

# *Digital technology entrepreneurship in modern regional development*

Korchagina I.V.  
Kemerovo State University  
Kemerovo, Russia  
korchagina-i@mail.ru

Sychjova-Peredero O.V.  
Kemerovo State University  
Kemerovo, Russia  
ovsp2006@rambler.ru

Korchagin R.L.  
Kemerovo State University  
Kemerovo, Russia  
kor4.ru@yandex.ru

**Abstract** — Digital technology entrepreneurship is an important element of the transition to the digital economy, a factor of accelerating regional development. But this type of entrepreneurship has been studied insufficiently in the scientific literature. The aim of the study is to determine the impact of digital technology entrepreneurship on the development of Russian regions by clarifying its types and features. The methods of included observation, structural analysis, functional analysis, comparative analysis were used in the study. As a result, the definition of digital technology entrepreneurship is clarified, its categorization by four classification grounds is developed, the main features are established, the key directions of influence on the social and economic development of the region are identified. The recommendations on the accelerated development of digital process entrepreneurship in the regions are proposed and substantiated. The results of the study can be used by the authorities and universities developing digital technology entrepreneurship.

**Keywords** — digital economy, digital technology entrepreneurship, region, technology transfer, innovation ecosystem.

## I. INTRODUCTION

In the 1980s, the concept of technology entrepreneurship was introduced into scientific circulation, which plays an important role in the modern theory of innovation and economic development [1, 2]. In the context of the transition of the economy to digital technologies, technology entrepreneurship is also undergoing digitalization, thus, the term "digital technology entrepreneurship" has arisen. Digital technology entrepreneurship, on the one hand, is associated with the development of new digital products, applications, and services. On the other hand, it can facilitate the transfer and implementation of world-class digital technologies in the regions. But this phenomenon is studied insufficiently. In Russian scientific journals indexed by the "Russian Science Citation Index", the authors found no articles with the descriptor "digital technology entrepreneurship" in the title, abstract or keywords.

Among the world's publications, one can distinguish the work by F. Giones, A. Brem, where the hypothesis of the emergence of digital technology entrepreneurship in the conditions of digitalization has been put forward for the first time. They share the traditional technology entrepreneurship associated with the commercialization of truly new scientific knowledge (they consider the creation and introduction of graphene to the market as a typical example of technology entrepreneurship) and digital entrepreneurship, which cannot develop new technologies, but use the Internet of things, smart devices, artificial intelligence to solve a variety of tasks [3].

S. Nambisan notes that digital technologies open a new period in the development of entrepreneurship [4]. For example, the analysis of big data in the areas of health, transport, education can identify new social problems, unmet needs that open up new business opportunities for entrepreneurs. However, this article examines the digitalization of traditional entrepreneurship rather than the role of technology entrepreneurship in the development of digital technologies. A similar approach is also presented in the study by A. Pergelova et al., where it is shown that digital technologies contribute to the development of traditional entrepreneurship of women [5], B. Hansen on the use of digital technologies by Chinese entrepreneurs [6]. Often digital technologies are considered as a way to involve marginal groups or people with disabilities in entrepreneurship [7].

Digital academic entrepreneurship is considered in the work by P. Rippa and G. Secundo [8]. Traditional academic entrepreneurship is closely related to technology entrepreneurship. It involves the commercialization of the results of university research and development. The widespread adoption of digital technologies is transforming academic entrepreneurship so that stakeholders are more involved. New forms of technology entrepreneurship, including networking, are emerging. These authors note that the study of digital technology entrepreneurship in 2019 is only beginning (although, as shown by the study of Internet sites of universities in Europe and the United States, they

already have special training programs for digital technology entrepreneurship).

K.A. Venkatesh and N. Pushkala view a digital entrepreneur as an intelligent entrepreneur working with digital technologies such as cloud computing or the Internet of things. [9] Their study provides examples of digital services created by entrepreneurs for pilgrims in India. The latest research raises the question of a digital entrepreneurial ecosystem by analogy with more traditional approaches to entrepreneurship ecosystems [10].

Thus, existing research focuses mainly on how digital technology is changing traditional entrepreneurship. Digital technology entrepreneurship is insufficiently studied even at the qualitative, descriptive level, its role in social and economic development is not disclosed. Therefore, the purpose of this article is to determine the importance of digital technology entrepreneurship in regional development on the basis of clarification of its key content characteristics.

## II. RESEARCH METHODOLOGY

The study is qualitative, because digital technology entrepreneurship is studied insufficiently, it requires the development of fundamental scientific provisions (definition, features, types, forms, etc.) for further research. The following qualitative research methods are used in this research: structural analysis, functional analysis, comparative analysis, scientific abstraction. The method of the included supervision of training of potential technology entrepreneurs, creation and development of digital business projects on the basis of School of technology entrepreneurship "Insight", Kemerovo state University, is also used. One of the authors is the head of this school, others take an active part in its work. The materials of the study are the data of the included observation, documents and materials on the work of the School of technology entrepreneurship "Insight", as well as the basic documents of international organizations on the digital economy [11, 12, 13].

## III. RESULTS OF THE RESEARCH

At the first stage of the study, the definition of digital technology entrepreneurship is clarified by synthesizing recognized scientific ideas about the essence of technology entrepreneurship and the digital economy. As you know, classical technology entrepreneurship is a project for the commercialization of new scientific and technical knowledge, usually on the basis of technology firms (startups). What is important for understanding digital technology entrepreneurship is that it does not necessarily involve the use of fundamentally new scientific knowledge and technologies. Digital technology entrepreneurship can use well-known commercial technologies to solve various consumer problems, work with software products, in the Internet space.

A typical example of digital technology entrepreneurship is the development of new software products, applications for smartphones, technical solutions for automation of production, control of technology processes (for example, the use of GPS navigation technologies to control road transport). However,

excessive expansion of the scope of the concept is also incorrect. Already, many traditional entrepreneurs, who are not directly related to digital technologies, use these elements in their activities. Almost any small business can store information in the cloud, manufacturing firms can become more efficient using the Internet of things, etc. Thus, almost all entrepreneurial firms can use digital technologies, but this does not give grounds to classify them as digital technology entrepreneurship.

According to the authors, in order to separate digital technology entrepreneurship from other types, it is advisable to use the criterion of the source of consumer value creation. Digital technology firms offer the consumer goods, works, services, where consumer value is created primarily by digital technologies. The consumer receives mainly the end result of the operation of digital technologies (information, analysis data, automation services, ready-made solutions). If an entrepreneur uses digital technologies in their activities, but the consumer value is not directly based on them, it is a traditional entrepreneurship that uses digital technology as a consumer.

In particular, a company that provides GPS-monitoring services for vehicles or Internet of things technology for semi-autonomous driving, monitoring the condition of vehicles is an example of digital technology entrepreneurship, since the result of the consumer's interest is formed by the direct use of digital technologies. At the same time, it can use both its own and purchased from another vendor programs, devices, computer networks. On the contrary, a car service or transport service provider can use digital technologies in its work, e.g., cloud technologies or blockchain, but it is not a digital entrepreneurial firm, because the value for the client in this case is created without the direct application of these technologies.

Thus, digital technology entrepreneurship is proposed to be understood as entrepreneurial activity in the course of which all or most of the consumer values are created by the direct use of digital technologies. This definition makes it possible to clearly define the range of digital technology entrepreneurs for research and management decision-making.

Next, let's consider the problem of classifying digital technology entrepreneurs. According to the authors, taking into account modern ideas about digital technologies, it is important to categorize them according to the following classification grounds: availability of technologies of own development; sphere of activity of the digital technology entrepreneur; origin of the entrepreneurial project, degree of its independence; content of the digital technologies used.

Based on these classification principles, the following classification of digital technology entrepreneurs is proposed (Table 1). It categorizes digital technology firms in terms of impact on national and regional economies, support needs, risk levels, scientific and technological capacity, and other variables.

For example, self-development of new digital technologies is the most difficult and risky activity, it requires significant support. At the same time, it has the maximum potential to

have a positive impact on social and economic development. Digital technology entrepreneurship has a certain specificity that distinguishes it from both traditional and classical technology entrepreneurship. It is proposed to distinguish the following features.

TABLE I. CLASSIFICATION OF DIGITAL TECHNOLOGY ENTREPRENEURSHIP

Classification feature	Types	Scope
1. Availability of proprietary digital technologies	1.1. Using only proprietary technologies 1.2. Using only borrowed technologies 1.3. Using technologies, both proprietary and borrowed	Allows to consider the potential effect of the digital technology entrepreneur, differentiating support (development of own technologies is more complex, costly, risky, but gives a greater effect)
2. Digital technology entrepreneur's field of activity	2.1. Through the market 2.1.1. Consumer market (B2C) 2.1.2. Industrial market (B2B) 2.1.3. Public procurement (B2G) 2.2. By types of economic activity and industries	Allows to analyze the impact of digital technology entrepreneurship on different markets and industries, compare them
3 Origin of the entrepreneurial project, degree of its independence	5.1. Independent (initiative) 5.2. University-based (academic spin-off) 5.3. Large corporation-based (corporate spin-off)	Allows to determine the productivity of the innovation ecosystem, identify the impact on the development of digital technology entrepreneurship of universities and corporations. We need a balanced proportion between independent projects and spin-offs
4. Content of digital technologies used in the work	4.1. The Internet of things 4.2. Big data 4.3. Virtual reality 4.4. - Smart technologies, etc.	Allows to assess the balance of development of all types of digital technologies, tracking how entrepreneurs work with end-to-end digital technologies that are important for the development of the economy

1. According to the degree of influence on innovative development and economic growth, technology entrepreneurship stays between traditional entrepreneurship and classical technology entrepreneurship. A digital entrepreneur using only proprietary technology is actually a classic technology entrepreneur. But most digital technology entrepreneurs use borrowed technologies, transfer them to the regions, adapt them, and form flexible solutions for the users. This significantly increases the efficiency of traditional industries, the quality of life of citizens, although there is no creation of fundamentally new industries based on new technologies, which has a maximum positive impact on social and economic development (local monopoly, radical diversification of the economy).

2. Digital technology entrepreneurship, unlike classical, is less risky and requires less resources, because it uses less real (tangible) assets, works primarily in a virtual environment, involves improving rather than basic innovations. For some digital entrepreneurial projects, computer hardware, software and human resources are sufficient. This suggests that digital technology entrepreneurship can be quite a mass phenomenon.

3. Digital technology entrepreneurship solves a significant part of the tasks of digitalization of the economy, since it provides commercial organizations, the public sector with digital services, facilities, solutions that consumers are only able to develop on their own to a limited extent. Institutionally, this implies the mandatory inclusion of digital technology entrepreneurship in strategic planning documents related to the digitalization of the Russian economy.

Next, we highlight the main positive effects of digital technology entrepreneurship for the social and economic development of the region, which are proposed to be considered in the context of the following areas: economic, social, institutional (Table 2). The important role of digital technology entrepreneurship in regional development is not only in the growth of integrated economic indicators, job creation.

Its development allows to increase the level of maturity of the innovation ecosystem of entrepreneurship, accumulating experience and work out the most effective support practices, increasing the social capital of the region (trust and social relations), strengthening the importance of innovative and entrepreneurial values. In other words, the development of digital entrepreneurship can be considered as a preparatory, a kind of "training" stage for the development of classical technology entrepreneurship with a more significant effect for the region.

TABLE II. GROUPING EFFECTS OF TECHNOLOGY ENTREPRENEURSHIP FOR SOCIAL AND ECONOMIC DEVELOPMENT OF THE REGION

Direction of effect implementation	Types and content of the effect
Economical	Direct growth of production volumes, gross regional product, tax base, etc. due to the creation of new firms Increase of production efficiency, competitiveness in basic branches of specialization by providing digital solutions, technology transfer for the regional economy, engineering services Diversification of the economic structure, development of progressive economic activities (e.g., "professional, research and technical activities»)
Social	Professional, personal self-realization, obtaining entrepreneurial income by competent professionals Consolidation of the population, including educated youth, through the organization of post-industrial formats of activity Improving safety (at work, in the urban environment) Improving the quality of life by providing consumers with quality digital services
Institutional	Formation of innovative, entrepreneurial culture, accumulation of social capital (trust, business relations) Development of innovation ecosystem, competences of its participants Improving infrastructure and business support institutions

#### IV. DISCUSSION OF RESULTS

The results of the study show that digital technology entrepreneurship has a certain specificity, a rather complex structure that requires a specific approach to its support. The promotion of digital entrepreneurship has a multi-directional positive impact on the social and economic development of the region. Therefore, for the accelerated development of digital technology entrepreneurship at the sub-federal level, the following recommendations are proposed according to the results of the study.

1 To achieve a synergistic effect, integrate measures for the development of entrepreneurship in the part of digital technology entrepreneurship with activities for the implementation of the National program "Digital Economy of the Russian Federation".

2. To differentiate measures of the state support of digital technology entrepreneurship (taking into account its specifics) in programs and projects of development of small and medium-sized enterprises of federal and regional levels, taking into account more significant economic effect and influence of this type of entrepreneurship on digitalization of economy.

3. Within the framework of stimulation and support of innovative ecosystems of technology entrepreneurship on the basis of universities, innovation clusters, development corporations to allocate separate blocks of activities, resources and results on digital technology entrepreneurship.

4. Create institutions and forms of collective use of digital resources for startups and existing technology entrepreneurs, the cost of creating or accessing which is generally not available to single technology firms (e.g. supercomputers).

5 When implementing projects and programs at the regional level to modernize existing enterprises, increase productivity, introduce digital technologies in basic economic activities, maximize the potential of local digital technology entrepreneurship, integrate it into the value chains of large companies.

At the same time, access to traditional incentives and support institutions is also important for the development of digital technology entrepreneurship: preferential financing, innovation infrastructure, training and acceleration programs.

#### V. CONCLUSIONS

Since 2017, the term "digital technology entrepreneurship" has appeared in scientific circulation, reflecting the significant role of entrepreneurship in the digitalization of the economy. However, its essence, types, features, and impact on social and economic development remain uncertain. The study found that digital technology entrepreneurship offers a consumer value as a result of the use of digital technologies (both developed by the technology firm itself and purchased from other suppliers).

This defines the main features and potential of digital technology entrepreneurship. This type of entrepreneurship occupies an intermediate place between traditional and technology entrepreneurship. In turn, digital technology entrepreneurship is heterogeneous and differentiated according to the criteria of the sphere of activity, the degree of

independence; the content of the technologies used. The contribution of this type of business to social and economic development is not limited to the quantitative growth of output or gross regional product. It increases the efficiency of branches of specialization, as well as creates conditions for the active development of the "soft" component of the regional innovation ecosystem (social capital, innovation culture, practices and competencies for innovation).

#### Acknowledgment

The publication was prepared based on the results of the research work financed from the funds of the Kemerovo state University on the topic "Formation of the Innovation Ecosystem of Technology Entrepreneurship as a Factor in reducing the Monodependency of the Region".

#### References

- [1] H. Montiel-Campos and Y.M. Palma-Chorres, "Technological entrepreneurship: A multilevel study", *Journal of Technology Management & Innovation*, 2016, Vol. 11, No. 3, pp. 77–83.
- [2] M. Nazarov, N. Butryumova and D. Sidorov, "Development of technology entrepreneurship in a transition economy: an example of the Russian region with high scientific potential", *DIEM: Dubrovnik International Economic Meeting*, 2017, Vol. 3, No. 1, pp. 89–104.
- [3] F. Giones and A. Brem "Digital technology entrepreneurship: a definition and research agenda", *Technology Innovation Management Review*, 2017, Vol. 7, No. 5, pp. 44–51.
- [4] S. Nambisan, "Digital entrepreneurship: toward a digital technology perspective of entrepreneurship", *Entrepreneurship Theory and Practice*, 2017, Vol. 41, No. 6, pp. 1029–1055.
- [5] A. Pergelova, T. Manolova, R. Simeonova-Ganeva and D. Yordanova, "Democratizing entrepreneurship? Digital technologies and the internationalization of female-led SMEs". *Journal of Small Business Management*, 2019, Vol. 57, No. 1, pp. 14-39.
- [6] B. Hansen, "The digital revolution – digital entrepreneurship and transformation in Beijing", *Small Enterprise Research*, 2019, Vol. 26, No. 1, pp. 36–54.
- [7] A. Martinez Dy, L. Martin, and S. Marlow, "Emancipation through digital entrepreneurship? A critical realist analysis", *Organization*, 2018, Vol. 25, No. 5, pp. 585–608.
- [8] P. Rippa and G. Secundo, "Digital academic entrepreneurship: The potential of digital technologies on academic entrepreneurship", *Technological Forecasting and Social Change*, 2019, Vol. 146, No. 9, pp. 900–911.
- [9] K.A. Venkatesh and N. Pushkala, "Digital entrepreneurship: the technology deployment in internationalization speed in the digital entrepreneurship era and opportunities-Tirumala Tirupati Devasathanam (TTD)", *International Journal on Recent Trends in Business and Tourism*, 2018, Vol. 2, No. 4, pp. 39–42.
- [10] A.K. Song, "The Digital Entrepreneurial Ecosystem – a critique and reconfiguration", *Small Business Economics*, 2019, Vol. 53, No. 3, pp. 569–590.
- [11] Gruppya Vsemirnogo Banka. Tsifrovaya povestka Evraziyskogo ekonomicheskogo soyuza do 2025 goda: perspektivy i rekomendatsii. Obzor. URL: [http://mosopen.ru/document/2215\\_rp\\_2010-10-11](http://mosopen.ru/document/2215_rp_2010-10-11) (data obrashcheniya 24.09.2019).
- [12] Gruppya Vsemirnogo Banka. Konkurentsya v tsifrovuyu epokhu: strategicheskie vyzovy dlya Rossiyskoy Federatsii. Doklad o razvitiy tsifrovoy ekonomiki v Rossii. URL: <http://documents.worldbank.org/curated/en/848071539115489168/pdf/C-ompeting-in-the-Digital-Age-Policy-Implications-for-the-Russian-Federation-Russia-Digital-Economy-Report.pdf> (data obrashcheniya 06.10.2019).

[13] Chto takoe tsifrovaya ekonomika? Trendy, kompetentsii, izmerenie.  
Doklad Natsional'nogo issledovatel'skogo universiteta – Vysshey shkoly

ekonomiki pri uchastii Vsemirnogo Banka. M.: Izdatel'skiy dom  
Vysshey shkoly ekonomiki, 2019. 85 s.