Modernization of Russian flagship universities in the context of regional sustainable development

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Abstract. At the present time, the prerequisites for intensification of the regional economic systems’ development are being created in the Russian higher education system. The article deals with the issues of modernization of the flagship universities, reflected in their development programs. A hypothesis has been put forward that the development of flagship universities would adequately correspond to the regional agenda, while ensuring the sustainable development of both the university and the region as a whole. It becomes possible with a more detailed study of the components of the social and economic potential of the regions and the development and implementation of strategic projects of flagship universities aimed at developing the natural and resource regional potential, taking into account the effects of transforming universities into centers of innovation, technological and social development of the regions.

1. Introduction

Today, the sustainable development of Russian regions can be supported by the functioning and development of a network of flagship universities. The transformation of universities into the regional flagship universities requires the development of a theoretical and methodological base for the processes of regional development. The focus of the flagship universities is on the sustainable regional development problems’ solution makes it determines the necessity to study expert analytical and other information that can become the basis for the following forms of analytical activity:

- Analysis of indicators reflecting the level of social and economic development of regions;
- Analysis of the components of investment attractiveness rating of the region, primarily natural resource potential;
- Correlation analysis to identify the groups of flagship universities, which modernization makes is possible to develop the natural and resource potential of the regions;
- Analysis of the content of development programs and strategic projects of flagship universities.

2. Results
The theory of sustainable development presupposes the obligatory consideration of mutually complementary interests in the development of the economic, social, and environmental subsystems of the regional system – individually and collectively [1]. In the system of higher education in Russia, there are prerequisites for ensuring sustainable development of the regions through the modernization of their flagship universities. Based on the results of competitive selection of higher educational institutions for the financial support of development programs of federal state higher educational organizations from the federal budget in 2015 and 2017 were formed two groups of flagship universities in Russia. In 2015 (the first wave) were selected 11 universities (Volgograd State Technical University, Voronezh State Technical University, Vyatka State University, Don State Technical University, Kostroma State University, Omsk State Technical University, Orel State University named after I.S. Turgenev, Samara State Technical University, Siberian State Aerospace University named after academician M. F. Reshetnev, Ufa State Oil Technical University, Tyumen Industrial University). In 2017 (the second wave) were selected 22 universities, which were divided into two groups. The first group has 8 universities (Novosibirsk State Technical University, Vladimir State University, Siberian State Medical University, P. G. Demidov Yaroslavl State University, Nizhny Novgorod State Technical University named after R.E. Alekseev, Tula State University, Cherepovets State University, Murmansk Arctic State University). The second group consists of 14 universities (Altai State University, Belgorod State Technological University named after V. G. Shukhov, Petrozavodsk State University, Ulyanovsk State University, Kemerovo State University, Togliatti State University, Mari State University, Yaroslav-the-Wise Novgorod State University, Magnitogorsk State Technical University named after G. I. Nosov, Pskov State University, Kalmyk State University named after B. B. Gorodovikov, Syktyvkar State University named after Pitirim Sorokin, Yuri Gagarin State Technical University of Saratov, Sochi State University). Thus, 33 universities were selected and received the status of flagship ones. They are located on the territory of 32 regions (Samara State Technical University became the main wave in the Samara Region, Togliatti State University in the second wave).

Currently, a number of relevant ratings of the regions are available, related to their socio-economic status, social and economic potential, in the structure of which a number of researchers include the natural and resource potential. The socio-economic potential of the development of the regional system is a combination of external and internal factors that determine the possibilities for the development of the region. Moreover, each of the factors is considered as one of the potentials for the development of the regional system.

The most important factor for the regional sustainable development is a corresponding development of their natural resources potential. The key circumstance is the inclusion in the list of the regional development plans’ priorities the tasks of the transition to a highly productive and environmentally friendly agro- and aquaculture, the development and implementation of systems for the rational use of chemical and biological protection equipment for agricultural plants and animals, the storage and efficient processing of agricultural products, the creation of safe and high-quality, including, functional, food products [8].

It should be noted that, in accordance with the requirements of the Ministry of Education and Science of the Russian Federation, the programs for the development of flagship universities should include activities in areas not directly related to the development of the natural resource potential [7]: modernization of education; modernization of research and innovation activities, including the development of the University's innovative ecosystem; development of human resources; modernization of the university management system; modernization of the material and technical base and socio-cultural infrastructure; development of local communities, urban and regional environment.

The natural-resource potential is characterized by a set of natural resources of the region that can be involved in economic circulation, taking into account economic opportunities and the expediency of developing science and technology [2]. The level of development of science, engineering and technology in the region, in turn, depends on several factors, most important of which is the activity of the local universities.
In the model and parameters of monitoring of the universities’ centers of innovative, technological and social development of the regions (Priority Project "Universities - as Centers of Innovation Creation Space"), two indicators were used to divide universities into groups - the average grade of students enrolled in the previous calendar year for the budgetary form of education in all educational institutions of higher education in the region (65 points) and the gross regional product (GRP) per capita for the previous calendar year according to Rosstat (280,000) [3]. At launch projects for the modernization of flagship universities in 2015 only three regions with the flagship universities of the first wave, the GRP per capita was formed below the value of 280,000 rub. - Kirov region (GDP per capita in 2015 amounted to 216918,0 rub.), Kostroma region (245940.9 rub.) and Orel (273107.5 rub.). In 2016 the Oryol region managed to overcome the border (282494.1 rub.). In 2016, all regions in which the flagship universities of the first group of the second wave are located have shown GRP per capita higher than 280,000 rub. The same result was demonstrated by 8 of the 14 regions in which the flagship universities are located, which are in the second group of the second wave.

In Figure 1 shows the average GRP per capita in the regions in which the flagship universities are located.

![Figure 1. The average GRP per capita in the regions in which the flagship universities are located, rub.](image)

As shown in the Figure 1, the regions in which the flagship universities are located, according to GRP per capita, demonstrate high competitiveness.

When making the ratings of the investment attractiveness of the regions (formed by the rating agency “Expert RA”) as one of the components of the investment potential of the regions, it is evaluated their natural-resource potential [4, 5]. At the same time, it is necessary to emphasize that the activities of universities promote the maximum use of the labor, innovation and production potential of the regions. Figure 2 shows the average ranks of the components of the investment potential of the regions where the flagship universities are located, as of 2016.
Figure 2. The average rank of the regions where the flagship universities are located (2016).

As can be seen from Figure 2, the natural-resource potential of the most competitive is the group of regions where the flagship universities belonging to the second group of the second wave are located. Their average natural-resource rank in 2016 is 37 (in 2015 - 36).

To determine the direction of modernization of the flagship universities in the context of maximizing the use of the regional natural-resource potential, a correlation analysis was carried out.

As a result of 2016 for the first-wave support universities, there is a noticeable correlation of the arrays of natural-resource and innovation ranks of the regions (correlation coefficient is equal to (0.72), arrays of natural-resource and labor ranks of regions (0.76), massifs of natural resources and production ranks (0.76). At the end of 2015, the correlation is slightly weaker (0.71, 0.74, 0.74, respectively).

For the first group of flagship universities of the second wave in 2015 and 2016, correlation is not observed (all correlation coefficients have negative values).

For the second group of flagship universities of the second wave, another situation is observed. Based on the results of 2016, a certain correlation of the natural-resource and innovation ranks of the regions is observed for this group (correlation coefficient is equal to (0.22), arrays of natural-resource and labor ranks of regions (0.47), arrays of natural resource and industrial ranks (0.56). Following the results of 2015 there is a slightly stronger correlation (0.31, 0.54, 0.65 respectively).

Thus, it is most preferable to develop and implement measures and projects to develop the region's natural and resource potentials within the framework of modernization of the first-wave flagship universities and the second group of the second wave. For this, it is necessary to take into account the determinants of the development of the natural-resource potential, by which we will understand the dominant natural factors, the synergetic effect of which determines the ecological and economic assessment of the natural resource potential and its individual components (geographic location, climate, relief, geological structure, geomorphological processes) [6].

It is reasonable to analyze the content of strategic projects of flagship universities in order to take into account these determinants. Currently, the flagship universities implement 136 strategic projects in the regions, which can be grouped in the following areas [8]: “Agroprom”; “Technologies (industry)”; “Medical”; “Technical Entrepreneurship”; “Talents”; “Social projects”; “The urban space”; “Tourism”. An important and compulsory condition for the implementation of strategic projects is the modernization of a number of activities of flagship universities.
In a single direction, which is directly related to the development of the natural and resource potential of the regions - direction “Agroprom” - the projects of only a few of the supporting universities entering the second group of the second wave are presented:

- A strategic project of the Altai State University “Creation and introduction of competitive domestic biological products and technologies for the agro-industrial complex of the Altai Territory on the basis of an innovative model of the full scientific and technological cycle”: among the tasks of the project is the expansion and modernization of the experimental and production infrastructure of the engineering center “Prombitech” of the University for the production of experimental lots of innovation products for the agro-industrial complex, as well as the development and implementation of new innovative practice-oriented educational programs in the field of agro-bioindustry on the basis of the latest scientific achievements and accumulated potential of the University in the field of microbial biotechnologies; It is planned that the implementation of the project will provide systemic effects in the development of the university's educational, scientific and innovation complex;

- A strategic project of the Kemerovo State University “Creation of the center for the introduction of unmanned systems in the operations of industrial and agricultural enterprises of the Siberian Federal District”: as a goal of the project announced the formation of the Competence Center; among the objectives of the project - the formation of a portfolio of services based on unmanned lethal technologies for agriculture, road infrastructure, oil and gas, mining, power generation and construction industries on the basis of benchmarking global best practices implementation of unmanned technologies; the impact of the project on the development of the university is to increase the budget co-financing of applied research, increase the level of pay specialists responsible departments of the university, improving the quality of the material and technical base of the university;

- A strategic project of the Mari State University “The University as a center for development of agriculture of the Mari El Republic”: as a goal of the project announced the development of a training system for the agro-industrial complex of the Republic of Mari El in accordance with labor market needs and future challenges of food security of the country;

- A strategic project of the Petrozavodsk State University “Complex scientific, technological and import substitution solutions for the development of agriculture and fisheries in the region”: is aimed at addressing the modernization of agricultural sector through development and implementation of integrated scientific and innovative solutions, import substitution developments of the flagship university, creating "new growth points”;

- A strategic project of the Kalmyk State University named after B. B. Gorodovikov “Provision of food security in the region through the development and scientific justification of competitive technologies for the production of beef and socially significant products based on modern biotechnological and molecular genetic methods”: as effects from the project implementation, an increase in the number of research and innovation projects, the upgrading of skills of specialists and science-based indicators of the university.

Stating the importance of these projects for the development of regions, we note that in the course of the analysis it is established that there is not explicit necessity to modernize the flagship universities in the implementation of projects.

3. Future Research Directions

The study suggests an approach to the justification of the content of measures for modernization of the flagship universities.

Of practical interest is a method for identifying the groups of regions, which are located on the territory of the flagship universities. According to the authors, to determine the effective formulation
of measures for modernization of universities is advisable to use the identified group of regions with the flagship universities of the first wave and the second group of the second wave.

Analysis of the content of strategic projects of these universities has shown that they do not fully take into account the potential for modernization in the context of sustainable development. Consequently, some improvement is needed in the composition of measures to modernize the activities of the core universities in the following areas:

- Analysis of the systemic potential of the transformation of flagship universities in the context of sustainable development of universities;
- Development of a methodology for assessing the impact of modernization processes of flagship universities on the development of the natural and resource potential of the regions;
- Development of theoretical and methodological bases for the development of a model strategic project aimed at developing the natural and resource potential of the regions.

4. Conclusions
Within the framework of scientific research, the authors studied theoretical and practical aspects of modernizing the flagship universities’ activities in the context of the regional natural and resource potential development as a factor of their sustainable development. The authors attempted to identify the groups of flagship universities which modernization will contribute to the development of the regional natural and resource potential.

The transition from developing common approaches to modernizing the activities of all flagship universities to differentiating such approaches in the context of individual groups of flagship universities demonstrates a good methodological potential in the context of ensuring the regional sustainable development. First of all, the theory should be tested in the second group of the second wave of flagship universities.

The implementation of similar projects in other groups of flagship universities will require more time and effort.

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