Innovative territorial cluster as a promising factor of sustainable economic development of Russian steppe regions

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Abstract. The purpose of the study is to prove the need for development of innovative territorial clusters (ITC) in steppe regions. With a well-known determination of the factors of sustainable economic development of steppe regions of Russia, territorial planning and formation of environmental management structures were considered the most important. Today, the greatest relevance for steppe regions of Russia should be seen in development of the ITC as the most important condition for transition to a new technological order in the coming decades of the 21st century and a new management system based on improving scenario forecasting tools that allow identifying trends and incentives for sustainable economic development of steppe regions of Russia as a result of minimizing problems and strengthening their economic potential in the process of climate restructuring of the Earth. The results of the study include the following: definition of the ITC role as a tool for normalizing economic relations between research and educational organizations, business, development institutions and the state, as well as possibility of adapting the resulting cluster model of joint activity management to solving problems of sustainable economic development of steppe regions in the context of digital transformation of Russian economy. Innovative territorial approach should become the basis for Complex programs of ecological, economic and noospheric development of Russian regions. And there are all the prerequisites for this - rapid development of digital technologies, and along with it the growth and rapid promotion of digital innovations, without which there is no future, make this goal feasible and achievable. Therefore, it can be said that ITCs in steppe regions should serve as a source of digital innovations in Russian economy, creating new jobs for population, increasing viability of their territories and ensuring food security of the country as a whole.

1. Introduction

Today, the whole world is gripped by a pandemic called COVID-19. The pandemic has engulfed all of humanity and is rapidly breaking the existing living conditions. It does what it takes years to do in a normal life. For example, as a result of government directives, Russia has switched to distance education. A well-known saying is relevant here: "Violence is the midwife of progress." But what is...
the progress during the pandemic? It lies in transition from traditional economy to digital one, and moreover, at an accelerated pace.

Russian digital business seeks to combine efforts to create technological components that stimulate development of the IT industry. ITC is tasked with promoting advanced Russian developments in the field of digital technologies, which will allow them to enter the world market and strengthen the position of Russian companies in one of the most competitive high-tech areas. The cluster economy of Russia operates on the principles of public-private partnership (PPP). The jobs that ITC currently creates are the jobs that are so lacking at the moment. In order for the effect of the introduction of ITC to be significant, it is necessary to implement a National Strategy for the Development of Digital Economy and AI on the basis of consensus with partner countries and international associations.

If you look at the problem of economic growth in Russia from the perspective of a pandemic, then it is definitely holding it back. So, according to official statistics, the GDP growth rate in Russia is negative. What can be done? There is a way out of this situation. "This requires defining the vision and content of digital transformation, furthermore, applying digital technologies in a unified and coherent manner within a single strategy" [1]. In the context of the COVID-19 pandemic, caused by restrictions on business activities, as well as free movement of people, fundamentally new, real-time systems and methods of rapid response to changes in coordination between countries are required. A new quality of economic globalization is manifested in the desire to digitalize business. In this regard, Russia is trying to develop a new model of economic development that meets the interests of its own people and all of humanity. There are pros and cons of digital economy (DE) development. For example, rising unemployment as a result of professions change, increasing social stratification, immensely growing cyber threats rapidly lead to major failures (turbulence) in global market, especially against the background of unpredictable consequences of COVID-19. At the same time, despite negative consequences, the use of digital technologies is increasingly spreading in business activities. The largest companies are already participating in the competition in the field of digital technologies in order to increase the results of business processes both in industry and in the agricultural sector. However, as a result of the worldwide pandemic, "some firms will reduce capital spending, while others will delay new projects, or seek to reduce costs in other ways"[2].

As for steppe regions digitalization, it can be based on innovative territorial clusters (ITC) [3]. In our opinion, if we combine the research of territorial organization with analysis of innovations role in their development, we come to a new paradigm of economic teaching as development of ITC and their role in the regime not only at macro and micro levels, but also at meso level, i.e. regional. In our study, we show the role of ITC as a component of sustainable economic development of steppe regions. The territories of steppe settlements occupy a significant area in Russia and play an important economic role, but their lag in innovative development negatively affects competitiveness of the country's economy as a whole. The main trend of Russia's development in the 21st century will be not just basic resource capabilities, but the emerging development of the ITC in steppe regions of Russia.

This is the essence of the question of the role of ITC as a component of steppe regions’ economy development.

2. Methodology

2.1. Innovative approach to solving the problem of sustainable economic development of steppe regions based on the ITC development

Traditionally, it was believed that economic growth could be achieved only as a result of building up new productive forces, especially in the sphere of manufacturing industries. In the context of digital transformation, the emphasis is on development of digital communication. For such development to be effective, it is necessary to have not only good IT specialists, but also to promote development of the IT industry in the mode of creating a digital sector, where digital equipment and infrastructure are directly created ("hardware of digital economy"), especially in terms of creating robotics. Obviously, this can’t be done today.
Sustainable development of steppe regions in conditions of turbulence and increased risks requires testing of scientifically based modeling and forecasting methods, the use of formalized methods to identify the main patterns of development and supporting trends that allow us to objectively take into account the current business conditions in digital economy. The correct assessment of objective trends, scientifically based application of modeling methods and development of a set of forecast scenarios for steppe regions development is very important for regional markets of agricultural products with significant growth potential. In this regard, the study of trends and patterns of steppe regions development is relevant for modern Russia. In our opinion, the actual condition for stable and sustainable development of steppe regions is formation and active use of a new form of organization in economic activity - an ITС [4].

When studying the innovative activity of research organizations in the context of its improvement, general scientific methods of system, synergetic, comparative analysis, as well as private methods of economic research, namely: subject-object, economic-sociological method, empirical research, logical modeling, were used.

2.2. The conceptual model of the ITC management in the practice of steppe regions strategic development

The implementation of ITC strategic potential in the field of innovation has a positive impact on the convergence of R & D and business, which contributes to digital economy and Russian digital society formation.

This convergence has a positive impact on improving the ITC project activity and the growth of supply of goods and services with a qualitatively new set of properties, the implementation of which requires knowledge and competencies from related fields of science and technology. No less important is the fact that the considered approach to improving and implementing the ITC strategic potential is not narrowly focused and can be applied to solving a class of problems with similar initial parameters, regardless of the branch affiliation of economic entity and organizational structure of economic agent.

It should also be noted that the issues of social adaptation to IT development are relevant in the context of inevitable transition to digital transformation of economy. Consideration of traditional type of organization and conduct of research within the framework of ITC showed the presence of a significant number of its advantages. Consistency of ITC`s activities allows us to build up business potential and conduct research in search of new forms of organization of project activities.

Development of ITC contributes to transition to cyber-physical space and virtual reality, giving rise to new directions for development and analysis of big data, their storage, patenting and protection. In digital economy, innovations are products of digitalization, which requires expanding the range of research areas in order to improve methods and tools for using big data.

The implementation of priority ITC projects improves the quality of life of population, increases jobs for young professionals of various profiles, and minimizes risk of bringing new innovative products to the market that are relevant in modern economic conditions. ITC fully supports the state strategy for development of digital economy of Russia. Thus, the organization of ITC project activity is one of the current trends in development of Russian economy against the background of digital transformation that is gaining momentum.

In order to improve efficiency of steppe regions economic activity, the following recommendations are presented:

- To implement the conceptual model of ITC management and use it more effectively in the practice of strategic development of steppe regions.
- To apply the conceptual model of ITC to implement a set of measures for adaptive and tactical correction of strategic plans for sectoral programs of steppe regions.
3. Results

3.1. Strategy for ITC development in the context of digital transformation

Steppe regions are striving for digital transformation of their businesses, so ITCs are beginning to play a significant role in this process. The ITC strategy should evolve to support innovation at all levels of regional economic development, while ensuring convenient development, deployment, and continuous management at all distributed points of production.

ITC is the foundation of digital transformation. Companies that are part of ITC can gain a significant competitive advantage by accelerating market entry, flexible cost management, and scaling. Each organization that moves to ITC applies cluster strategies and priorities to deploy its activities. As a result of improving business processes and creating a flexible process for developing an IT environment, organizations can eventually use cluster infrastructure (energy, transport, etc.). Some may argue that ITC is just a step towards a new business model, but many recognize that ITC strategy is not a transition process, but part of production optimization, which is carried out during digital transformation of economy at all its levels.

Organizations that successfully move their operations to ITC, expanding their activity with digital technologies, gain greater control over production and reduce business and management costs. The result is more flexible production, as well as a standardized set of common management tools that are part of ITC organizations.

ITC is a natural stage in digital technologies development, as a result, the computing environment combines local and peripheral resources using software-as-a-service (SaaS), platform-as-a-service (PaaS) and infrastructure-as-a-service (IaaS) models.

To help ITC work effectively in a complex environment, it is proposed to create applications and deploy them anywhere, monitor services, and ensure security of the entire organization.

In the conditions of ITC, the company can:
- Get private access to services running in other regions.
- Expand its own services by placing them behind the load balancer to implement a private channel, as well as access Azure Sentinel.

Azure Sentinel is a scalable cloud-based information and security management System (SIEM). It provides IT department with access to real-time security analytics and threat analysis across the organization, and serves as a single solution for detecting alerts, identifying and proactively searching for threats, and responding to them. Data breaches continue to negatively impact your business, so rapid detection and remediation are essential to the security of your infrastructure. Azure Sentinel collects data across all parts of the hybrid cloud architecture and from other cloud service providers, supporting multi-cloud strategies. By combining global and industry-specific threat intelligence, the platform can also detect experienced attackers and reduce the number of false positives. Azure Sentinel uses artificial intelligence (AI) to help companies respond quickly and effectively to every threat. Azure Sentinel improves the investigation and detection processes, thanks to the flow of analytical information about Microsoft threats, and allows you to create your own analytical data using AI and machine learning.

Azure Sentinel Features (SIEM + SOAR Cloud System):
- Collect security data across the organization.
- Detect threats with an extensive database of threat analytics.
- AI-based critical incident investigation.
- Protection response and automation.

Thus, the main task for ITC organizations is to provide a truly integrated solution for their developers, users and administrators. To help enterprises cope with the increasing complexity of cluster management, ITC managers need to develop administrative management principles to increase productivity and flexibility without compromising ITC security and compliance, or rather to keep up
with the pace of growth of innovation in business activities. The ITC must adhere to the following principles:

- Develop new digital technologies.
- Create integrated management, i.e. manage local areas as a single environment.
- Provide a security system for cluster production based on artificial intelligence (AI).

3.2. Artificial intelligence as a new component in ITC development

The term "artificial intelligence", first used in a research paper presented by John McCarthy and his colleagues in 1955, is defined as the science and technology of creating intelligent machines, especially intelligent computer programs" [5]. Since then, terms such as AI, machine learning, deep learning, cognitive computing, and machine intelligence have become frequently used in scientific research and applied work. Computer science scientist Pedro Domingos argues that "AI is the goal; AI is the planet we are heading for; machine learning is the rocket that will take us there. And big data is the fuel" [6]. AI can be considered as "a phenomenon of the modern Russian economy, since it contributes to the increase in labor productivity, the growth of competitiveness and innovation of economic entities, and most importantly - the receipt of large dividends from its use" [7, 1209]. AI research slowed in the 1970s and 1990s due to an overblown hype about negative results from its implementation.

Today, the world is undergoing global changes in the mode of digital transformation with corresponding consequences in economic, social and administrative fields. The real world is updated by AI. It's getting more and more intelligent. The urgency of problems associated with the introduction of AI and the formation of an innovative digital economy based on it has attracted legitimate interest of politicians and scientists in Russia and around the world. The era of large-scale use of AI is coming. Now we can say AI is a new resource in the economy of the twenty-first century, whose value is only increasing every day.

In general, Russian companies have formed an idea of the need to use AI as one of the strategic objectives of their activities in the future. The companies plan to transform the entire operation of the enterprise, rather than any individual business functions and directions. The main problems in the way of using AI in business lie in the technical, organizational plane, but especially in the personnel sphere, which lacks specialists with necessary qualifications in this area. AI development reduces the asymmetry of information, which leads to market failures (fiascos).

However, AI development has so far had little impact on the lives of most of the world's population. Nevertheless, practice shows that a number of Russian organizations, especially in the sphere of finance, public services, healthcare, and tourism, are already using AI in their activities. However, Russia, not having its own full production of AI objects, becomes dependent on foreign manufacturers. Therefore, Russian companies have a lot of work to do to reach the global level of robotization of our economy. This is our "intriguing future".

3.3. ITC development and economy of steppe regions of Russia

The goal for Russia is to get into the top five largest economies in the world. The Russian government is focusing the population on "digital future". The idea is constantly voiced that penetration of digital technologies in all spheres of economy will give a positive result. It is emphasized that digital economy will enter the most remote areas of the country, in particular steppe regions. However, we must not forget that today Russian economy is not the most fertile ground for thinking about "bright digital future". Perhaps this will change after implementation of the national project "Digital Economy of the Russian Federation". But it is not the first year that Russian economy is not in the best condition. It depends on the export of raw materials and on the sanctions that cause turbulence in its development. An example of this is the intention of the US and Polish governments to prevent the construction of the "Nord Stream -2" [8]. Precisely, this event is an example of a new round of turbulence in the economic development of Russia. But Russia is looking for and has already found a way out of this situation. This is the accelerated development of AI.
However, today only 4% of Russian companies use AI in their work. If a company is outside of AI, then it lives in the past. Our "childhood without AI" is over. All our current and future solutions should be translated to the "cloud" or AI. "The Russian markets of artificial intelligence and neurotechnologies can grow 80 times by 2024 and reach 160.1 billion rubles and 8.2 billion rubles, respectively. This is stated in the roadmap "neurotechnologies and artificial intelligence", developed by Sberbank and published on the website of the Ministry of Communications of the Russian Federation [9]. The purpose of this study was not to identify different aspects of AI impact on different sectors of economy, but to correctly build a strategy for its development. The AI strategy should be well coordinated between AI technology and concepts of each business function, including data selection, defining relationship between task concepts and technology, and fine-tuning the AI development system. Russia aims to create a strong AI.

Russian digital business seeks to combine efforts to create technological components that stimulate development of the IT industry. ITC is tasked with promoting advanced Russian developments in order to enter the global market and strengthen the position of Russian companies in one of the most competitive high-tech areas [10].

New Russian economy should work on the principles of public-private partnership (PPP). This is a national consensus on the implementation of the National Development Strategy of Russia. In Russia, different levels of authority (federal, national, regional, local) mainly use a targeted programmatic approach to develop and implement measures to support steppe areas.

The study of the issues of program-targeted management of steppe regions economy shows the need to introduce a cluster program-targeted approach due to complexity of solving intersectoral and interregional socio-economic problems that go beyond a single region. The regional level of ITC development and international cooperation includes aspects of the program for improving competitiveness of an economic entity on the world stage [11].

Groups of strategic measures at regional and international levels, of course, contribute to the growth of number and quality of innovative projects for production and supply of final goods and services. Thus, the implementation of ITC activity, regardless of its industry affiliation, contributes to improving the efficiency of R & D and information and analytical activity of industrial facilities.

Abstracting from a specific area of economic activity, the resulting model of ITC development allows us to talk about its applicability to a wide range of market segments in the context of interaction between divisions and other organizational units of corporation, which in turn is equivalent to sustainable economic growth.

Driving forces of ITC allow to predict competitive advantage of a particular type of activity more accurately, provided that its strategy was built correctly. Therefore, governments and regulators need to support ITC development in order to successfully implement it in business. Consequently, there are various issues and opinions regarding ITC development that need to be taken into account for a proper ITC strategy in business processes [12, 13]. ITCs provide a competitive advantage for firms if their strengths and weaknesses are well understood. The ITC strategy should be well coordinated in order to overcome possible turbulence in economic development under the influence of exogenous factors, particularly sanctions often used by Western governments against Russian economy.

Among innovative territorial clusters of Russia, according to the data of the Russian Cluster Observatory, 2017 (see table 1), only four ITCs are located in steppe zone of Russia. This is clearly not enough for the current stage of economic development in the context of international competition.

The authors did not set out to analyze all the ITCs of steppe zone. We will focus only on some aspects and examples. In steppe regions, it is necessary to use the opportunity to "complete" the value chain based on innovation trend at all territorial levels and in all industry areas. In particular, there are prospects for this not only in the industrial sector, but also in the agro-industrial complex. In the tertiary sector of the economy – for example, in the recreational sphere, clusters can be transformed into ITCs, since they are presented as an advanced form of territorial organization of society and make it possible to rationalize environmental management through the use of production automation, formation of closed cycles, scientific and production and other infrastructure (including research
institutes, design bureaus, universities), on the basis of available qualified personnel and innovative opportunities to improve their skills, and, consequently, the reduction of employment in industrial sector and formation of post-industrial society. In steppe zone regions, there are prerequisites for implementation of this vector. 

Table 1. Steppe innovation territorial clusters of Russia.

| №   | Region-subject of the Russian Federation | Industry direction                                      | Cluster name                                      | Number of participants |
|-----|----------------------------------------|-------------------------------------------------------|--------------------------------------------------|------------------------|
| 1   | Samara region                          | Aircraft and spacecraft production, shipbuilding      | Aerospace                                        | 67                     |
|     |                                        | Automobile manufacturing                              |                                                  |                        |
|     |                                        | Pharmaceuticals, biotechnologies and medical industry  | Automotive industry                              | 52                     |
|     |                                        |                                                       | Medical and pharmaceutical technologies          | 55                     |
| 2   | Altai Krai                             | Pharmaceuticals, biotechnologies and medical industry  | Altai Biopharmaceutical cluster                   | 19                     |
| 3   | Kemerovo region (Kuznetsk Basin)       | Chemistry and petrochemistry                         | Complex processing of coal and industrial waste of the Kemerovo region | 46                     |
| 4   | Republic of Bashkortostan              | Chemistry and petrochemistry                         | Petrochemical Territorial Cluster                | 211                    |

In steppe zone, there is a significant reserve for its implementation. At the same time, the existing production capacities require innovative promotion and completion of existing relationships formation. For example, in the Orenburg region there are examples of innovative clustering, mainly micro-clusters. One of them is JSC "PO Strela" - with a powerful research and production base, a leader in energy efficiency, producing high-tech products and having a number of ITC attributes. Micro-clusters in the oil and gas and other industries have great potential. We can only talk about regional level of clustering in the future. We emphasize that there are necessary conditions for it. Moreover, it is possible to form cross-border ITCs, for creation of which there is a certain reserve since the times of the USSR. Part of ITCs can be "completed" due to the missing links - most often in the field of management by completing the formation of AI. Currently, many organizations are being formed that are engaged in the digitalization of regional economy. In 2019 the Ministry of Digital Development and Communications of the Orenburg Region was created to deal with problems of management "in the field of information technology, communications, telecommunications, information security and personal data protection, information society development and formation of e-government".

For successful ITCs development in steppe regions, a collaboration of technical and managerial skills in conducting economic activities is necessary, this trend characterizes the current stage of economic development. Thus, innovative territorial aerospace cluster of Samara Region won the competition of the Ministry of Economic Development of the Russian Federation for development of innovative clusters. In this aspect, the cluster will be assisted in the use of various support measures from the ministry, other departments and development institutions to ensure their outstripping growth rates based on achieving a world-class investment attractiveness, developing mechanisms to support business activities and embedding them in global value chains. This makes it possible to correctly assess the impact of innovative territorial aerospace cluster of Samara Region on development strategy of the region and Russian economy as a whole.
4. Conclusion

- The authors believe that ITC is considered as an effective form of ensuring the growth of innovation and competitiveness of economy by expanding digital space that is adequate to specific conditions of economic development. Hence the "golden rule" of Russian ITCs: to encourage digitalization of Russian economy in order to grow both in the aspect of steppe regions and national economy as a whole.
- ITC has the potential to be used in many sectors of economy, such as automotive, energy, mining, agriculture, security, and transportation, recreation.
- AI technologies should be implemented in certain areas of activity with careful study, since automated solutions can destroy a firm's reputation if ethical and regulatory cases do not work well.
- It is emphasized that AI technologies can be used in many sectors, such as healthcare, automotive, energy, mining, finance, agriculture, security, IT, transportation, retail and e-commerce, education, and insurance.

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