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"Global Challenges and Prospects of the Modern Economic Development"****A CRITICAL INFRASTRUCTURE BACKGROUND OF THE  
ECONOMIC SECURITY OF REGIONAL DEVELOPMENT**

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***Abstract***

The urgency of the analyzed issue, due to the critical role of infrastructure sectors, particularly a transport complex and a system of science and education, digital economy of the economic security in the sustainable economic development of territories in the modern global economy, is considered. The purpose of the article is to make a conclusion about this new major role in the economic security of the formation of modern city agglomerations, on the example of the polycentric Samara-Togliatti city Agglomeration (STA), on the basis of the formation of their scientific, educational, information, innovative and transport frameworks. Taking into account the economic growth and qualities of the economic space improvement of the Samara region as the target priorities and institutional peculiarities of the territory and organizational characteristics of significant conditions we can make the following assumption: The effectiveness of economic functions in education and science is implemented and determined taking into account the institutional and organizational characteristics of the territory, it forms the structure and quality of the scientific and educational frame of territorial branch clusters. It seems appropriate to consider economic clusters of the Samara region developed and mature with established research, educational and information and transport frame. The important prerequisite for the implementation of competitive advantages and the economic security of the Samara region, which has a system of high – tech economic clusters and their system of scientific and educational and information frameworks.

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**Keywords:** Infrastructure sectors of the economy, economic security, scientific and educational complex (SEC), scientific and educational framework of the sectoral cluster, Samara-Togliatti city Agglomeration.

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## 1. Introduction

The need of the Russian economy for the development of agglomerations is very up-to-date. In many countries the city agglomeration is the main form of living rather than in cities. The optimization of labour resources, attraction of the population within the borders of Samara-Togliatti agglomeration will contribute to the transformation of the city districts in agglomerations with intensively populated suburbs which provide the chain formation of large urbanized systems – industrial, scientific and cultural centers in the structure of settlements of the Samara region. The agglomeration development as the territory with attractive environment for living and working is becoming very actual, because of the perspective decrease of workforce (Sedlacek & Gaube, 2010).

The Samara region has powerful Samara-Togliatti agglomeration (the third place for the number of the population in the country – more than 2.5 million people), more than 85.3% of the population of the region. In the Samara region there are the most powerful and competitive sectors – automotive sector, aerospace, petrochemicals, energy and agriculture complexes. They form clusters, the core ones of which are large industrial enterprises, scientific and educational organizations (Noskov & Vlezkova, 2017).

The development of infrastructure sectors of the regional economy in the context of globalization is an important tool for achieving the social, economic, foreign policy, the economic security and other objectives, enhances the quality of life (Kinnear & Ogden, 2014). A special role among infrastructure sectors in the economic security and the sustainable development of the modern economy plays the transport sector and the education system and science, digital economy.

On the territory of the Samara region there was formed the largest transport system in the Volga Federal District that provides transport links of the federal and regional levels in all directions. If there is the sustainable development, the growth rate of turnover, energy consumption and employment should be lower than the rate of the GRP growth. In the formation of market relations, the approaches to the further development of the transport planning must be based on the determination of final results of this development. One of indicators, acting as the final result for the industry, is a cargo intensity of the economy.

A characteristic feature of both Russia, as a whole, and the Samara region is a relatively high value of the cargo intensity compared with the global rate. Thus, the level of the traffic load on the GDP, expressed in ton-kilometers of transportation per unit of the parity GDP, at the beginning of the XXI century Russia was inferior more than 3 times to the United States, 4 times - to China, 29 times – to Germany and 143 times – to Japan.

It is obvious that the industrial growth is impossible without the transportation growth. However, their growth should be less than the GDP growth. This is confirmed by a retrospective analysis of changes in the cargo intensity of the GDP: the transition of developing countries to the developed category, and the overall social progress is accompanied by a decrease in the transport burden on the economy.

This new quality of the regional economy will provide a highly developed scientific and educational complex (SEC) and it's forming high technologies in economic clusters. SEC of the region as well as regional economic clusters unite enterprises, universities, scientific research institutions, laboratories, information centers, technological parks located on the territory of STA.

## 2. Problem Statement

The tendencies of the economic development in the regions of Russia are more and more defined by the quality and quantity of labour resources. The gradual transition of the economy to the postindustrial phase increases the impact of information technologies on all spheres of life, intellectualization of production, the dynamics of which depends on the quality of workforce and makes an increasing impact on the labor potential. Due to the innovative quality of the labor force it is possible to increase the competitiveness in all areas of the economy and to create breakthrough technologies. The decisive role in this process is played by the educational system which is the basis of the formation and development of qualitative characteristics of the labor force. Qualitative and quantitative characteristics of the labor force are closely related, quantitative indicators are the basis for planning the structure of labor force quality, providing human resources for all areas and levels of economic activities. The most visible indicator of the evolution in labor quality is the level of education in the region. Vocational education in the modern world economy acts as a catalyst of many social and economic processes, gradually moving from the service function to the function of forming environment and shaping the future and the economic security of society (Karlsson, Johansson, & Stough, 2012).

The development of STA, on the territory of which it is expected to form high-tech industries, will promote productive jobs creation and it will develop the educational system of the Samara region. SEC of the Samara region is represented by more than 30 higher educational vocational institutions. These are universities including the research ones, academies, and institutes functioning on the territory of STA: 17 state and municipal higher institutions and 13 non-state higher institutions and their research and scientific commercial sub-divisions.

Evaluation of the SEC potential of the Samara region on the structure of its sub-divisions allows making a conclusion that the generating (scientific and educational) function of SEC is performed more actively in technical universities. The leader is Samara State University (SSU) since March 2016, and it has in its structure 7 scientific research institutes, 8 branch scientific research laboratories, 17 scientific research laboratories, 2 scientific research groups, 6 scientific research centers and the university got the status of the research university in 2009.

In classical and humanitarian universities the generating function activity is substantially lower which adversely affects the quality of the scientific, commercial and educational activities. The effectiveness of economic functions implementation aimed at achieving a maximum economic growth and development of the economic area of the Samara region by university ensures its sustainable competitive position and, therefore, the survival in the long run.

The household functions of some universities and scientific institutions are individualized and can be performed independently from their realization by other territorial scientific and educational organizations, but economic functions are inherent at universities and institutes as part of the interrelated complex with equal participation in solving the problems of the regional development. This uniting characteristics of economic functions of education and science is an objective basis for the formation of the scientific and educational and information framework of territorial-industrial clusters and innovation framework in the region.

### **3. Research Questions**

The efficiency increase of economic functions in education and science makes them more effective for the economic security, the economic development and evolution of the territory, the modern human capital development of the region by the regional branch economic clusters development. These processes are accompanied by:

First, expansion of the functional field within the scientific and educational and information framework – the increase in the number of functions performed by the units of the scientific and educational frame in innovative processes of the cluster. Expansion of the functional field in education and science provides the innovative development of the regional economy and its economic growth.

Secondly, the complexity of the structure of the internal (between the links of the scientific and educational frame) and external (between the links of the innovation and transport frame: its scientific-educational and educational-production parts) connections. Complicating the relations between the links of the scientific and educational frame implements the task of integrating scientific, educational, information and industrial space, and increases the competitiveness of the territory. All these processes are based and take place in the Samara region, first of all, on the territory of STA defining its formation and development.

### **4. Purpose of the Study**

Taking into account the economic security, the economic growth and qualities of the economic space improvement of the Samara region as the target priorities and institutional peculiarities of the territory and organizational characteristics of significant conditions we can make the following assumption:

The effectiveness of economic functions in education and science is implemented and determined taking into account the institutional and organizational characteristics of the territory, it forms the structure and quality of the scientific and educational frame of territorial branch clusters - units of the scientific and educational system of the region and links realizing its ability to be the driving force of innovations.

On example of the development of the Samara-Togliatti agglomeration we have examined the role of the transport sector, education and science, the digital economy, leading universities and research centers in the region, in the formation of modern urban agglomerations.

### **5. Research Methods**

It is necessary to use an institutional approach in the research of the fundamental role of education in the economic growth. Economic functions of science and education are concretized by economic functions of the scientific and educational frame of territorial and branch clusters of the Samara region (Friedman, 1966). The task of expanding economic functions within the scientific and educational and information framework of territorial and sectoral economic clusters requires a focused, efficient and full use of already formed resources, the effective use of which should be realized in the economic growth, the economic security and competitiveness of the territory. In the Samara region the reserve of such growth is the

development of STA. With regard to the regional economic growth the scientific and educational and information framework acts as a producer of new knowledge – a tool for the growth and the source of human development and capital. In this sense, being the tool of the fundamental economic resource of the modern economy, education and science is the driving force for the sustainable economic growth (Dahlman, Routti, & Ylä-Anttila, 2006).

The concentration of innovation technologies in the economic space of the region forms territorial innovation and information saturation. Organizational and institutional abilities of the scientific and educational frame in regard to innovation and intellectual saturation of the territory leads to the additional increase of the GRP due to the increase of capitalization of the regional economy (Tonn, 2004).

## 6. Findings

In 2015 the cargo intensity of the Samara region, excluding the pipeline transport was slightly higher than the value of this indicator in Russia on average, but it was lower than in such regions of the Volga Federal District as Tatarstan and the Kirov region. Despite the fact that the cargo intensity of the Samara regional economy significantly exceeds the national average, it is worth noting that from 2011 to 2018, in a relatively economic growth, there was a negative trend to its increase. The changes of this trend will contribute to a new quality of the economic growth.

There are a number of countries with extremely high decrease in the cargo intensity. They include India (the first years after independence) and Japan (this country does not have its own natural resources and it is highly dependent on their transportation), and in recent decades - the United Kingdom. In the UK the system regulating the cargo intensity index is very important. In this country, as in any other, the GRP growth is outstripping the cargo growth (Tonn, 2004).

At the same time the main source of reducing the cargo intensity becomes a decrease in the average length of traffic by a transmitting short line (up to 250 km, but not up to 150 km as it was considered in Russia before) from the railway to road transport, which in turn implies the priority development of the road network. The main source of reducing the cargo intensity of the GRP is to reduce the transportation distance, despite the fact that its value will rise (after growing economy). It is estimated that 77% of the cargo intensity could be shorter or it is not needed (Bolgova, Noskov, & Noskov, 2011).

According to forecasts and assessment of the Ministry of Economic Development, Investments and Trade of the Samara Region (MEDT SR) by 2040 the value of the cargo intensity of the economy could fall to 1.05 ton-km./ US dollars, that displays the Samara region by this indicator on a par with the most developed countries.

Today, the transport costs for many sectors of the economy are a burden. The commercial speed of commodities' transportation from a producer to a consumer in Russia is 2-3 times lower than in Europe and the United States.

The share of transportation costs in the cost of goods for production purposes ranges from 5 to 35%, with average values in the country: in agriculture – 7%, in the food industry – 8.9%, in capital construction – 13%, in logging – 22% (Metyolkin, Stepanov, Rasikhina, Kravchenk, & Fedin, 2008). In the USA, for example, the transport component varies on average from 4 to 8%, and in only five sectors it

exceeds more than 10%: in the pulp and paper industry (11%), in furniture (12%), in food (13%), in timber (18 %), and petrochemicals industries (24%).

The dynamics of the passenger turnover capacity in the Samara region does not correspond to global trends: in 2018 there was a significant decrease in this indicator compared to 2000, despite the economic growth in 2000 – years, both in Russia as a whole, and in the Samara region (The territorial body of the Federal State Statistics Service of the Samara region, 2018).

However, the analysis of the population mobility shows that such negative trend in the passenger capacity can be explained, first of all, by a faster pace of the GRP growth compared to the passenger turnover. In addition, it requires analyzing the issues of increasing the people mobility in connection with the increase in motorization of the population and the possible unreported trips by public transport. The absolute value of the passenger capacity in the Samara region in 2015 was lower than in Russia as a whole and than in many countries (Noskov & Noskov, 2015).

It is known that the higher the level of the industrial and social and economic development of the country is, the higher its rate of mobility and the people mobility are. In the Western countries, only 35-40% of the passenger turnover accounts for passenger trips (in Russian – 60% or more). Certain studies have shown that the transport accessibility significantly affects the increase in per capita of the GDP, while the GDP growth in itself does not guarantee the transport accessibility growth (McKinnan, 2007). The population mobility of the population in 2003 was 4300 km. for 1 person per year. For the Soviet Union in 1990 it was 8700 km., whereas in developed countries, primarily in Western Europe, this figure now exceeds 10 thousand km. for a person per year (in Germany – 10.7 thousand km.). In the Samara region in 2018 it was equal to 1388 km. for 1 person per year (The territorial body of the Federal State Statistics Service of the Samara region, 2018).

Relatively to other regions of Russia, the Samara region has the average population mobility. The Russian transport strategy provides for the growth in mobility and the population mobility by 2020. It is primarily due to the growth in the vehicle fleet and to the increase in the share of passenger cars in the passenger transportation from 33% to 53% (The territorial body of the Federal State Statistics Service of the Samara region, 2018).

Every adult resident of the Samara region does less than 2000km. per year with social and cultural purposes. The development strategy of the unified tariff net of the Samara region, within which the passenger transport will develop, guarantees the mobility growth of 1 resident with social and cultural purposes at least 3 times by 2040.

The growth of quality of life is accompanied by the growth of the population mobility, primarily due to trips with social and cultural purposes. In the last 15 years the population mobility of the Samara region has decreased in all branches of public transport and modes of public transport. This negative trend has not corresponded to the development strategy of the region and should be overcome in the long term. We believe that by 2020-2025 the passenger capacity of the GRP of the Samara region can be increased 1.5-2 times under any scenario of the GRP growth. It's enough to reach the rate of the population mobility, which was in the country in 1990.

Education and science, digital economy as the factors for the stable development and the economic security of the regional economy are the most important modern branches (Chekmarev, 2003; McRae, 1996).

The links of the scientific and educational and information framework of the territorial branch economic cluster in the region is the combination of scientific and educational and information resources and integration ties which are prerequisites for achieving the targets of region's economic and spatial development.

The practical differentiation orientation of household and economic functions in education is fundamentally different by the orientation on various development indicators and by the institutional apparatus of the regional economy and the characteristics of institutions linked to the objective of reforming the education system in Russia.

The problem solving of productive use of education and science in Russia is connected with the recognition of their economic functions as priority ones. The contradiction between the developed system of education in Russia and low productiveness of its functioning reveals itself in the disparity between the high coverage of higher education and a low growth rate of its GDP.

This development of the scientific and educational and information frame improves organizational characteristics of the territorial and branch clusters and the institutional construction of the whole economic space of the Samara region.

At the same time the formation of branch clusters in the region is the necessary prerequisite for these processes and the efficiency of the cluster forming in its turn depends on the company's effectiveness of internal and external ties determining the qualities of scientific and educational, innovation and information and transport frame structures of the territorial and branch economic clusters.

The structure of the scientific and educational complex of the Samara region and the structure of its territorial and branch clusters are comparing. It allows revealing the ability of the regional system of science and education to fulfill the functions of economic clusters in the region (Noskov & Noskov, 2015). The structure of the scientific and educational complex of the Samara region is actually formed in accordance with the structure of industrial clusters of the territory and follows the structure of STA formation.

The previous periods of the system development of science and education in the Samara region contributed to the fact that the links of the scientific and educational potential of the region correspond to the sectoral focus of its developing economic clusters and make a good potential to realize the functions of their scientific and educational frame. In a number of economic clusters, their scientific and educational, innovative and information and transport framework has already been developed to a high degree, in others – they are only in the process of formation and they require a significant effort for their development both from the governing bodies of the Samara region, and in the self-development of universities and scientific organizations.

This, in our opinion, the most important problem to develop a more innovative and competitive economy of the region must be taken into account in the formation of the concept of STA development. The analysis shows that practically all economic clusters and their scientific and educational frames spread on all the territory of STA making it economically, scientifically and educationally uniform.

It seems appropriate to consider economic clusters of the Samara region developed and mature with established research, educational and information and transport frame. In STA they include: petrochemical, aerospace, automotive, energy and agro industrial clusters. In their structure there are universities and research organizations which educational and scientific activities are fully focused on the

needs of the cluster. In addition, the structure of their scientific and educational framework has the core - Profile University (Noskov, 2003). Potential territorial and branch clusters of the region have not got a clear scientific and educational and information frame or a core yet – the leading profile university that is oriented towards the needs of the cluster.

## 7. Conclusion

Having determined the importance of the services of the most important infrastructure sectors in the economic development of the territories in the global economy, we conclude about the new crucial role of the transport complex, education and science, digital economy, leading universities and research centers in the development of the regions in the transition to a modern industrial society. This role is manifested through the development of regional sectoral economic clusters, on the basis of the formation of their scientific, educational, information, innovative and transport frameworks, the growth of their modern human capital.

Thus, it seems that the presence of the leading specialized university, surrounded by effective scientific infrastructure, forming the core of the scientific and educational and information frame and focused on the needs of the cluster, is the most important criterion for the successful development, prospects and competitiveness of the cluster. The important prerequisite for the implementation of competitive advantages and the economic security of the Samara region, which has a system of high – tech economic clusters and their system of scientific and educational and information frameworks, is the further development of the transport and logistics framework of the STA.

The problems of practical implementation of the factors that strengthen the competitiveness of the economy in the Samara region, on the one hand, especially in the face of globalization, and on the other hand, in the face of economic instability and economic sanctions, should be the subject of the further serious research.

An important background for the successful formation of STA, the realization of competitive advantages of the Samara region with the system of a high technological economic cluster and a developed system of scientific and educational and information frames is the development of the transport and logistics system of STA. It must become the subject of a further research of the STA development. The improvement of transport services leads to significant improvements in health outcomes (preservation of human capital) of regions, reduction of unemployment, crime and deaths from traffic accidents and it will increase the migration attractiveness in the global economy.

In the transition to a predominantly stable type of the economic growth, the cargo turnover growth in the Samara region will lag behind the growth in the GRP and to an even greater degree it will lag behind the passenger turnover growth. This will determine the way in which the economy of the Samara region will gradually move into the post-industrial development stage, accompanied by a decrease in the contribution of traditional economic sectors in the GRP and increasing the population mobility.

We can assume further that in the process of moving towards the new economy based on knowledge, the role of leading universities in respective economic clusters will increase, and they will increasingly play the role of the main centers in the formation and development of territorial and sectoral clusters. In this sense, STA development as a single economic and scientific and educational and



information complex will play an integral ever-growing positive role, and will soon become indispensable for rapid capitalization of the region, promoting the economy of the Samara region in the direction of more the economic security and sustainable development.

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