



TECHNOLOGICAL ENTREPRENEURSHIP AS A VECTOR OF THE DEVELOPMENT OF THE RUSSIAN ECONOMY UNDER EXTERNAL CONSTRAINTS

EMPREENDEDORISMO TECNOLÓGICO COMO VETOR DO DESENVOLVIMENTO DA ECONOMIA RUSSA SOB RESTRIÇÕES EXTERNAS

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ABSTRACT

The study aims to identify the opportunities and obstacles for developing technological entrepreneurship in Russia. Overcoming external constraints on the Russian economy and achieving high economic growth rates are impossible without focusing on innovative development and technological independence. In this regard, fostering technological entrepreneurship at the regional and national levels is a key objective in ensuring Russia's economic security and sovereignty.

Methods: The study is based on a comparative analysis of data on the state of technological entrepreneurship in Russia and leading global economies, as well as a systematic analysis of support mechanisms for this type of business.

Results: The article assesses Russia's position in terms of technological innovation on a global scale and ranks it. The authors analyze the innovation and technological prerequisites for developing technological entrepreneurship nationwide and in specific regions.

Conclusions: The Russian economy is experiencing significant challenges related to the post-pandemic period and the impact of sanctions imposed by major global economies. These factors have substantially weakened Russia's competitiveness in international trade by limiting access to advanced technologies across various





economic sectors. Prioritizing the development of technological entrepreneurship should catalyze achieving innovation-driven self-sufficiency. The study's novelty is associated with original proposals for building a technological entrepreneurship system through the interaction of the state, business, science, and education.

Keywords: Technological entrepreneurship; Education and innovation; Economic security; Technological independence of the state.

RESUMO

O estudo visa identificar as oportunidades e obstáculos para o desenvolvimento do empreendedorismo tecnológico na Rússia. Superar as restrições externas à economia russa e atingir altas taxas de crescimento econômico são impossíveis sem focar no desenvolvimento inovador e na independência tecnológica. Nesse sentido, promover o empreendedorismo tecnológico nos níveis regional e nacional é um objetivo fundamental para garantir a segurança econômica e a soberania da Rússia.

Métodos: O estudo é baseado em uma análise comparativa de dados sobre o estado do empreendedorismo tecnológico na Rússia e nas principais economias globais, bem como uma análise sistemática de mecanismos de suporte para esse tipo de negócio.

Resultados: O artigo avalia a posição da Rússia em termos de inovação tecnológica em escala global e a classifica. Os autores analisam os pré-requisitos de inovação e tecnologia para o desenvolvimento do empreendedorismo tecnológico em todo o país e em regiões específicas.

Conclusões: A economia russa está enfrentando desafios significativos relacionados ao período pós-pandemia e ao impacto das sanções impostas pelas principais economias globais. Esses fatores enfraqueceram substancialmente a competitividade da Rússia no comércio internacional, limitando o acesso a tecnologias avançadas em vários setores econômicos. Priorizar o desenvolvimento do empreendedorismo tecnológico deve catalisar a obtenção de autossuficiência impulsionada pela inovação. A novidade do estudo está associada a propostas originais para a construção de um sistema de empreendedorismo tecnológico por meio da interação do Estado, das empresas, da ciência e da educação.

Palavras-chave: Empreendedorismo tecnológico; Educação e inovação; Segurança econômica; Independência tecnológica do estado.

1 INTRODUCTION

Ensuring economic growth in Russia has always been a top priority, especially considering the fact that over the past three years, the Russian economy has been under the influence of international sanctions and other restrictive measures. In this context, achieving technological independence, innovation-driven self-sufficiency, and economic security has become a pressing challenge. Accelerated development and





progress toward technological leadership could serve as an initial stage in the qualitative transformation of the national economy. This vector of economic transformation requires large-scale efforts from the state and regional authorities to achieve a multiplier effect in creating a national innovation system capable of ensuring continuous and sustainable long-term development and maintaining the reproduction of technological innovations over an extended period. In this regard, Russia is placing a strong emphasis on the accelerated development of technological entrepreneurship (Galimullina, 2023).

To become a key driver of economic growth, technological entrepreneurship requires specific organizational conditions and coordinated actions from the state, regional authorities, real-sector enterprises, and the education system. The latter is the foundation for preparing highly qualified professionals focused on innovation-driven development priorities.

A literature review shows that the issue of technological entrepreneurship and ensuring technological independence is multifaceted. Several aspects require further research and solutions, such as the impact of external constraints on Russia's technology and innovation market, institutional aspects of technological development regulation, and the challenge of training a qualified workforce to meet the demands of rapid technological progress.

This article analyzes the current state of technological entrepreneurship in Russia, assesses its position in relation to leading high-tech economies, identifies both the prospects and challenges associated with the urgent need for independent technological advancement, and formulates recommendations for enhancing Russia's technological transformation in the near future.

The research objective is to identify opportunities and obstacles for developing technological entrepreneurship in Russia.

Research tasks are as follows:

- To assess Russia's level of technological development compared to global economies;
- To analyze socioeconomic trends and challenges in the labor market amid the digitalization of the Russian economy;
- To develop recommendations aimed at mitigating socioeconomic difficulties arising from labor market transformations in the context of digital economic development in Russia.





2 MATERIALS AND METHODS

The current state of technological entrepreneurship in Russia was assessed based on statistical data and official analytical reports from the Higher School of Economics (Gokhberg, 2021), the Ministry of Foreign Affairs of the Russian Federation (Ministerstvo inostrannykh del Rossiiskoi Federatsii, 2023), the “Expert” Analytical Center (Tolmachev, 2024), and the Competence Development Center of the Higher School of Business (Tsentr razvitiya kompetentsii, 2021). To consider the infrastructural challenges of technological entrepreneurship in Russian regions, an empirical observation method was employed, involving the collection and analysis of statistical data characterizing this market. The primary sources of information included official statistics from the Federal State Statistics Service for 2022-2024 and regional statistical data from selected regions (Territorialnyi organ Federalnoi sluzhby gosudarstvennoi statistiki, n.d.). The chosen research period is justified by the fact that during this time, the Russian labor market was significantly affected by a combination of adverse global factors, including the post-pandemic period and the imposition of international sanctions aimed at hindering Russia’s economic development.

3 RESULTS

Russia’s socioeconomic development will be shaped by the growing importance of technological entrepreneurship and private initiative. In line with global trends related to technological shifts and the increasing role of creativity, entrepreneurship as a form of creativity and self-realization has become an almost inevitable strategy for population adaptation. New technologies are expanding opportunities for small businesses.

Technological entrepreneurship is a potential driver of employment, economic diversification, and long-term growth in the domestic economy. In an era of automation, rising labor productivity in large enterprises, and increasing retirement age, millions of specialists will require employment and retraining. (Zemtsov, 2020, p. 20). Technological entrepreneurship involves the investment of financial, intellectual, and human resources into specific assets (new physical or software products) based on cutting-edge scientific and technological advancements (knowledge-intensive ideas). These assets are created to maximize value and enhance the efficiency of a company or enterprise. (Tsentr razvitiya kompetentsii, 2021).





Technological entrepreneurship is defined as an activity that generates value by combining human capital with tangible and intangible assets (Belokur & Tsvetkova, 2019). "As a key trend in the digital economy and a response to the innovation challenges of social development, technological entrepreneurship is attracting attention from scientists and is being recognized as a significant factor in the modern socioeconomic system" (Galimullina, 2023, p. 1159).

The need for large-scale changes in the development of technological entrepreneurship in Russia is conditioned by the country's current position, ranking 48th globally in the technological innovation index (Figure 1).

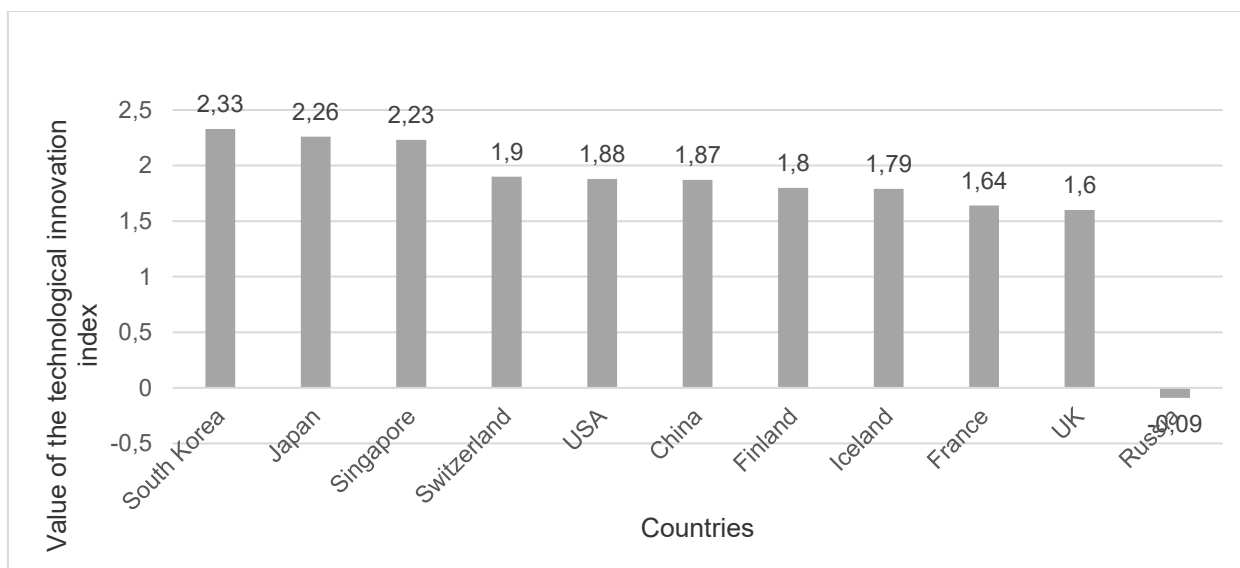


Figure 1. Country ranked by the technology innovation index in 2024. Compiled based on data from (Global finance. Information portal, n.d.)

Being a technological outsider makes it impossible to achieve a qualitative leap in economic growth and improve the standard of living. Furthermore, it is difficult to regain competitive positions in international trade while remaining merely a supplier of energy resources. These factors stipulate the urgent need for technological independence.

As a result, Russia is actively fostering technological entrepreneurship by integrating business and education. This support is being implemented in the form of technology startups in higher education. The sector is becoming crucial for strengthening the national and regional economies. The growing significance of this trend is evidenced by the fact that over the past two years, an increasing number of students and young scientists have been engaging in the creation of technology



startups, which are expected to lay the foundation for future high-tech companies.

According to a study conducted by the Project Office for the Development of Youth Entrepreneurship in Higher Education Institutions, as of early October 2024, a total of 338 universities were participating in initiatives fostering youth entrepreneurship in higher education. Of these, 209 institutions joined for the first time, while 129 had participated previously. (Departament gosudarstvennoi molodezhnoi politiki, n.d.).

Indeed, technological entrepreneurship is not only an emerging sector in the national economy but also a crucial step toward establishing sustainable businesses capable of growing from startups to small enterprises. This is evidenced by the Project Office for the Development of Youth Entrepreneurship in 2023, “aimed at creating conditions for student startup projects within universities under the Startup as a Diploma program. Research data from the Project Office indicates that by early October 2024, 170 universities had participated in the program, with 3,326 students defending their final qualification projects in the Startup as a Diploma format. These participants represented eight federal districts and 64 regions (Proektnyi ofis po razvitiyu molodezhnogo predprinimatelstva, n.d.). During the analyzed period, 269 startups successfully registered as legal entities or sole proprietors. The leading professional fields among these startups include telecommunications, information and communications technologies, services and consumer-oriented businesses, education, finance, and economics (Proektnyi ofis po razvitiyu molodezhnogo predprinimatelstva, n.d.).

To understand the essence of technological entrepreneurship, it is essential to define its specific characteristics. “Technological entrepreneurship is a phenomenon of the modern economy driven by information and digital technologies, and innovation” (Galimullina, 2023, p. 1160). Each year, more than 30,000 young Russian citizens participate in entrepreneurial projects, and 23% of individuals aged 14 to 35 years express a desire to start their own business. This highlights the crucial role of youth-driven technological entrepreneurship in the development and modernization of the national and regional economies (Proektnyi ofis po razvitiyu molodezhnogo predprinimatelstva, n.d.).

The Lipetsk Region is a compelling example of a Russian region poised for the successful growth of technological entrepreneurship in the near future. Known for its high investment attractiveness and innovation-driven growth, Lipetsk has traditionally





been dominated by metallurgy and other manufacturing sectors. The processing industry accounts for 48.9% of the region's GRP, while 28% of the region's employed population works in industrial production. In 2022, the GRP of the Lipetsk Region reached 792,823.2 million rubles, with small- and medium-sized enterprises contributing 24.3% (Territorialnyi organ Federalnoi sluzhby gosudarstvennoi statistiki, n.d.). The total volume of goods shipped from own production amounted to 1,097,525.1 million rubles. However, the share of innovative goods and services in this total output was only 3.4%, with industrial organizations accounting for 2.9% (Lipetskayaoblast.rf, n.d.).

The Lipetsk Region is characterized by relatively low economic activity and underdeveloped entrepreneurship, including technological entrepreneurship. This is due to several key factors.

The primary obstacle hindering the regional development of technological entrepreneurship is the acute shortage of engineering and technical specialists with experience in applying modern technologies. A possible solution requires significant investment in strengthening material and technical resources for their training. Another limiting factor is the lack of or insufficient investment in R&D at regional enterprises and a high dependence on foreign equipment, components, and technologies. Outdated infrastructure and equipment at many production facilities, combined with limited access to affordable financing, further constrain the region's potential for technological growth.

Despite these factors, the socioeconomic indicators of the region's performance in recent years suggest that the Lipetsk Region possesses the necessary potential to establish and grow technological entrepreneurship. According to official statements,

the regional administration is actively pursuing a policy of encouraging local enterprises and entrepreneurs to achieve high positions in the rankings of the largest companies in Russia and worldwide. One of the key strategic goals outlined in the Strategy for the Socioeconomic Development of the Lipetsk Region until 2030 is the priority development of a globally competitive industrial sector, advanced technologies, and environmentally sustainable agriculture. This strategy aims to create favorable conditions for productive employment and successful entrepreneurship. (Strategiya sotsialno-ekonomicheskogo razvitiya, 2022).

To assess the prospects for regional technological entrepreneurship, it is essential to examine a comprehensive system of indicators, including capital (fixed





assets), human resources, scientific potential, government procurement, institutional environment, and infrastructure availability.

The foundation of technological entrepreneurship lies in high-tech activities (Belokur & Tsvetkova, 2019, p. 2213). According to the National Report “High-Tech Business in the Regions of Russia”, the Lipetsk Region is classified as a small center of non-resource-based growth, with its share of Russia’s resources for high-tech business development reaching 0.91% and its share in the results of Russia’s high-tech business being 0.37% (Zemtsov, 2020). The report places the Lipetsk Region among the regions with favorable conditions and accessible resources for high-tech business development.

In the context of digital transformation, there is a growing likelihood of a sharp decline in employment within the next five or seven years. One of the most effective tools for increasing employment in the region is the creation of new businesses as a form of innovation and self-realization, with technological entrepreneurship playing a key role. An analysis of relevant indicators suggests that, based on the regional attractiveness index for highly skilled professionals, which includes factors such as housing conditions, climate, and income levels, the Lipetsk Region ranks 6th, following the Voronezh Region and the Belgorod Region. This ranking reflects the region’s competitiveness in terms of attracting and retaining highly qualified talent (Zemtsov, 2020).

The scientific potential of the Lipetsk Region is represented by 15 higher education institutions, including three state universities (P.P. Semyonov-Tyan-Shansky Lipetsk State Pedagogical University, Lipetsk State Technical University, and I.A. Bunin Yelets State University), along with two private universities and ten research branches (ZAO “Scientific Research Institute of Environmental Problems in Metallurgy”, the All-Russian Scientific Research and Project-Technology Institute of Rapeseed, and the Institute of Foundry Technology and Engineering, etc.) (Ministerstvo inostrannykh del Rossiiskoi Federatsii, 2023). More than 250 research projects are underway, many of which directly address regional challenges and support key industries, including metallurgy, energy, construction, mechanical engineering, agriculture, healthcare, and education.

Regarding government procurement, the Lipetsk Region has demonstrated a steady annual increase in contract volumes. As of early 2024, the total procurement volume amounted to 64.8 billion rubles, with absolute budget savings of 4.1 billion





rubles and a relative budget savings rate of 10% over the same period (Goszakaz Lipetskoi oblasti, n.d.).

Characterizing the institutional environment, the Lipetsk Region stands out as a region with high investment attractiveness, ranking among the top 15 in the National Rating of Investment Climate in the Russian Federation. The structure of fixed capital investments is as follows: transportation and storage – 3%, electricity, gas, steam supply, and air conditioning – 4%, agriculture – 12%, and residential construction – 24%. The region holds the 1st place in the Central Federal District for industrial output per capita (1.014 million rubles) and the 5th place for investment per capita, which amounted to 146.8 thousand rubles in 2022. Currently, the region's credit rating is at AA (RU) with a "Stable" forecast, while its bonds are also rated AA (RU) (Agentstvo investitsionnogo razvitiya Lipetskoi oblasti, n.d.).

The Lipetsk Region is actively developing its investment and innovation infrastructure, positioning itself as one of Russia's leading regions in this regard. The region has established successful practices for attracting investors, with a notable example being the special economic zone of industrial production type "Lipetsk", which operates across two sites in the Gryazinsky and Yeletsky municipal districts.

Since its establishment, the zone has attracted 67 resident companies, with a total declared investment volume of 178.9 billion rubles and the creation of 16,700 declared jobs. In terms of non-resource exports per capita, the Lipetsk Region is an absolute leader, demonstrating a 17.8% growth over two years. Within the Central Federal District, the region ranks 3rd in total goods exports. (Gokhberg, 2021, p. 47).

A key innovation development tool in the region is the cluster policy. Three innovation clusters have been established in the Lipetsk Region. The region has built an effective innovation infrastructure ecosystem, including special economic zones, technology parks, and other facilities, supported by targeted government initiatives fostering innovation-driven projects.

Thus, an assessment of these indicators suggests that sustainable economic growth in the Lipetsk Region can be achieved through the development of technological entrepreneurship. This process relies on collaboration between the government, scientific and educational institutions, and key representatives of the business community.

A distinctive feature of technological entrepreneurship is that it differs





significantly from traditional business forms. Its foundation lies in the concept of an innovative business idea. The development of technological entrepreneurship requires a well-established regional innovation ecosystem that fosters its growth. This entrepreneurial activity demands a strong regional foundation, including appropriate infrastructure, a supportive legislative framework, resource potential, socioeconomic, institutional, and educational environment that facilitate the adoption of such progressive changes.

In terms of innovation activity, the Lipetsk Region ranks 29th among all Russian regions, with the consolidated innovation index of 0.378 (Abashkin et al., 2023). The structure of this indicator (Table 1) is of particular interest as it represents the region's strengths and weaknesses and capacity to embrace technological entrepreneurship as a new driver of economic diversification.

According to Table 1, the consolidated innovation index of the Lipetsk Region is based on aggregated values of socioeconomic conditions for innovation activity, scientific and technological potential, innovation activity, export activity, and the quality of innovation policy. These indicators consist of 15 detailed structural metrics that ultimately determine the innovation index of the region. A closer examination reveals that only four out of 15 indicators meet or exceed the average values for the Russian economy. In our opinion, the key consolidated indicator defining the region's technological entrepreneurship prospects is its scientific and technological potential, i.e., the real capabilities that can be transformed into technological projects and bring positive economic results. However, among the four structural indicators forming the innovation potential of the Lipetsk Region, only one (material and technical resources) equates to the national average. This can be explained by the region's historical industrial specialization which has been traditionally linked to ferrous metallurgy, industrial machinery, and agricultural engineering.

Table 1. Structure and value of the consolidated innovation index of the Lipetsk Region in 2023 (compiled based on (Abashkin et al., 2023))

Indicators forming the consolidated innovation index of the region	Structure of indicators forming the consolidated innovation index of the region	Ranking of indicators forming the consolidated innovation index of the region (index value)	Compliance with average values for the Russian economy (+/-)	Total value of the indicator included in the composite innovation index (ranking/index)
	Basic macroeconomic	55 (0.222)	-	55/0.341





Socioeconomic conditions of innovation activity	indicators			
	Educational potential of the population	32 (0.500)	+	
	Digitalization potential	59 (0.301)	-	
Scientific and technological potential	R&D financing	59 (0.225)	-	39/0.364
	Academic personnel	67 (0.223)	-	
	Material and technical resources	10 (0.596)	+	
	Effectiveness of scientific R&D	45 (0.410)	-	
Innovation activity	Activity in technological and non-technological innovations	7 (0.636)	+	20/0.337
	Innovation costs	26 (0.233)	-	
	Innovation performance	38 (0.143)	-	
Export activity	Export of goods and services	22 (0.428)	-	37/0.346
	Knowledge export	60 (0.264)	-	
Quality of innovation policy	Regulatory and legal framework for science, technology, and innovation policy	1 (1.000)	+	32/0.62
	Organizational support of science, technology, and innovation policy	20 (0.500)	-	
	Participation in federal science, technology, and innovation policy	35 (0.361)	-	

The academic personnel in the Lipetsk Region, ranking relatively low at 67, indicates a severe shortage of qualified researchers, preventing the effective realization of its scientific and technological potential. The existing scientific and technological infrastructure is primarily being used for current production and consumption needs rather than for prospective research and development.

The shortage of skilled personnel is a critical challenge for technological entrepreneurship in the Lipetsk Region and the Russian economy. The deficit of resources and an insufficient number of competent professionals in technological entrepreneurship worsen the uneven technological development of Russian regions. Moreover, a significant “disparity in living standards forces the most qualified and valuable professionals to relocate to regions with higher innovation potential and better-paying jobs” (Myasnyankina & Zaitsev, 2023, p. 55). According to official statistics and expert assessments,

about 40% of Russia’s industrial innovation assets are concentrated in just three federal subjects: Moscow, Saint Petersburg, and the Moscow Region. Meanwhile, the Kaluga Region, the Ulyanovsk Region, the Nizhny Novgorod Region, and the Perm Territory demonstrate an average level of technological development. (Kadatskaya & Lavrova, 2020, p. 985).



A key initiative stimulating technological entrepreneurship in Russian regions is the Startup as a Diploma program launched by the Ministry of Science and Higher Education of the Russian Federation as part of the national “Digital Economy” program. Implemented in Russian universities since 2020, this program aims to establish a system for developing entrepreneurial competencies within higher education institutions and to prepare professional personnel in technological entrepreneurship. The broader vision behind the effective implementation of this program is to ensure technological sovereignty and achieve full economic security for the country.

4 DISCUSSION

Research findings indicate that Russia’s transition to accelerated technological development is only possible through a rapid and high-quality transformation of its higher education system. This transformation must ensure the country has the necessary workforce for technological entrepreneurship. This shift is not limited to the specialized training of economists. It requires graduates from all fields of study to be prepared for involvement in the technological business sector. Recognizing this need, Russia launched the national program Startup as a Diploma to integrate the educational process with student entrepreneurship. This initiative aims to develop the skills required for creating and managing businesses while enhancing graduates’ competitiveness in the job market. In a rapidly evolving economy where innovation plays the main role, the program can become a key tool for fostering a new generation of entrepreneurs. Indeed, research highlights several fundamental advantages of this program:

1. The development of entrepreneurial skills across all disciplines. The program enables students, regardless of their field of study, to gain practical knowledge in startup creation and management. This can significantly improve their employment prospects and career growth. Essential competences such as teamwork, problem-solving, and decision-making are crucial for future entrepreneurs.
2. Innovation-driven economic growth. By fostering new businesses, the program promotes the replication and scaling of innovative experiences. Young entrepreneurs can introduce new ideas and technologies to address pressing challenges and improve the quality of life. This contributes to job creation, the expansion of the middle class, and increased tax revenues.





3. Stronger collaboration between universities and businesses. University-based startups can receive support from experienced entrepreneurs, investors, and mentors, fostering knowledge exchange and resource sharing. This collaboration could be the foundation for an innovation ecosystem where universities act as hubs for technological advancement.

4. Active government support for startups and technological entrepreneurship. Within the Startup as a Diploma framework, students gain access to grants, subsidies, and other forms of financial support. These incentives encourage young people to pursue entrepreneurship and transform their ideas into real businesses.

5. Access to international markets. Modern technology enables young entrepreneurs to expand beyond national borders, which is a crucial advantage given the current external economic restrictions and attempts at global isolation. The Startup as a Diploma program equips students with the knowledge to adapt their products and services for international markets, opening new opportunities for growth and enhancing the global competitiveness of Russian businesses.

However, like any initiative aimed at achieving breakthrough results, the Startup as a Diploma program faces several challenges that must be addressed for its effective implementation:

1. Insufficient preparation of university faculty for teaching entrepreneurship. Many professors lack practical experience in creating and managing businesses, which may negatively impact the quality of education. A comprehensive approach is needed to organize specialized training for faculty members, along with a clear institutional understanding of what constitutes a student startup. This is also necessary to prevent concept substitution and the misrepresentation of program outcomes, where a small private business in retail or everyday services is mistakenly presented as a successful startup.

2. Lack of infrastructure to support startups, including incubators, accelerators, and innovation centers. In some regions of Russia, such infrastructure is either absent or underdeveloped. This limits students' ability to implement their ideas and reduces the overall potential of the program.

3. Financial risks and lack of investment in student entrepreneurship due to the novelty of this area, hesitation from large businesses to take risks, and distrust from small enterprises. Students often face difficulties in attracting investment for their projects. Despite government support, private investors prefer funding more





experienced teams, making it harder for students to secure financing. The declining interest of private investors in university startups is primarily linked to high economic and financial uncertainty caused by sanctions and the limited business competencies of student teams.

4. Lack of practical entrepreneurial and teamwork skills among students. While the program is designed to develop practical skills, students do not always achieve the intended goals. Many lack experience in real business environments, making their startups less viable or even leaving them incomplete, both as actual projects and theoretical concepts. To address this, it is essential to actively integrate hands-on entrepreneurial experience into the educational process by replicating success stories of technology entrepreneurs, organizing training seminars, and conducting workshops.

5. Cultural barriers and fear of failure. The Russian society has a certain level of fear regarding business failure and an almost categorical aversion to risk, which can discourage young people from starting their ventures. Cultural stereotypes associating entrepreneurship with high financial risks and frequent failure may negatively impact students' motivation to participate in this program and entrepreneurship.

To overcome these challenges, it is necessary to revise the qualitative approach and organizational algorithms of the educational process in universities. To initially guide students toward technological entrepreneurship, the educational process should be structured into three fundamental stages:

1. Engaging students in entrepreneurial activities.
2. Supporting student startup projects.
3. Facilitating startup implementation and scaling successful experiences.

At the first stage, during the first and second years of study, students should be introduced to entrepreneurial activity through courses such as "Economics and Financial Literacy" and "Project-Based Learning." To develop teamwork skills, interdisciplinary projects should be incorporated into the curriculum. Extracurricular activities should include entrepreneurial competence training conducted by employers or practicing entrepreneurs.

At the second stage, during their second and third years of study, support for startup projects should involve interdisciplinary project work, participation in entrepreneurial skill competitions, and mentorship from university startup studios or entrepreneurial communities. In addition, senior students should be encouraged to take part in the Startup as a Diploma competition.





The third stage, supporting implementation and scaling successful ventures, should facilitate the seamless integration of student startups into the real economy through regional development institutions, “My Business” centers, the region’s innovation ecosystem, and the entrepreneurial community. This stage should also include post-graduation support.

Only a structured approach to the formation, development, and scaling of technological entrepreneurship can yield a tangible impact at the regional economic levels and on a national scale.

Our results, when compared with other studies in this field, indicate that forecasting future changes in the Russian labor market in the context of digital economic transformations remains highly relevant and requires further research.

5 CONCLUSIONS

The research findings indicate that technological entrepreneurship is crucial for ensuring Russia’s economic security and serves as a promising driver of its economic growth. However, to be truly effective, technological entrepreneurship must evolve into a systematic integration of business and education, rather than remain a standalone initiative. Only then can it scale across the entire Russia. At the current stage, several key challenges must be systematically addressed to facilitate the effective development of technological entrepreneurship.

The uneven economic development of Russian regions results in significant gaps in employment opportunities, salary levels for qualified specialists, and the ability to apply professional skills effectively. This leads to talent migration from lower-income regions and industries to areas with better economic conditions and career prospects. A strong industrial and scientific infrastructure does not necessarily equate to the technological leadership of a particular region. The key resource remains the availability of highly skilled professionals. Therefore, higher education is vital in preparing the workforce for technological entrepreneurship. The Startup as a Diploma program has significant potential for driving economic growth by nurturing a new generation of entrepreneurs and stimulating innovation. However, its impact should extend across the country, rather than being concentrated only in regions experiencing an influx of skilled labor. Universities in these regions lead in startup implementation, investment attraction, and innovation commercialization. According to the “Expert”





Analytical Center, only 25 universities across six Russian cities are actively implementing startups and securing investments, while a total of 49 universities in 16 cities are engaged in startup activities (Tolmachev, 2024).

To successfully implement this program, it is necessary to overcome several challenges related to teacher training, lack of infrastructure, and cultural barriers. A comprehensive approach is required, encompassing the improvement of educational methods, the development of startup support infrastructure, and a shift in public perception of entrepreneurship. These measures create the conditions necessary for the program's effective functioning and positive impact on the national economy.

Ultimately, the effectiveness of the program will depend on the joint efforts of the government, educational institutions, and businesses to establish a favorable ecosystem for the development of startups in Russia.

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