

# The Role of Flagship Universities in a Region: Transformation Models

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**Abstract.** Efforts in providing expert and methodological support for the implementation of flagship university development programs in 2016–2017 yield-

ed a specific-purpose flagship university model and four generic flagship university transformation models: regional technology leader (RTL), regional comprehensive university (RCU), industry sector leader (industrial university) (IL), and trans-border region university (TBRU). The article provides distinctive features of the four models, analysis of the regions where specific types of models prevail, and the results of model testing.

As it has been found, flagship universities basically develop along two generic models, RCU (classical universities, nearly half of the project participants) and RTL (engineering universities, one third of the flagship universities). For most universities, the type of transformation model pursued is strongly related to their current status and external environment characteristics. However, a number of universities fall in between and cannot be classified neatly under any particular model due to some specific external and internal factors. In this case, universities may use elements of more than one transformation model at once, yet the choice of model should first of all be based on the regional factors that determine the position and role of the flagship university in terms of the priority areas of regional development.

**Keywords:** flagship university, regional development, target model, transformation model, higher education, development program.

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*Translated from Russian  
by I. Zhuchkova.*

Focus on the role and contributions of universities to regional development has been a major trend in Russian and international educational research over the past decade. A wide range of theoretical and applied studies have explored the impact of universities on the key aspects of regional development, innovations in the first place, seeking to foster an effective dialogue with different stakeholder groups and to devise methods of evaluating the contribution of universities to regional development [OECD 2007; Goddard, Vallance 2013; McAdam, Miller, McAdam 2016; Rucker Schaeffer 2018; Perfilyeva 2011; 2013; 2014; Leshukov et al. 2017]. A number of researchers have analyzed institutional diversity in higher education and developed approaches to university classification [Kuzminov, Semenov, Froumin 2013; Knyazev, Drantusova 2013; Platonova 2015]. This article benefits the most from the studies attempting to draw a typology of regional higher education systems in Russia, which are extremely heterogeneous due to the strikingly different economic and sociodemographic contexts of regional development across the federal subjects [Leshukov, Lisyutkin 2015; Froumin, Leshukov 2016].

Research in this field has been growing ever more relevant since the Russian system of higher education adopted the concept of regional flagship universities. A network of such universities is expected to be created<sup>1</sup> in response to the major challenges faced by the majority of Russian regions, notably the growing internal migration of students to megalopolises, the lack of strong regionally-focused research and development centers, the low involvement of regional universities in local socioeconomic processes and, as a consequence, weak ties with regional stakeholders [Arzhanova et al. 2017:11].

The distinctive feature of this new category of universities is that their development strategies positively foster orientation toward solving the issues of regional socioeconomic development, which has been reflected in the specific-purpose flagship university development model. The general model assumes that universities evolve into regional centers of talent attraction and retention, warrantors of high-quality education in a broad range of disciplines, regional research and innovation centers, and drivers of positive change in urban and regional environment. However, flagship universities make up a highly heterogeneous group, and the socioeconomic characteristics of their regions can be extremely different. For this reason, one of the research objectives under the project Improving Performance of Flagship Universities...<sup>2</sup> is to identify the generic models of flagship

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<sup>1</sup> Federal Specific-purpose Education Development Program for 2016–2020 (approved by the Resolution of the Government of the Russian Federation No. 497 of May 23, 2015), p. 23.

<sup>2</sup> Improving Performance of Flagship Universities through the Development and Testing of New Integrated University Governance Models with Due Regard to the Implementation of Development Programs Oriented at the Key

university governance and development (transformation) whose design would reflect the specific aspects of university-region interaction and the differences in university contributions to regional development across the federal subjects. Meanwhile, the models suggested should describe not so much the current status of a flagship university and its position in the region but rather the vector of strategic development and transformation of the university as the main driver of change, in the context of the region's socioeconomic development strategy.

Among the multiple types of educational institutions classified as flagship universities, researchers identify the following four generic transformation models that reflect the university's relations with society, business environment and the government, grouping together universities with similar missions, strategies and organization patterns:

- regional technology leader (RTL);
- regional comprehensive university (RCU);
- industry sector leader (industrial university) (IL);
- trans-border region university (TBRU) [Arzhanova et al. 2017:13].

### **1. The Conceptual Framework of Model-Based Classification**

The typology of flagship university transformation models is built around the concept of *regionally engaged university*, which matches the goals and objectives of flagship universities to the fullest extent. The concept allows researchers to “consider the specific characteristics of regions, classify all the diverse interactions between flagship university and local community, and assess the level of university cooperation with the major groups of regional stakeholders, encouraging the development of regional identity among universities and affecting their missions and institutional structures” [OECD 2007:13–14; Perfilieva 2013:106].

The literature on universities' contributions to regional development is broad and diverse, including research on the concept of *regionally engaged university*, yet very few studies attempt to identify and describe the conceptual models of university contribution to regional evolution. One of such few papers identifies four models of university role in regional development based on the analysis of university functions and with due regard to the political and sociocultural characteristics of Great Britain, Sweden and Austria:

- (a) *Entrepreneurial university* enjoys economic autonomy, transfers its industrial knowledge and contributes to regional prosperity by creating conditions for knowledge generation and utilization;

- (b) The *regional innovation systems (RIS)* approach conceptualizes universities as having a fundamental role in knowledge production in the capacity of local network coordinators that bridge regional production, innovations and global knowledge to promote economic growth of the region;
- (c) The *mode 2 university model* contributes to settlement of socioeconomic problems in the region by engaging numerous organizations in collaborative research and co-production of new, regionally applicable interdisciplinary knowledge;
- (d) *Engaged university* adapts its functions to regional needs, focusing its research potential on interactions with local industries and communities and actively shaping regional identity [Trippi, Sinozic, Smith 2014].

The authors of this university typology observe that Great Britain, Sweden and Austria favor the entrepreneurial university and RIS models, even though neither approach is flawless [Ibid.:25]. In Russia, some regional universities, including those assigned the flagship university status, also opt for the entrepreneurial university model which facilitates successful overcoming of difficulties generated by cuts in government funding [Bodunkova, Niyazova, Chernaya 2016:108; Ershov 2017:84]. However, the problems faced by flagship universities would be better solved by the engaged university model that uses university's academic and research potential to solve a wide variety of economic, political, social and cultural problems in the region [Kranzeeva 2017:68]. This inference confirms the feasibility of using the concept of *regionally engaged university* as the basis for designing generic models of flagship university governance and transformation.

Qualitative analysis of university performance was used to measure institutional heterogeneity of flagship universities and identify the boundaries between the types of university transformation. This method allows using the model of multilevel and many-sided university engagement in regional development, which makes it possible to examine various aspects of regional university performance and assess the potential contributions of regional universities to regional prosperity by using in-depth analysis of university development programs, considering the major trends and strategies of regional socioeconomic evolution and defining the practices of university engagement with the key groups of regional stakeholders [Perfilyeva 2014:484].

Qualitative analysis enables researchers to pay special attention to internal and external factors of flagship university performance, which create (jointly as well as severally) the unique contexts for university existence and interactions and can affect the differentiation of flagship universities [Academy of Networking LANIT 2008:12].

The internal factors are derived from the university governance strategy, i. e. its mission statement, strategic objectives, development priorities, institutional profile, key business processes, product portfo-

lio, resource potential and competitive advantages as well as relations with different groups of external stakeholders. Treating stakeholders as an internal factor makes sense because having a system of interactions with external stakeholders normally results from the university's purposeful efforts and implementation of its development strategies, indicating its growing autonomy and independence.

External factors are determined by the political, economic, societal and technology processes that unfold at the national, regional and global levels. Although global and national factors apply to every region, their effects may differ as a function of specific regional variables, which is what shapes the global and national contexts of the development of flagship university contribution models.

However, university-region interactions are influenced most strongly by regional factors, which shape the scope of university activities and directly affect the choice of university development strategy. Some of the crucial regional factors include:

- Geographic location, in particular relative to the border (borderland/inland);
- Demographic situation, which affects current and future needs of the labor market as well as employment rates among regional university graduates and skilled migration rates;
- The level of socioeconomic and innovative development in the region and the strategic priorities for regional (urban) development, which are among the target goals of flagship universities;
- Region engagement in priority state-run programs and megaprojects designed to improve the country's competitiveness and promote the development of strategically important national industries;
- Institutional landscape and competitive power of the regional higher education system, which determine its opportunities and limitations in solving problems faced by the region; the flagship university's position and role in the regional higher education system (with due regard to competition, first of all on the part of the "leading" universities, i. e. federal universities, national research universities and the Project 5–100<sup>3</sup> participants).

In order to demarcate the boundaries among the flagship university transformation models, a number of studies have attempted to identify quantitative indicators reflecting the differences between the specific models. Characteristics of universities' academic activities and

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<sup>3</sup> Project 5–100 is a special government-run program to develop major Russian universities, launched by the Russian Ministry of Education and Science on the basis of Presidential Decree on Measures for the Implementation of State Policy in the Field of Education and Science of May 7, 2012 (*Translator's note*).

their contribution to regional manpower wind up being the most relevant criteria of distinguishing between the models. Availability of a field of study with the highest proportion of students in total student population (normalized<sup>4</sup> student population) that indicates university specialization, was chosen to be the fundamental university characteristic [Platonova 2015:23]. The proportion of 50 percent of students (normalized student population) enrolled in one of the eight fields of study in higher education (estimated based on the data from the Monitoring of University Performance<sup>5</sup>) was set as a cut-off percentile. The following data was used as specifying indicators of differentiation:

- Proportion of university students in regional student population across different fields of study, which indicates the degree of flagship university's monopoly power in the regional system of higher education [Kuzminov, Semenov, Froumin 2013:46];
- Proportions of students (normalized student population) in specific majors, which indicate the key trades in which skilled workers are trained for the regional labor market.

Analysis of the results obtained is presented in the section Differentiation of Flagship Universities by Specializations and Fields of Study.

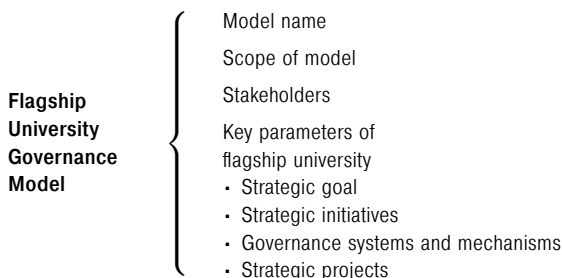
Allowance made for the internal and external factors mentioned above, the generalized flagship university transformation model includes the following elements (Fig. 1):

- Scope of the model, i. e. description of the regions hosting flagship universities of a specific model, which takes into account geographic location of a region as well as the level of its socioeconomic and innovative development and primarily indicates the level of innovative development in the region determined on the basis of individual indices and rankings designed to assess the status and dynamics of innovative processes;
- Stakeholders and major groups of external partners, interaction with which is seen as mutually beneficial and as a top priority for the flagship university of a specific governance model type;
- The key parameters reflecting the current state of a flagship university, which can serve as the basis for classifying it under a specific governance model;
- flagship university governance model strategic toolkit:
  - Strategic goal of the university;

<sup>4</sup> *Normalized student population* is estimated using the formula  $N_n = N_{ft} + 0.25N_{pt} + 0.1N_d$ , where  $N_{ft}$  is the number of full-time students,  $N_{pt}$  is the number of part-time students, and  $N_d$  is the number of distance students ( $TN$ ).

<sup>5</sup> Monitoring of University Performance, 2017. Available at: <http://indicators.miccedu.ru/monitoring/?m=vpo>

Figure 1. **Flagship University Governance Model Structure**



- Strategic initiatives, i. e. actions and/or action programs designed to implement the university development strategy;
- University governance systems and mechanisms;
- Strategic projects reflecting the top priorities of a flagship university of a specific model and taking into account the regional development strategy.

The generalized flagship university governance/transformation model was designed with due regard to the approved target flagship university model<sup>6</sup> and the predesigned generic models of regional flagship universities of particular specializations. A flagship university transformation model should describe the trajectory of strategic development of a flagship university as the central driver of change in the region. Analysis should therefore be focused on the external context and the key groups of stakeholders, which are considered by flagship university development strategies and the systemic changes within their frameworks.

## **2. Distinctive Features of Flagship University Transformation Models**

Analysis of external regional contexts as well as current activities and development programs of 33 flagship universities allows identifying some generalized characteristics of the generic models of flagship university transformation.

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<sup>6</sup> Regulations of the Ministry of Education and Science of the Russian Federation On the Procedure of Competitive Selection of Universities for Federal Funding of Federal State University Development Programs of October 16, 2015. Available at: <https://минобрнауки.рф/новости/6469/файл/5402/FIN-Положение%20о%20конкурсном%20отборе.pdf>

**2.1. Regional  
Technology Leader  
(RTL)**

RTL universities are located in industrially developed regions with pretty high levels of innovative activities, so their primary goal must consist in moving to the fore of regional innovations in order to solve the following strategic objectives that define the role of a flagship university:

- Improve the region's competitive performance at the national and international levels, in particular by participating in regional clusters in the prioritized industries;
- Develop centers of excellence to foster research and development in the top priority domains of regional development at the national level and globally; establish an innovation infrastructure on the basis of the university;
- Find and build effective mechanisms of interaction between the key elements of regional innovation systems—universities, industries and the government—within the framework of the “triple helix” model [Etzkowitz 2008]; transform the university into a center of efficient communication with and integration of regional stakeholders;
- Create an innovation-enhancing environment in the region to promote relevant motivations among active youth, the development of innovative entrepreneurial initiatives and the growth of the social class of technology entrepreneurs in the region;
- Develop a system of continuing engineering and technology education in the region to boost the prestige of engineering careers and shape the regional tech elite.

University transformation under the RTL model must include a whole range of systemic and structural changes affecting all the major areas of university activities.

First and foremost, a university must start developing an effective system of management support for innovations, which includes:

- Administrators' perception of innovations as a prerequisite for sustainable and successful university growth;
- A set of structural units to ensure support and administration of innovation projects at every stage;
- Shared governance mechanisms: co-participation of university and businesses—innovation cluster participants in the governing board; design of complementary development strategies for all innovation process participants in the region;
- An innovation environment and an entrepreneurial culture aimed at encouraging creative initiatives of faculty and students with innovative potential;
- A system for monitoring and predicting the demand of regional innovative businesses for human resources of various skills and backgrounds, including those with unique competencies, which



implies creating a unified register of cluster participant companies' manpower needs.

As part of establishing a system of continuing engineering and technology education, a flagship university must ensure a qualitatively new way of engineering training by networking with secondary and vocational schools. Successful implementation of the new philosophy of engineering and technology education is expected to feed new, innovative-minded engineers into the regional economy.

Efforts in reorganizing university activities with a view to build a relevant and efficient innovation system should foster innovative advancement of the region through the creation and commercialization of intellectual property, the development of new technology industries, businesses, markets and infrastructures, and, in particular, the participation in the National Technology Initiative program.

Pursuing new partnerships and building a communication platform to bring together all the innovation process participants becomes an important aspect of university governance. To ensure long-term collaboration with different groups of partners, first of all hi-tech businesses and industries, universities could develop industrial partnership programs that imply merging the intellectual potential as well as material, financial and corporate resources of all the partners. In shaping the regional innovation environment, a flagship university must act as to popularize the innovative path of modern production development and the advantages of knowledge-intensive and hi-tech industries. For this purpose, it should organize workshops, forums and conferences on science and business and set up entrepreneurship clubs as platforms for informal interactions between entrepreneurs and innovators in the region.

As a result, a flagship university choosing this transformation model should become a regional integrator of innovation and the center of the regional technology innovation environment<sup>7</sup>.

## **2.2. Regional Comprehensive University (RCU)**

The RCU model has been built to meet the needs of a fairly large group of regions of Russia characterized by relatively low rates of economic growth, average levels of innovations and, consequently, low socio-economic performance indicators in general. Higher education systems of such regions have no universities from the "leading" league and are usually based around one big classical university (university complex), which serves as the center of education, science, culture and health-care in the region. Under such circumstances, the flagship university

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<sup>7</sup> Passport of Priority Project "Universities as Centers of the Innovation-Generating Environment" approved by the Presidium of the Presidential Council for Strategic Development and Priority Projects (Minutes No. 9 of October 25, 2016). Available at: <http://legalacts.ru/doc/pasport-prioritetnogo-proekta-vuzy-kak-tsentry-prostranstva-sozdaniya-innovatsii/>

pursuing the RCU transformation model may assume the mission of a federal university—on the regional scale.

The distinctive feature of this model is that the university makes comprehensive contributions to regional development with a view to improve competitiveness of the prioritized industries and sectors by concentrating intellectual, human, methodological and technology resources around itself.

The priority areas of activity of universities in this category should include the following:

- Develop a regional system of priority continuing training and re-training in a broad range of disciplines and industries, making allowance for the regional labor market's needs;
- Prioritize the development of Master's and postgraduate studies in order to train and retain highly-skilled research and academic staff;
- Raise the new regional elite, i. e. senior executives of regional and municipal authorities and top managers of major enterprises and businesses in the region;
- Promote and capitalize breakthrough interdisciplinary research to improve the position of the university and the region as a whole at the national level as well as globally;
- Promote innovations in the region and shape an innovation environment, which suggests transformation of teacher education and integration of innovations into the learning process;
- Come up with innovative sociocultural initiatives to develop the region through social partnerships and the concentration of drivers of positive societal, economic and cultural change around the university.

A flagship university opting for this transformation model should become a network integrator of intellectual resources in the region, cooperating with a wide range of regional and trans-regional stakeholders in the selected priority areas.

### **2.3. Industry Sector Leader (Industrial University) (IL)**

The IL model owes its existence to the important role that individual regions play in developing the innovation economy and improving national competitiveness. Achievement of these goals requires priority development of the strategic industries and sectors within the frameworks of major industrial infrastructure projects and national industrial programs, which normally unfold on the basis of specific regions<sup>8</sup>. In addition, an important priority of national and regional innovative de-

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<sup>8</sup> Ministry of Economic Development of the Russian Federation (2013) Forecast for Long-Term Socioeconomic Development of the Russian Federation up to 2030. Available at: <http://static.government.ru/media/files/41d457592e04b76338b7.pdf>

velopment is to improve the quality of human potential through modernization of the social sector (non-manufacturing) industries, such as healthcare, tourism, culture or sports, whose development is also largely dependent on specialized regional universities.

The priority goal of “qualitative, quantitative and spatial optimization of the university network”, stated in the national program Education Development for 2013–2020, includes the objective to form a specific group of universities—industry leaders contributing to technology and personnel modernization in various industries of the Russian economy<sup>9</sup>. Such universities should satisfy the demand for human resources of adequate quantity and quality as well as for research and development efforts in the core and strategically important industries. One of the policy tools to achieve this objective should consist in “increasing the role of specialized universities (or specialized schools within “broad universities”) and ensuring their cooperation with businesses” [Kuzminov, Semenov, Froumin 2013:57].

As a consequence, the mission of a university using the IL transformation model should reflect the university’s aspiration to become “the No. 1 university for corporations” that have plant assets deployed in the region in order to facilitate the Third Industrial Revolution by integrating science, education and manufacturing, while at the same time improving the region’s competitiveness and living standards<sup>10</sup>.

Flagship universities pursuing the IL transformation model face a whole lot of objectives:

- Develop an industrial system of continuing education tailored to increase the prestige of industrial education and supply the region with highly qualified professionals oriented towards innovations and improving the efficiency of industrial production;
- Enhance innovative potential and competitive power of the respective industry at the national and global levels, which includes creation of industrial innovation clusters in the region as well as development and integration of new technology solutions and science-intensive products;
- Establish an internationally competitive open system of industrial knowledge management as part of shaping the uniform industrial information and learning environment [Mitsuk, Khabarov, Volegzhanina 2016:482];
- Provide an efficient dialogue between industrial agencies and businesses, on the one hand, and regional authorities, on the other.

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<sup>9</sup> Education Development for 2013–2020, National Program of the Russian Federation. Resolution of the Government of the Russian Federation No. 792r of May 15, 2013. Available at: <http://base.garant.ru/70643472/>

<sup>10</sup> Flagship University Development Program for Tyumen Industrial University (Federal State Budgetary Institution of Higher Education). Available at: <https://www.tyuiu.ru/university/programma-razvitija/>

er, in terms of building effective interconnected strategies for industry and regional development (achieve an inter-institutional balance of interests);

- Foster active communication within the regional community on forecasting in science and technology, exchange of cutting-edge knowledge, and global problems in the sector of university specialization.

A flagship university using this transformation model should become a regional industrial integrator, initiator and active participant in the innovative development of the industry of its specialization, thereby contributing heavily to the socioeconomic evolution of the region.

#### **2.4. Trans-Border Region University (TBRU)**

Russia has the longest national border in the world and the highest number of bordering countries (16), so most regions in the country (49 federal subjects) are border-adjacent. Nowadays, trans-border cooperation is seen as a key factor of economic and sociocultural growth of Russia's regions. The experience of EU countries, the U.S., Canada and China has shown that trans-border cooperation is the most important factor of promoting international economic relations, and rational use of the benefits of border proximity may boost socioeconomic development of even the most seemingly unpromising borderland areas [Vagin 2013:24].

A flagship university pursuing the TBRU transformation model and striving to expand international cooperation and promote economic, academic and sociocultural integration with the neighboring countries may become the critical driver of socioeconomic development in the borderland region.

The priority areas of activity reflecting the specific aspects of this model should include the following:

- Strengthen the position and credibility of Russia on the global scene by using the academic relationships of universities in the borderland regions as public diplomacy tools to encourage the development of transnational bilateral relations with the neighboring countries;
- Provide an efficient cross-cultural and cross-national dialogue between the borderland regions and the neighboring countries to make the university a fundamental platform for all sorts of interactions;
- Actively promote the Russian language, Russian culture and Russian-language education in the neighboring countries;
- Create trans-border innovation clusters in the region as new forms of cooperation to ensure dynamic and sustainable development of borderland regions. Academic clusters appear to be a promising type of trans-border clusters, being useful for border-adjacent regions not only in terms of concentrating research and academic

resources but also in terms of providing active integration of Russian universities into the global sociocultural environment [Morozova, Dubrovskaya 2016: 2576].

One of the promising vectors of activities for universities using the TBRU model could be promoting education export<sup>11</sup>. Unlike in other federal subjects of Russia, education export efforts of universities in the borderland regions imply focusing on attracting foreign students from the neighboring countries and shaping a pool of international graduates loyal to the region and willing to engage in further cooperation. Not only does this type of activity help make the university more attractive and competitive in the global education market but it also provides an opportunity to achieve a number of socioeconomic development objectives in the region [Vashurina, Evdokimova 2017:43].

The choice of types and forms of university-region interactions under this model depends on the areas and strategies of trans-border cooperation in the region, the economic, academic and research potential of the neighboring countries' borderland regions, and the university's proper resources.

The flagship university transformation models described above differ in the ways and methods of building relationships with the external environment, the strategies of development, and the strategic tools used to implement them. Table 1 provides a brief description of the models' characteristics.

### **3. The Scope of Models: Analysis**

This study understands the scope of flagship university transformation models as the federal subjects of Russia where flagship universities have been created as a result of a two-stage selective competition<sup>12</sup>. Using the concept of *regionally engaged university* provides an important opportunity to identify types of university-region interactions as a function of external factors that create specific conditions for university performance and its interactions with the environment. As the next step, the proposed typology of flagship university transformation models will be matched against the priorities and vectors of socioeconomic development of the regions (federal subjects of Russia)

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<sup>11</sup> Passport of Priority Project "Development of the Export Potential of the Russian Education System" approved by the Presidium of the Presidential Council for Strategic Development and Priority Projects (Minutes No. 6 of May 30, 2017). Available at: [http://d-russia.ru/wp-content/uploads/2017/06/education\\_export.pdf](http://d-russia.ru/wp-content/uploads/2017/06/education_export.pdf)

<sup>12</sup> [Minutes of the meeting of the Council for the Implementation of Development Programs for Flagship Universities Playing a Pivotal Role in the Industrial and Socioeconomic Development of the Subjects of the Russian Federation](#) and the Ministry of Education and Science of the Russian Federation No.DL-26/05-pr of May 18, 2016; Minutes of the meeting of the Competition Committee on the procedure of a selective competition among univer-

Table 1. **Flagship University Transformation Models: The Fundamental Elements**

Model Element	Regional Technology Leader	Regional Comprehensive University	Industry Sector Leader (Industrial University)	Trans-Border Region University
Scope of Model	Industrially prosperous regions with high levels of innovations and growing hi-tech industries	Regions with relatively high levels of innovations and multi-industry economies	Regions, including mono-industrial regions and monotonowns, which serve as the ground for unfolding large-scale industrial infrastructure projects and national industrial programs	Borderland regions oriented toward socioeconomic development of the region and promotion of socioeconomic relations with the bordering countries
Stakeholders	Innovation development institutions and investment companies; Industrial enterprises and organizations; Leading Russian and foreign universities and centers of scientific learning	A broad variety of regional and cross-regional academic and business stakeholders (in the prioritized areas)	Regional enterprises and businesses in the area of university specialization; Industrial academic partners (universities and research institutes); Industry-related ministries and agencies; Ministry of Education and Science of the Russian Federation	International partner universities; Regional borderland communities, including ethnic diasporas; Regional and foreign trans-border businesses and organizations
Key Parameters	University is an active participant in regional cluster development; A wide belt of innovative knowledge-intensive small businesses around the university; A high number and a broad variety of science and technology studies	Big multidisciplinary classical university; University is the center of education, science, culture and healthcare in the region; A wide range of areas of fundamental and applied research	University is the fundamental educational institution feeding human resources into the region's dominant industry; Pronounced industry-specific specialization and/or institutional (industrial) affiliation of the university; Prevalence of applied studies initiated by industrial partners	A broad array of programs and campaigns designed to promote international and trans-regional cooperation with universities of the bordering countries/regions; University is the center of education, science, culture and healthcare in the region
Strategic Mission	Integrate the potential of the university, regional businesses and regional authorities to help the region move to the fore of developing the national innovation system	Improve competitiveness of the prioritized industries and sectors in the region by concentrating intellectual, human, methodological and technology resources around the leading regional university	Provide continuing innovation-oriented education, breakthrough research and transfer of technology to develop hi-tech and backbone industries of the country and the region	Expand trans-border cooperation and promote international economic, academic and sociocultural integration to ensure dynamic and sustainable development of the region
Strategic Initiatives	Improve the prestige of engineering education; Industrial partnerships; Applied research; Technology entrepreneurship	Lifelong multidisciplinary learning; Intellectual network partnerships; Interdisciplinary research; Technology and social entrepreneurship	Industrial education; Industrial partnerships; Industrial research; Technology and social entrepreneurship	Expansion of cross-regional trans-border cooperation; Promotion of the Russian language; Social entrepreneurship
Governance System and Mechanisms	System of priority continuing education in engineering and technology; System of technology production and transfer to hi-tech industries; "Triple helix" model; Centers of excellence for research and development	Priority continuing education in a wide range of programs and fields; University is the center of integration and communication between authorities, businesses, academic community and society; Leadership in breakthrough research areas; University is the center of generation of sociocultural initiatives designed to foster regional development	Industrial system of continuing education; Development of strategic industries; Technology modernization of the industry; Regional industrial centers of excellence	Common trans-border research and academic environment; University is the center of promoting the Russian language, Russian culture and Russian-language education; Development of an innovation environment within the framework of trans-border cooperation; Platform for implementing sociocultural changes in the region
Strategic Projects <sup>a</sup>	Innovations; Industrial partnerships; Technology education; Applied research; Technology entrepreneurship	Innovations; Intellectual network partnerships; Lifelong learning; Interdisciplinary research; Technology and social entrepreneurship	Innovations; Industrial partnerships; Industrial education; Industrial research; Technology and social entrepreneurship	Innovations; Trans-border partnerships; Promotion of the Russian language; Public diplomacy; Social entrepreneurship

<sup>a</sup> The scopes of strategic projects correspond to the generalized priorities of socioeconomic development of the regions that make the scope of a specific model. These priorities are captured in the regional strategies and development programs (*Authors' note*).<FootnoteEnd:>

based on statistical analysis of their socioeconomic performance indicators and the current achievements in their strategic development.

Analysis of 32 subjects of the Russian Federation hosting flagship universities has allowed to identify the major external factors affecting the distribution of flagship universities within the typology proposed and indicating the scope of every specific model: geographic location of the region hosting the flagship university, its socioeconomic and innovative development indicators, and competitive landscape of the regional higher education system.

### **3.1. Geographic Location**

The choice of flagship university governance model depends on university location in a particular federal district with its specific indicators of socioeconomic performance, demographic situation and regional labor market as well as on whether the region is adjacent to the border.

Current distribution of the flagship universities among the federal subjects looks as follows:

- Volga Federal District—8 universities;
- Northwestern Federal District—6 universities;
- Ural Federal District—2 universities;
- Central Federal District—6 universities;
- Southern Federal District—5 universities;
- Siberian Federal District—6 universities.

Volga Federal District has the highest number of flagship universities and thus experiences a considerably higher level of university competition than the other districts, both within and among the regions. No flagship universities have been created in North Caucasian and Far Eastern Federal Districts so far. Yet, it is crucial to envisage the creation of such universities, given the geopolitical and socioeconomic significance of these federal districts for national development and the implementation of a number of national programs involving the regions that are part of these two districts.

### **3.2. Socioeconomic Performance Indicators and the Level of Innovations**

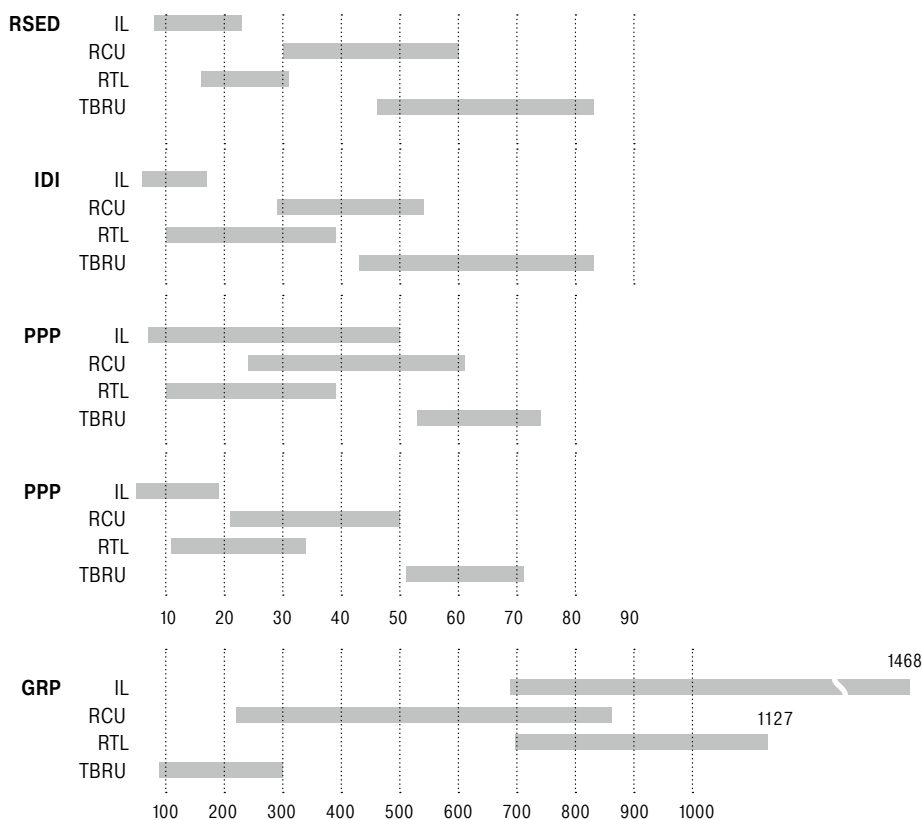
The choice of a flagship university transformation model is largely affected by the level of development, the scale (Gross Regional Product, GRP) and industry specialization of the regional economy (region's position in the ranking of socioeconomic development of the federal subjects of Russia, RSED)<sup>13</sup>, and the level of development of the regional innovation system, which is assessed based on specific indices and rankings:

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sities for federal funding of federal state university development programs in 2017–2019 No.OV-11/05-pr of April 17, 2017.

<sup>13</sup> RIA Survey and Ranking (2017) The Ranking of Socioeconomic Status of the Subjects of the Russian Federation: The 2016 Results. Available at: <http://riarating.ru/>

Figure 2. **Ranges of Values of Specific Indices and Regional Rankings for Different Transformation Models**



- The Ranking of Innovative Regions of Russia (Innovation Activities Index, IAI), which discriminates among five types of Russia's federal subjects to facilitate monitoring and governance: strong, medium-strong, medium, medium-weak and weak innovators [Association of Innovative Regions of Russia 2017];
- The HSE Russian Ranking of Regional Innovation Development (Innovation Development Index, IDI) [Gokhberg 2017:12];
- The Public-Private Partnership Ranking of Russian Regions (PPP Index) [PPP Development Center 2016], and more.

Each model is associated with a certain range of index values, the most reliable model-region relationships being observed for the indices of socioeconomic status, innovation activities and innovative development of the regions (Fig. 2).

The interrelation between the flagship university transformation models and the types of regions' innovation activities is shown in Ta-



ble 2: the RTL and IL models are mostly typical for industrially developed regions classified as strong or medium-strong innovators, while the RCU model is most often found in regions with moderately developed industries and low levels of innovations. Regions that form the scope of the TBRU transformation model also demonstrate rather low levels of innovation activities.

### 3.3. Competitive Landscapes of Regional Higher Education Systems

When there are universities from the “leading” league in a region, it can affect greatly the choice of flagship university transformation model, inducing intra-regional university competition for niches and spheres of influence, intellectual and financial resources, and target groups of consumers. In a situation like that, the flagship university must choose a transformation model that will boost its competitive advantage in the region, primarily by virtue of unique academic programs and diversification of product portfolio, methods and forms of interaction with external stakeholders.

Because the universities classified as “leading” pursue specific missions and goals set by the government and possess a strong research and academic potential as well as ample resources for development, they are normally oriented towards leadership at the national and international levels, building their governance models, internal processes and forms of interaction with the external environment accordingly. Striving to take the lead among the national universities and to obtain heavy subsidies from the federal government, such universities do not normally seek integration into regional processes [Smirnov 2013:105]. Therefore, even when there is a “leading” university in the region, the flagship university can move to the fore of the regional system of higher education, ramping up its effort to implement the regional development strategy and at the same time establishing effective partnership relationships with the “leading” university (cooperation instead of competition).

Which transformation model a flagship university will choose also depends on the type of regional higher education system determined based on functional and market orientation of regional universities. The typology discriminates among:

- Regions with “leading” universities;
- Regions with balanced systems of infrastructural<sup>14</sup> higher education;
- Regions with balanced systems of industrial higher education;
- Regions where infrastructural universities prevail;
- Regions with low-developed higher education systems [Leshukov, Lisutkin 2015:33–34].

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<sup>14</sup> In Russian literature, *infrastructural universities* are understood as universities feeding manpower into the soft and hard infrastructures of the region.

**Table 2. The Distribution of Flagship University Transformation Models across the Federal Subjects of Russia with Higher Education Systems of Different Types and Different Indices of Innovation Activities**

Strong Innovator	Medium-Strong Innovator	Medium Innovator	Medium-Weak Innovator	Weak Innovator
Regional System of Higher Education with "Leading" Universities				
Nizhny Novgorod Oblast Novosibirsk Oblast Samara Oblast	Rostov Oblast Chelyabinsk Oblast	Belgorod Oblast, Saratov Oblast		
Krasnoyarsk Krai Tomsk Oblast	Tyumen Oblast			
Regions with Balanced Systems of Infrastructural Higher Education				
	Tula Oblast	Vologda Oblast Kirov Oblast The Mari El Republic	Kemerovo Oblast Orlov Oblast	
Regions with Balanced Systems of Industrial Higher Education				
The Republic of Bashkortostan	Voronezh Oblast Altai Krai Ulyanovsk Oblast Yaroslavl Oblast	Omsk Oblast Krasnodar Krai Novgorod Oblast	Volgograd Oblast Pskov Oblast	
Regions with Infrastructure Universities Prevail				
	Vladimir Oblast	Murmansk Oblast	Kostroma Oblast The Republic of Karelia	The Republic of Kalmykia
Regions with Low-Developed Higher Education Systems				
			The Komi Republic	

	RTL
	RCU
	IL
	TBRU

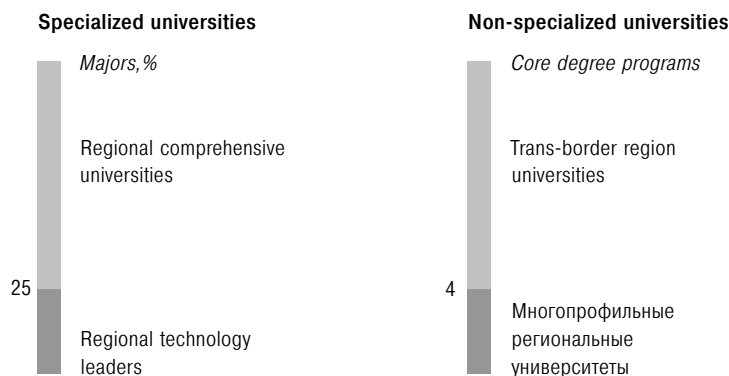
It has been observed, for instance, that the RTL and IL transformation models are preferred by flagship universities in the regions with "leading" universities and those with balanced systems of industrial higher education, while the RCU model is commonly pursued by flagship universities in the regions that have no other leading universities and where infrastructural universities prevail (Table 2).

#### **4. Differentiation of Flagship Universities by Specializations and Fields of Study**

As a key university characteristic, specialization is often used as a classification criterion in higher education [Froumin, Leshukov 2016:124;

Being regionally engaged, they are not involved in any large-scale research activities (*TN*).

Figure 3. **The Role of Flagship Universities in Regional Manpower Training (Specialization)**



Platonova 2015:22]. Analysis has been carried out to find out that flagship universities can be divided into two groups based on this criterion:

- Specialized, where over 50 percent of students (normalized student population) are in the same major;
- Non-specialized, where none of the majors accounts for at least 50 percent of total (normalized) student population.

The first group includes the universities pursuing the RTL and IL transformation models, while the RCU and TBRU universities naturally fall under the second one. The proportion of normalized student population enrolled in specific majors was used to discriminate between the models within the group of specialized flagship universities, while the models used by non-specialized ones were distinguished based on university contributions to regional manpower training. Figure 3 shows the distribution of the models by the status of university specialization.

*Regional Technology Leaders.* This model is pursued by specialized engineering and technology universities where the proportion of students enrolled in Engineering, Technology and Technical Sciences varies between 60 and 96 percent of total (normalized) enrollment, the average being around 77 percent. However, such universities cannot be considered as narrowly specialized as there is no major within their area of specialization that would account for more than 25 percent of enrollment, which means that universities of this type train workers for a wide range of industries.

*Industry Sector Leaders (Industrial Universities).* Such universities are highly specialized (the average proportion of students in the core major being 75 percent), offer a narrow spectrum of degree programs and mainly seek to meet the staffing demand in specific industries (like oil and gas) or public sectors (e. g. medical schools). For ex-

ample, engineering and technology flagship universities pursuing this model usually offer only one field of study to major in, which accounts for over 25 percent of their total enrollment.

*Regional Comprehensive Universities.* These offer a broad array of degree programs to feed manpower into the regional labor market and have no explicit specialization (none of degree programs accounting for more than 50 percent of total enrollment). The average proportion of students enrolled in such universities hovers around only 35 percent of total student population in the region, which is the result of heavy intra- and cross-regional competition among universities in such regions. Meanwhile, such universities hold the leading position in training skilled workers for the region in three trades on average (the proportion of students enrolled in the respective programs exceeding 90 percent of total same-major enrollment in the region).

*Trans-Border Region Universities.* Such universities have no specialization either. However, in contrast to the previous group, they enroll about 65 percent of all students in the region and have on average five or six degree programs which account for over 90 percent of total same-major enrollment in the region. That is to say, the flagship university dominates the regional education market, which is largely explained by low competition in higher education systems of borderland regions due to the small number of universities.

Heterogeneous data normalization method was used to identify clusters of flagship universities and define the boundaries between them. The following formula was used to calculate scores for heterogeneous indicators:

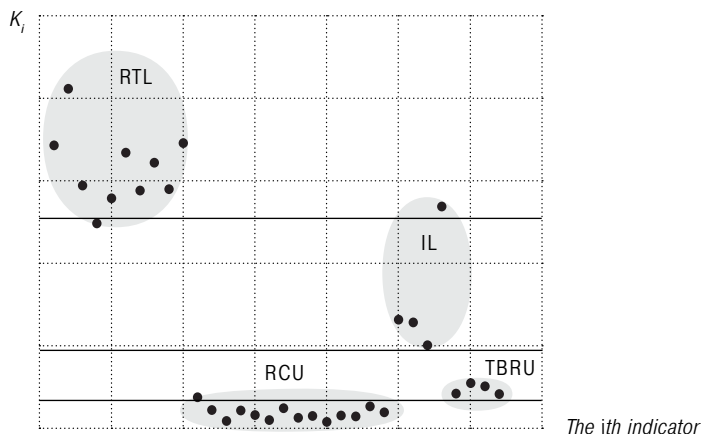
$$N_i = w_j \cdot \frac{I_j}{I_{jmean}},$$

where  $N_i$  is the number of scores assigned to a specific university for the  $j$ th indicator;  $w_j$  is the weight of the  $j$ th indicator;  $I_j$  is the value of the university's indicator; and  $I_{jmean}$  is the arithmetic mean of the indicator.

Weighted values have been calculated to be 75 for the IL model, 25 (major-based proportions) for the RTL model, 5 for the TBRU model, and 3 (number of degree programs) for the RCU. Evaluation involved all of the sample (all types of models) (Fig. 4).

Quantitative analysis of the selected characteristics of flagship universities has revealed clear boundaries among the clusters (models). A conclusion can thus be made that indicators describing university specialization and enrollment in specific degree programs can be used as fundamental criteria for identifying the transformation model and as the key guidelines for setting priority goals and developing policies to achieve them in terms of modernization of flagship university's educational activities.

Figure 4. **The Distribution of Flagship Universities by the Method of Heterogeneous Indicator Normalization**



## 5. Model Testing

A set of practical tools has been developed as part of the Development of a Network of Flagship Universities project to classify universities under one of the transformation models proposed. The toolset involves application software, evaluation sheets for collecting feedback from universities on the performance of individual components of the governance model being tested, and graphic models with descriptions. The main stages of choosing a transformation model are presented in Figure 5.

At the stage of determining priority areas of activities, universities are advised, first of all, to analyze the level of socioeconomic development and innovations in their region, the levels of human potential and entrepreneurial activity, the demand for educational services among the population, and the demand for graduates among businesses. It appears vital at this stage to outline the range of major stakeholders, interactions with which will largely define the vectors and paths of flagship university transformation. The following stages involve choosing the critical systemic governance mechanisms for the specific model with due account for the existing resources and applicable regulatory framework as well as determining the set of measures to modernize the core modules of flagship university activities in terms of the transformation model to be selected.

The key characteristics describing the specific fundamental organizational units and strategic tools for every model can be used by flagship universities to develop and adjust their development strategies so as to ensure successful transformation under the model selected (Fig. 6).

The online resource allows using the regional indices and rankings available, the descriptive model characteristics and the regions' pro-

Figure 5. **Stages in the Selection of a Flagship University Transformation Model**

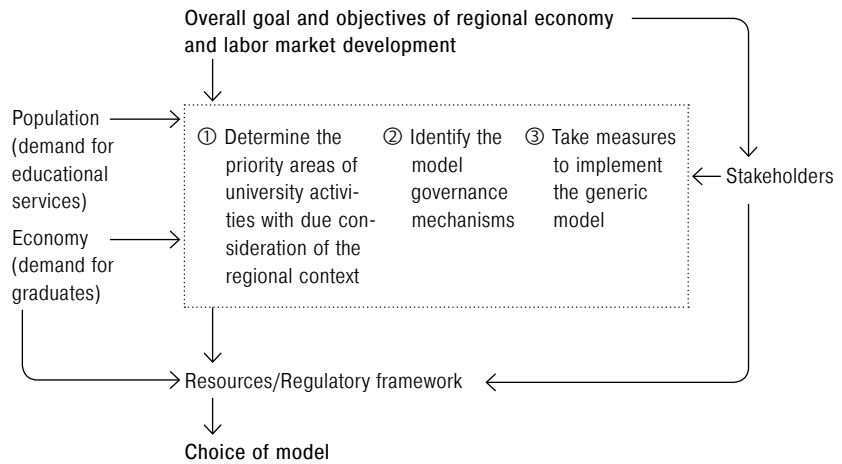



Figure 6. **Strategic Tools for Selecting a Flagship University Transformation Model**



**Инструментарий для определения управленческой модели опорными университетами**

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1. Многопрофильный региональный университет (МРУ)
2. Технологический лидер в регионе (ТЛР)
3. Лидер в отрасли (отраслевой) университет (ЛО)
4. Университет в трансграничном регионе (УТР)

Ареал деятельности	
МРУ	Индустриально-аграрные регионы, преимущественно со средней или слабой инновационной активностью
ТЛР	Промышленно-развитые регионы с высокой инновационной активностью развивающие высокотехнологичные отрасли экономики
ЛО	Регионы, в том числе моноотраслевые регионы/моногорода, на территории которых реализуются крупные отраслевые инфраструктурные проекты и федеральные отраслевые программы
УТР	Приграничные регионы с относительно низким уровнем социально-экономического развития
Стратегическая цель	
МРУ	Повышение конкурентоспособности приоритетных отраслей и сфер экономики региона за счет концентрации интеллектуальных, кадровых, методических и технологических ресурсов вокруг ведущего регионального университета
ТЛР	Интеграция потенциала университета, регионального бизнеса и региональных властей с целью достижения регионом лидирующих позиций в развитии национальной инновационной системы
ЛО	Реализация непрерывного инновационно ориентированного образования, прорывных исследований и трансфера технологий для развития высокотехнологичных и базовых секторов экономики региона и страны
УТР	Расширение трансграничного сотрудничества и укрепление международной экономической, академической и социокультурной интеграции, обеспечивающих динамическое и устойчивое развитие региона
Географическое (территориальное) расположение университетов	
Выберите Субъект Российской Федерации*	Приграничная территория*
<input type="text"/>	<input type="checkbox"/> нет

files to consider the regional context in determining the priority areas of university activities, identifying the model governance mechanisms and defining the measures to modernize the flagship university’s core activities (Fig. 7).

Figure 7. The Online Resource for Selecting a Flagship University Transformation Model

The screenshot displays the online resource interface for selecting a flagship university transformation model. It is divided into several main sections:

- Types of Models (ТИПЫ МОДЕЛЕЙ):** This section provides an overview of the models and lists four categories:
  - Многопрофильный региональный университет:** A multi-profile regional university.
  - Технологический лидер в регионе:** A technological leader in the region.
  - Многопрофильный региональный университет:** A multi-profile regional university.
  - Лидер в отрасли (отраслевой) университет в трансграничном регионе:** A leader in the industry (industry) university in a cross-border region.
- Региональные индексы и рейтинги (Regional indices and rankings):** This section provides information on regional indices and rankings, including a map of the Ulyanovsk region and a list of indicators.
- Паспорт региона (Region Passport):** This section provides detailed information about the Ulyanovsk region, including its administrative center, population, and key indicators. It also includes a strategic diagram showing the relationship between strategic goals, initiatives, and projects.

The toolset was designed using the ranking method and the combinatorial approach to quantitative data assessment. The following parameters are ranged:

- Scope of activities;
- Strategic goal;

- Geographic location of university;
- Key parameters (KP);
- Governance system and mechanisms (GSM);
- Priority areas of activity (PAA).

*Scope of activities* and *strategic goal* have permanent descriptive characteristics in each model. *Geographic location* is technically the indication of whether a university is located in a borderland region.

*Key parameters* were defined using the permanent characteristics of specific models, whose assigned (weighted) values were calculated using the formula below.

KP = KP1 (four characteristics) + KP2 (four characteristics) + KP3 (four characteristics) + KP4 (four characteristics) + KP5 (one characteristic of choice). Selections of elements make the ranking of weighted values for each model.

The following formula was used to determine the quantitative values of the *governance system and mechanisms* variable:

GSM=GSM1 (four characteristics) + GSM2 (four characteristics) + GSM3 (four characteristics) + GSM4 (four characteristics) + GSM5 (two characteristics of choice). Similar to the procedure described above, various elements are picked out of this multitude and combined to provide a ranking of weighted values for each model.

*Priority areas of activity* were determined based on the permanent characteristics of specific models, whose values were calculated using the formula:

PAA = PAA1 (four characteristics) + PAA2 (four characteristics) + PAA3 (four characteristics) + PAA4 (four characteristics) + PAA5 (three characteristics of choice).

Math computations using variously conditioned combinations allow defining the flagship university transformation model.

In its simplified version, the formula is reduced to summing up the quantitative values of all the selected characteristics.

Analysis carried out using the pre-developed tools shows that flagship universities mostly evolve under two generic models, namely *Regional Comprehensive University* (classical universities, nearly half of the project participants) and *Regional Technology Leader* (engineering universities, one third of the flagship universities). For most universities, the type of transformation model pursued is strongly related to their current status and external environment characteristics. However, a number of universities fall in between and cannot be classified neatly under any particular model due to some specific internal



and external factors. In this case, universities may use elements of more than one transformation model at once, yet the choice of model should first of all be based on the regional factors that determine the position and role of the flagship university in terms of the priority areas of regional development. For instance, a classical university located in a borderland region will benefit the most from pursuing the TBRU model, designed to solve geopolitical problems and promote economic, academic and sociocultural integration of the country and region in the global scene.

**6. Conclusion** The generic flagship university transformation models proposed in this study mostly reflect the objectives that flagship universities face as drivers of regional socioeconomic development, allowing such universities to select their niche and trajectory of development.

The choice of a specific model has to do with a great deal of internal and external factors. Meanwhile, a number of flagship universities may have difficulties choosing a particular generic governance model due to the complexity of their organization. In this case, universities may be advised to select, having carried out necessary research, the model that meets the university's objectives most fully—as the basis, complementing it with elements of other governance models.

Naturally, all the models proposed represent ideal types of organization, but they nevertheless have not only theoretical but also practical potential, serving as tools for governing universities and allowing university administrators to consistently build their governance activities in terms of flagship university transformation.

The models described in this article and the model-specific strategic tools could also be used by potential participants in the competition for developing a network of flagship universities<sup>15</sup> to design university development programs.

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<sup>15</sup> The new competition for developing a network of flagship universities was announced by Olga Vasilyeva, Minister of Education and Science of the Russian Federation, during the working session at Transbaikal State University on March 6, 2018. <https://минобрнауки.рф/пресс-центр/12392>

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