Business model of regional institutional design of digital state entrepreneurship: management aspect

Alla Nikolaevna Golovina, and Roman Yurevich Levchenko

Ural State University of Economics, st. March 8, 62/45, 620144 Yekaterinburg, Sverdlovsk region, Russia

Abstract. In the article, the authors present the transformation of the concept of "institutional design". Its methodological core is considered in the context of the social and information and communication direction of digital state entrepreneurship. They offer the author's business model of the regional institutional design of digital state entrepreneurship.

1 Introduction

The scientific community has relatively recently begun to use such a concept as institutional design in almost all spheres of public life. Particularly noteworthy are the ideas that design is a capacious philosophical concept, the content of which goes beyond the boundaries of a narrow understanding of it as an art. It covers, but is not limited to it. Thus, the well-known design methodologist K. Jones claims that design should not be mixed with art, since it can be used as a tool for finding an optimal solution, and also used to reformulate the problem itself. Through its inherent constructivism, design allows not only to embody knowledge, information about the subject in the project, but also to understand the meaning of the problem [4].

Ch. Mills believed that any design has a social meaning, which allows it to be considered as a socio-cultural phenomenon of a developing society [10]. Here the ideas of G. Simon and Ch. Mills come down to the fact that today the subject of design extends to the construction of a way and style of life, synthesizing new cultural, moral, social values and is the bearer of social changes.

Summarizing the existing scientific approaches of foreign and Russian researchers to the definition of institutional design, one can conditionally distinguish two directions [3, 9, 5, 17].

The first direction defines design as social construction, creation or transformation of socio-economic reality [8, 13]. The transformations of Peter the Great, Vladimir Lenin, and others can be cited as an example of institutional design. Institutional design can be in narrower formats as well. For example, within a region or a specific organization.

Another direction considers institutional design as a Russian original method for the creation and transformation of social, economic, industrial, and other institutions [1, 2, 11, 16]. Institutional design here acts as one of the ways to change the modern economic situation, since it re-cultivates the existing structure of building a social space, based on the principles of the presence of power relations, self-organization and equality in society [7].

Thus, all the above statements taken together reveal the content of institutional design in modern society either as a socio-cultural phenomenon, or as a philosophy of design, development and formation of the built environment. At the same time, the purpose of the design is to improve the quality of life of people through the formation of a harmonious spatial environment [6].

In this regard, in our opinion, institutional design should be considered as social transformations, a set of institutions created and reorganized by the authorities in order to form a new quality of life in society.

Based on the above definition of institutional design, let us designate its methodological core in the context of digital state entrepreneurship. So, it is based on the provisions of the following regulatory documents.

1. Forecast of scientific and technological development of the Russian Federation for the period up to 2030 (approved by the Government of the Russian Federation on January 3, 2014). It identifies the most important areas for the development of science and technology that provide the country's competitive advantages in areas such as medicine and health care; information and communication technologies; rational nature management; biotechnology; transport and space systems; new materials and nanotechnology; energy saving and energy efficiency. In each direction, problems, threats, as well as development opportunities, promising markets, products and services, as well as areas of scientific research have been highlighted.

2. The strategy of scientific and technological development of the Russian Federation, approved by the Decree of the President of the Russian Federation of December 1, 2016 No. 642 "On the Strategy of Scientific and Technological Development of the Russian Federation". For the next 15 years, the priority areas for the development of the Russian Federation will be the development of advanced digital technologies; robotization of industrial systems; use of new materials; transition to resource-saving and environmentally friendly energy; creation of new sources of energy storage; health preservation technologies; counteraction to technogenic, biogenic, as well as socio-cultural threats; connectivity of the territory due to telecommunication systems, etc.

3. The strategy for the development of the information society in the Russian Federation for 2017 - 2030, approved by the Decree of the President of the Russian Federation of May 9, 2017 No. 203 "On the Strategy for the Development of the Information Society in the Russian Federation for 2017-2030". This strategy is focused on the formation and development of the digital economy, i.e. economic activity of a company, in which digital data is a key factor in production, processing of large volumes and the use of the analysis results of which, in comparison with traditional forms of management, can significantly increase the efficiency of various types of production, technologies, equipment, storage, sale, delivery of goods and services.

4. The program "Digital Economy of the Russian Federation", approved by the order of the Government of the Russian Federation, dated July 28, 2017 No. 1632-p. This program is aimed at stimulating the development and implementation of digital technologies in various sectors of the economy. An important substantive aspect here can be identified as three main areas in which digital state entrepreneurship is manifested: industrial, social, information and communication.

As one of the main directions of digital state entrepreneurship, one can single out the formation of new opportunities for improving the quality of life of the population and developing human potential through the information services that allow you to quickly exchange knowledge, improve labor skills, receive and process large amounts of information, etc.

However, the comparative analysis of countries presented in Figure 1 for the indicator "Internet use by the population" indicates its low value in the Russian Federation. This is

due to the low user activity of Internet services among the population of retirement age, associated with their mentality and the lack of habitual skills in working with IT technologies [15].

Fig. 1. Internet use by population by country (as a percentage of the total population aged 15–74)

In addition, the economically active population also has weak digital skills in working with information resources. Here the Russian indicator is inferior to the corresponding indicator of Great Britain, Germany, Finland, France, Sweden, Estonia and other European countries. According to the results of opinion polls conducted by the HSE, the main constraints are: lack of need (70.1% of the respondents aged 15-74); lack of skills for working on the Internet (29% of respondents aged 15-74); high connection costs (11.5% of surveyed respondents aged 15-74); lack of technical connectivity (4.1% of respondents aged 15-74); for security and confidentiality reasons (3.2% of respondents aged 15-74) [15].

At the same time, it can be noted that remote learning is gaining momentum in Russia. The annual growth rate has averaged 23% since 2012. Among the main advantages of massive open online courses, students note an increase in the accessibility of education (59% of respondents); the possibility of learning at an individual pace (30% of the surveyed respondents); more up-to-date content of training courses and the possibility of their versatile general development (19–20% of the interviewed respondents); variety of courses offered (17% of respondents) [14]. Also, 25% of the students surveyed believe that such courses can help in employment, and 11% associate training in such courses with improved academic performance. This, in turn, serves as a signal for further demand for this type of educational services. But despite this, online education in the total volume of educational services still takes a very small share - less than 3% [12]. This accounts for the low Russian percentage of Internet use by the population for remote learning (4%) (Figure 2) [15].

Fig. 2. Internet use by the population for remote learning by country, as a percentage of the population aged 15–74 using the Internet

In general, it can be noted that the population began to use more online financial services and electronic government services. Thus, over the past two years, the number of respondents aged 15-74 using the Internet to carry out financial transactions has grown by more than 10%. At the same time, the Far Eastern Federal District and the Siberian Federal District show the highest growth rates. At the same time, an intercountry analysis of this indicator suggests that Russians are significantly inferior in performing financial transactions via the Internet from Finns (93%), Swedes (90%), Estonians (90%), etc., (Figure 3) [15].

Fig. 3. Use of the Internet by the population for financial transactions, as a percentage of the population aged 15-74 using the Internet

Thus, we find that the social direction of development of digital state entrepreneurship, first of all, should be focused on improving the indicators presented above, reflecting the use of the Internet by the population. In addition, the following Internet services should appear and expand: digital services for real-time monitoring of movements and health

status; scientific research based on "big data"; medicine "4P"; an expanded package of electronic public services and automated control of legally significant actions.

Another important area of digital state entrepreneurship concerns the development of the industry related to software production, data processing and transmission, storage, creation of Internet services, and electronic commerce.

According to the Ministry of Digital Development of Communications and Mass Media of the Russian Federation, the development of the information technology sector is advancing at a faster pace, the average salary in it exceeds the average for the economy by 50-60%. This sector of the economy can be considered young in terms of the age composition of its employees, which increases its potential for creativity, the perception of new knowledge, the development of innovative ideas of a revolutionary nature (Figure 4) [15].

Fig. 4. Share of ICT specialists under 35 years old in the total number of ICT specialists, %

If we consider certain types of software, then according to the Unified Register of Russian Programs for Electronic Computers and Databases (reestr.minsvyaz.ru), it contains information on more than 3500 software products. Russian ICTs take part in the creation of information retrieval systems, social networks, design systems (Compass, Adem), anti-virus programs, ERP systems (Galaktika, 1C).

At the same time, this sector of the economy is at the initial stage of its development, as the share of the ICT sector in the gross value added of the business sector is only 3.4%, while the same indicator for other countries is significantly higher: Republic of Korea - 10.3% ; Sweden - 7.3%; Finland - 6.9%; USA - 6%; Estonia - 6%; Czech Republic - 5.9%; Great Britain - 5.4%; Germany - 5%; France - 4.6%; Canada - 4%.

Considering the position of Russian ICT in the cross-country context on the export of goods and services, it can be noted that they are minimal (Figure 5) [15]. Moreover, a distinctive feature of the Russian Federation is the specialization of the Russian Federation in finding the solutions in the most competitive segments of the world's software (artificial intelligence, big data, computer vision, information security, machine learning).

Fig. 5. Exports of ICT goods and services, as a percentage of global exports of goods/services

In addition, the Russian ICT sector remains highly import-dependent, as for every dollar of ICT goods exports accounted for \$ 10.11 of imports, and for every dollar of ICT services exports accounted for \$ 1.11 of imports of services. Therefore, institutional measures are needed to develop import substitution in this sector.

Another important area of ICT development is the creation of new digital platforms, including new networks, cloud technologies, data centers, applications for processing and providing data. These software products are aimed at forming fundamentally different business models based on completely different principles of interaction between the consumers and manufacturers.

Summarizing the above trends, the authors believe that in order to create a favorable environment for the development of digital state entrepreneurship, it is necessary to develop regional institutions to support the main directions of digitalization of the economy. In our opinion, such a design should be based on the following institutions that are in continuous interaction: Institute of Industry Digitalization; Institute for Digitalization of Society and Institute for ICT Development. Figure 6 shows the author's model of the regional institutional design of digital state entrepreneurship. The model includes three modules:

- 1) The institutions of the digitalization of the industry;
- 2) Institutions of digitalization of society;
- 3) Institutes for the development of information and communication technologies.

Each module has a specific institutional structure and is focused on the specific results. This approach systematizes and integrates all the existing developments in the field of achievements of digital state entrepreneurship.

Institutes	1. Structure	2. Results
1. Institutes of the digitalization of the industry	1.1.1 additive technologies; 1.1.2 expansion of automation and robotics; 1.1.3 formation of the industrial Internet of things; 1.1.4 cloud computing; 1.1.5 use of smart networks; 1.1.6 end-to-end automation, CRM, ERP, PLM applications 1.1.7 implementation of cyber-physical systems; 1.1.8 development of industrial networks.	2.1.1 "smart" services and products; 2.1.2 decentralization of production management; 2.1.3 flexible supply chain; 2.1.4 flexible innovation in the product lifecycle; 2.1.5 flexible production networks; 2.1.6 improving the manageability of technological processes; 2.1.7 mass customization; 2.1.8 reduce costs and time spent on the product lifecycle.
2. Institutes of the digitalization of the society	1.2.1 storage and processing of "big data"; 1.2.2 creation of artificial intelligence; 1.2.3 creating the Internet of things; 1.2.4 virtual reality applications; 1.2.5 cloud computing; 1.2.6 geolocation applications.	2.2.1 participation in online trading; 2.2.2 use of geolocation technologies; 2.2.3 getting new educational services; 2.2.4 new ways and speeds of knowledge sharing; 2.2.5 availability of e-government services; 2.2.6 simplification of financial transactions and non-cash payments; 2.2.7 development of telemedicine and accurate health diagnostics.
3. ICT development institutes	1.3.1 increasing the number of University graduates in technical specialties related to ICT; 1.3.2 creating new platform companies and increasing jobs; 1.3.3 increase investment in fixed assets of ICT enterprises 1.3.4 import substitution and increasing the volume of exports of ICT products and services	2.3.1 standardization of processes; 2.3.2 organization of remote work; 2.3.3 emergence of new professions and the growth of the labor market; 2.3.4 intellectual property protection; 2.3.5 availability of skilled workers; 2.3.6 investment in research; 2.3.7 new business models.

Fig. 6. Structural model of regional institutional design of digital state entrepreneurship

The first module of the proposed model unites industrial digitalization institutions, reveals their structure and expected results of functioning.

The integration of modern information technologies and the production sector of the economy will lead to the emergence of new products, models and business formats, an increase in the quality and efficiency of the production process, and ensuring the stability of its work in any conditions, including during the COVID-19 epidemic.

The second module combines the institutions of digitalization of society. The digitalization of society is currently fundamental in its economic and social modernization. It leads to the acceleration of vital processes, access to services, that part of the population for which they were inaccessible. So, digitalization of public services, education, medicine can improve the life of a significant part of society. The doctor can not only promptly

diagnose, but also carry out the operation, regardless of the location of the patient. A resident of any region of the country can get an education, improve their qualifications or get a new profession remotely. Customers have a huge selection of products available in online stores. At the same time, the speed of rendering services and their quality increases.

The third module presents institutions for the development of information and communication technologies. The development of information and communication technologies will also create an information society, improve the quality of life of citizens, develop the economic, socio-political, cultural spheres of society, improve the public administration system, and ensure the competitiveness of products and services in the field of information and telecommunication technologies.

Using the methodology of tensor modeling of complex technical and economic systems (which includes state digital entrepreneurship), we can transform this structural model into a conceptual model of the main states of digital entrepreneurship, and also highlight the presence of invariants. These invariants are: reproductive scientific and technical cycle; types of activity (including by industry); resources consumed and produced (costs - results). Tensor algebra allows us to build general and specific models characterizing individual aspects and situational states of state digital entrepreneurship. In each specific case, you can use a typical mathematical apparatus of nonlinear optimization. The level of detail in the calculations is determined by the subject of management.

The indicated approach allows us to fix three blocks (Figure 6), and within the blocks there are various situational combinations that characterize certain states of digital entrepreneurship. These states characterize digitalization in terms of economic levels (national, regional, local) and types of activity, taking into account the complexity, technology features, industry, personnel training level and society's readiness to perceive digitalization processes.

To determine the most rational digitalization chains at the enterprise-to-enterprise level; territory-to-territory; industry-to-industry should use a non-linear modeling apparatus.

Each of the constituent links of the reproduction cycle of updating digitalization objects { 1) development of a new idea of digitalization; 2) familiarization; 3) replication; 4) modernization of the digitalization object; 5) exhaustion of potential, transition to a new digital idea }, respectively, we denote A, B, C, D, E, their specific weights, respectively - α , β , γ , δ , ε . Let us introduce a unified notation for the coefficients r_1, r_2, r_3, r_4, r_5 . Each of the phases has its own directional vector and its own quantitative characteristics. Then the optimization of digitalization development processes can be expressed by the following mathematical model.

Fig. 7. Model of optimization of digital processes through changing the power of streams

where: $Q \Delta$ is the gradient of increasing the power of the flow-process of changing state digital entrepreneurship (incoming flow);

r_1, r_2, r_3, r_4, r_5 – conversion factors for the capacity of state digital entrepreneurship;

$\alpha, \beta, \gamma, \delta, \varepsilon$ - vectors of individual phases of the renewal cycle of state digital entrepreneurship;

ξO is a possible increase in the power of the process flow (changes in state digital entrepreneurship);

$O\Psi$ - the actual increase in the power of the flow-process (changes in state digital entrepreneurship);

ΔQ - increase in flow power due to optimization of the interaction of elements (outflow).

The model makes it possible to comprehensively monitor the pros and cons of products (services), regions and industries and determine the most rational basic chains of state digital entrepreneurship, and accordingly develop adequate mechanisms for managing them.

Summing up the above we can draw the following conclusions:

1) the successful development of digitalization in the basic sectors of the economy is the source and consequence of a strategically adjusted scientific and technical policy at the state and regional level, combined with market methods for managing business processes and the development of the direct market for digital services and goods in the territory;

2) the basis for the successful development of digitalization is the unity of theoretical, methodological, procedural approaches, taking into account the transformation of the business model for the development of the country's economy and a specific region;

3) it is necessary to observe the principle of proportionality and evenness in the development of state digital entrepreneurship, given that the stability of the economy is determined, first of all, by the level of development of the industrial base as a whole, and not by its individual, even quite advanced fragments;

4) industrial corporations, being historically more organized and dynamic structures integrated into the economy of the country and the region, are highly sensitive to its general state and development trends, since the latter generate market activity, affect the strength of intersectoral and interregional information links, determine the investment climate, including in digitalization. This makes it possible to use the principle of the leading link in solving common problems of digitalization of the economy and society.

5) Digitalization processes built into multi-level scientific and industrial cooperation contribute to the integration of the economic space and accelerate the business processes of the reproduction cycle;

6) A successful solution to the development of state digital entrepreneurship requires an integrated approach: transformation of the digital law system, ideological and marketing support, systemic management of business processes at the regional level; harmonious integration into the socio-economic and social life of the population.

References

1. T.V. Anakhin, Bulletin of the Buryat State University, 6 (2013)
2. V.V. Volchik, L. A. Shafirov, A.A. Oganessian, Journal of economic regulation (Issues of economic regulation), **4(4)**, 41 (2013)
3. A.O. Glazacheva, O.E. Perfilova, Social and Humanitarian Knowledge, **12**, 156 (2008)
4. A.O. Glazacheva, Social and humanitarian knowledge, **4**, 327 (2019)
5. M.S. Glatko, Omsk Scientific Bulletin, **3(119)**, 96 (2013)
6. M. S. Kagan, *Philosophy of culture*, 415 (1996)
7. I. A. Krehbel, Philosophy and social dynamics of the XXI century: materials of the II Intern. scientific conf, 156 (2008)

8. M.A. Kulikov, Izvestia of the Russian State Pedagogical University named after A.I. Herzen, **64**, 84 (2008)
9. G.G. Kurierova, MSU Bulletin. Ser. 7. Philosophy, **2**, 74 (1994)
10. V.A. Lyashenko, Humanities. OSU BULLETIN, **9(91)**, 21 (2018)
11. Official website dolgorukov.ru, <http://dolgorukov.ru/>
12. Official website dolgorukov.ru, <https://www.openbusiness.ru/>
13. Official website wikipedia.org, <http://en.wikipedia.org/>
14. Ya. M. Roshchina, S.Yu. Roshchin, V. N. Rudakov, Questions of education, Educational Studies, **1**, 174 (2018)
15. G.I. Abdrakhmanova, K.O. Vishnevsky, L.M. Gokhberg, *Digital economy: 2020*, a brief statistical collection, 112 (2020)
16. R.E. Goodin, The theory of institutional design, **1** (1996)
17. H. Simon, The Sciences of the Artificial. Cambridge, 55 (1969)