficiently studied scientific field in Russia. According to the Global Entrepreneurship Monitor (GEM), in 2018, Russia ranked only 30th in terms of technology entrepreneurship development (4.3% of early-stage and 1.5% of established entrepreneurs) out of 49 countries participating in the project (Slovenia had the best index for start-up entrepreneurs of over 14 %, the worst index of less than 1% was observed in Morocco, Israel, India, Madagascar) [1].

The authors' previous research has made it possible to expand the approach to the interpretation of the term "technology entrepreneurship". The authors propose to understand technology entrepreneurship as entrepreneurial activity with increased risk and uncertainty, which is based on advanced scientific achievements and technologies designed to solve a significant consumer problem (challenge) by creating innovative goods and services with higher added value and focused on rapid growth to obtain profit and other benefits [4].

The second scientific direction "Serial entrepreneurship" has revealed the phenomenon of increased performance of a business established by an already active entrepreneur. Analysis of the current research in this field shows that the phenomenon of serial entrepreneurship in advanced economic science is a key topic in the issue of business performance for development and economic growth (Storey DD (1989) [5]; Landier A., Thesmar D. (2008) [6]; Amaral M., Baptista R. (2011) [7]; Chen J. (2013) [8]; Eggers JP, Lin S. (2014) [9]). One of the first empirical attempts to compare the performance of serial and non-serial entrepreneurs was made by the researchers Wright M., Robbie K., Ennew C. [10] In a 1997 sample of entrepreneurs from the UK, they did not find significantly higher productivity of serial entrepreneurs in comparison with beginners. In a subsequent study (2004) Westhead P., Ucbasaran D., Wright M., Binks M. [11], when using the example of Scottish entrepreneurs, they came to the conclusion that venture entrepreneurs are more efficient due to access to more diverse resources than serial and beginning entrepreneurs.

Thus, existing studies have conflicting conclusions about increased performance of serial entrepreneurs. Moreover, the results of foreign studies require clarification in modern Russian conditions. Separate studies of technological and serial entrepreneurship do not provide the foundation for establishing the specifics of serial technology entrepreneurship nature. Fundamental research at the intersection of technological and serial entrepreneurship has not been conducted yet.

The review of foreign and Russian studies of serial and technology entrepreneurship shows that the research, at the junction of the two indicated directions, describes an important area that has not been sufficiently studied previously. Therefore, it is necessary to continue and expand research into serial technology entrepreneurship. This research is supposed to test the hypothesis that the most massive strategies for setting up a technology

business by serial entrepreneurs are less effective for both the entrepreneur and the national economy.

The aim of the paper is to develop a theoretical and methodological approach to serial technology entrepreneurship as a source of new industrialization, to identify and evaluate the effectiveness of the dominant strategies used by serial entrepreneurs to set up technology businesses. This requires the implementation of the following research objectives: 1. To generalize and systematize the dominant strategies used by Russian serial entrepreneurs while setting up technology businesses. 2. To develop and test the new methodological approach "The effect of a serial technology entrepreneur", which includes the strategy and tools for assessing the effectiveness of Russian serial technology entrepreneurs in setting up technology companies. 3. To develop a theoretical and methodological approach to serial technology entrepreneurship by introducing a new scientific term "serial potential" of an entrepreneur.

2 Methods and Materials of the Serial Technology Entrepreneurs

To assess the performance of entrepreneurs, we used mathematical and statistical analysis methods, in particular, indicative analysis to compare the effectiveness of serial technology entrepreneurs' strategies. A retrospective analysis of entrepreneurial activity to create new economic entities was also used.

The source of empirical data was the data on the economic activities of Russian technology entrepreneurs, contained in the SPARK-Interfax database. This is the most representative database, which includes official information about the main stages of Russian companies functioning.

The sampling was based on the authoritative rating "TechUspek" , annually conducted by Russian Venture Company and involving a wide range of industry experts and scientists. Our research involved all of the 60 successful Russian small technology enterprises, which experts included in the category of "small" "innovative" companies in 2019. The authors performed the procedure of finding and identifying each technology company's founder (s) in the SPARK-Interfax database. Further, we identified the entrepreneur who had founded and/or was developing each company by analyzing data on the founders and comparing its beneficiary and its head. For each identified entrepreneur, it was found out if they had set up other companies, both technology and non-technology ones. As a result of generalization and comparison, data on more than 230 Russia's small enterprises during the period from 1992 to 2020 were systematized and analyzed. Most of them are technology companies and are located in various regions of Russia.

3 Analysis of the Effectiveness of Strategies of Serial Technology Entrepreneurs

Study and detailed analysis of such a large array of data on companies made it possible to assess practical distribution of the following methodological typologies of serial technology entrepreneurship in Russia:

Grouping of entrepreneurs based on the presence of a serial business:

First, non-serial entrepreneurs. We do not consider establishment of another company or other companies to be serial entrepreneurship, if they carry out economic activities in the same industry, and the first established company has characteristics of a "small enterprise". Unexpectedly for the authors, serial behavior among technology entrepreneurs is widespread in Russian practice. So only 2 out of 55 technology entrepreneurs turned out to

be non-serial (or 3.6% of the TechUspeh rating sample in the “small” “innovative” category).

Second, serial entrepreneurs. That is, for each entrepreneur from the rating who had established a small technology enterprise, we estimated the number of companies where they had contributed more than other founders. If there was more than one company, then the person was considered a serial entrepreneur.

Taking into account these two features, we identified 4 main strategies for establishing technology businesses in the order of their growing popularity among Russian serial entrepreneurs:

A. Strategies for cross-sectoral non-technology diversification (“technology enterprise + non-technology company (companies)”) - after the development of one technology enterprise, a new non-technology company was set up in another industry. This group of strategies turned out to be the least common: it was only used by 4 out of 52 entrepreneurs (or 7.7% of the sample). Its lack of popularity is explained, firstly, by the difficulty of choosing the right profitable sphere at once, and secondly, by the resulting attention spread. In order to apply their entrepreneurial abilities and diversify their business, a second company (sometimes more companies) was set up in other industries (real estate, construction, scientific activity, etc.).

B. Strategies for sectoral technological diversification (“technology enterprise + company (companies) in the value chain”) - after the development of one technology enterprise, a new technology company was founded in a related industry. The sustainable operation of a technology enterprise motivated the entrepreneur to set up a company in a related area, in particular, which can be integrated into the value chain (sale of their own products, scientific research, medical, educational and consulting services, etc.). For example, in addition to production (software development – closed joint stock company "DIGITAL DESIGN"), other companies were established in the following areas: sales of own products (LLC "AURORADE"), scientific research in the same or related areas (LLC "RAIDIX"), providing educational product related services (Private educational institution of additional professional education "Training Center" DIGITAL DESIGN "). In particular, the prospects for the successful development of vertical integration make this strategy more complex and capital-intensive, but also more attractive: 6 out of 52 entrepreneurs used it as initial (or 11.5% of the sample).

C. Strategies for sectoral search (accumulation) ("from services in the technology sphere to production") - before the development of a technology enterprise, an earlier technology company was established in a related industry, serving as a source of capital accumulation as well. A typical example of this group is a strategy that can be called "from services provided in the technology sector to production in the same industry", which means a progressive intra-industry development (first, services, and then production in the same industry). Every third entrepreneur in the sample (34.6% or 18 out of 52) used this strategy.

D. Strategies for intersectoral search (accumulation) (“from non-technology to technology business”) - before the development of a technology enterprise, an earlier technology company was established in another industry, serving as a source of capital accumulation as well. This group of strategies turned out to be the most widespread: almost every second entrepreneur entered tech business having entrepreneurial experience (24 out of 52 or 46.2% of the sample). The most common in this group is the strategy "from real estate to technology production", in this case, the initial activity in real estate business helped the entrepreneur form the initial capital for opening a more expensive technology production.

To assess the production and financial results of companies, traditional indicators were used that characterize profit, employment and the amount of budget tax replenishment.

Each indicator was calculated as the average of all operating companies owned by a serial entrepreneur at the time of the study. Due to the lack of some information in the SPARK-Interfax database, 44 technology entrepreneurs were included in the sample. Since the selected indicators, like many other characteristics with a few observations, rarely have a normal distribution, it is more expedient to use a more accurate version of the average, namely the weighted average. It is appropriate to use the share value of an individual entrepreneur in the authorized capital of each of the companies founded by him/her as weights.

$$\chi = \frac{\sum_{i=1}^{\eta} \omega_i * \chi_i}{\sum_{i=1}^{\eta} \omega_i}, \tag{1}$$

where χ – the weighted average of serial performance;

χ_i – the value of company’s performance indicator i ;

η – the number of operating companies established by the entrepreneur;

ω_i – the specific weight of the entrepreneur's capital in the entire authorized capital of the company i .

Experimental calculations of serial entrepreneurs’ production and financial results by means of formula (1) for various strategies in creating technology businesses are presented in Table 1.

Table 1. Comparison of production and financial results of serial entrepreneurs who used different strategies for establishing technology businesses in 2019.

Strategy	Number of companies	Number of employees	Net profit, RUB m	Taxes, RUB m	Cumulative performance rating
A. “Technology enterprise + non-technology company(companies)”	4	139	67.7	64.1	2
B. “Technology enterprise company(companies) in the value chain”	12	22	25.6	10.5	4
C. “From technology services to production”	12	29	39.7	16.0	1
D. “From non-technology to technology business”	16	39	5.5	11.6	3
Total	44	31	16.5	12.1	

It is logical that the first strategy, which also includes the results of non-technology types of businesses established later (therefore, more developed), has a significantly higher number of employees: the average of 139 people in a company versus 31 in the sample. The less frequently used strategy is also the most profitable: the average net profit of technology and non-technology companies is 67.7 million rubles. On the contrary, the most common strategy "From non-technology to technology business " leads to an average profit of 5.5 million rubles. Therefore, taking into account the high prevalence of the third strategy "From technology services to production" and at the same time its high values (especially financial), it is the most advantageous strategy in terms of total efficiency for the country for the purpose of new industrialization (first place in the conditional rating). Slightly less effective, but more advantageous for job creation, is the strategy "Technology enterprise + non-technology company (companies)".

4 Conclusions

1. The study of evaluating the effectiveness of serial technology entrepreneurs is relevant, since they have unrealized potential, considering the growing state and public demand for "accelerating technological development."
2. The conducted review of foreign and Russian research of serial and technology entrepreneurship shows that this study, which is at the junction of two scientific directions, describes an important area that was previously insufficiently studied. Therefore, it is necessary to continue and expand research into serial technology entrepreneurship.
3. We identified 4 dominant strategies used by serial entrepreneurs to establish technology businesses: "technology enterprise + non-technology company (companies)"; "technology enterprise + company (companies) in the value chain"; "from technology services to production"; "from non-technology to technology business".
4. The necessity of a new term "serial potential" of an entrepreneur is substantiated. The research novelty lies in the development of the methodological approach "The serial technology entrepreneur effect", which allows evaluating the effectiveness of serial technology entrepreneurs in setting up technology companies.
5. The most common non-tech to tech business strategy has lower aggregate performance (third place). Therefore, the least recommended strategy is "Technology Enterprise + Company (companies) in the Value Chain" as it has the lowest aggregate performance.

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