



O.V. LESHUKOV, D.G. YEVSEYEVA, A.D. GROMOV, AND
D.P. PLATONOVA

Assessment of the Contribution of Regional Higher Education Systems to the Socio-Economic Development of the Russian Regions

This article analyzes how Russia's networks of higher education institutions contribute to their host regions in terms of the following three major facets: the economic development; the human capital

English translation © 2017 Taylor & Francis Group, LLC, from the Russian text © 2017 “Vysshhaia shkola ekonomiki. Seriiia Sovremennaia analitika obrazovaniia.” “Otsenka vkladu regional’nykh sistem vysshnego obrazovaniia v sotsial’no-ekonomicheskoe razvitiie regionov Rossii,” *Vysshhaia shkola ekonomiki. Seriiia Sovremennaia analitika obrazovaniia*, 2017, no. 3(11), pp. 4–25.

Oleg Valerievich Leshukov, Researcher at the Laboratory for University Development, Institute of Education, National Research University Higher School of Economics, Moscow, Russia; Email: oleshukov@hse.ru

Darya Gennadiievna Yevseyeva, Analyst at the Laboratory for University Development, Institute of Education, National Research University Higher School of Economics, Moscow, Russia; Email: dasha.evseeva@yandex.ru

Alexander Dmitrievich Gromov, Researcher in Training at the Center for Fundamental Studies of the Laboratory for Economic Analysis and Forecasting, National Research University Higher School of Economics, Moscow, Russia; Email: adgromov@hse.ru

Daria Pavlovna Platonova, Head of the Laboratory for University Development, Institute of Education, National Research University Higher School of Economics, Moscow, Russia; Email: dplatonova@hse.ru

Translated by Kenneth Cargill.

development; and the innovative development. To ensure the analytical framework used derives relevant and representative findings given the nature of the Russian socio-economic environment, the authors implement a customized methodology that factors in the most appropriate components from various international best practices in assessing university effects on comprehensive societal development. The study will be of interest to a wide audience of stakeholders in higher education and broader contexts, including policy professionals at the federal and regional levels, institutional leadership, researchers and analysts, students in socio-political, economic, and educational majors, etc.

Introduction

Over the past few decades, the issue of how to assess the contribution of universities to the development of society across economic, social, cultural, and innovative dimensions has been of steady interest to educational policy researchers. Today, the topic of the development of research and education occupies an important place in regional economic and innovative development programs. The universities are beginning to position themselves as engines of regional development.

In fact, universities have been conceived of as drivers of regional development ever since the mid-20th century, when public policy began to focus on the development of human capital as the basis for long-term economic success. In recent decades, both developed as well as developing countries have steadily increased their expenditures on higher education. In addition, private investments in higher education are also growing. In the current economic environment, the need for individual investments in human capital has become the norm. Thus, over the past 20 years, the total expenditures on higher education as a percentage of GDP in the OECD countries have increased by more than 23 percent. For Russia, this trend has been even more impressive: between 2005 and 2010, higher education spending as a percentage of GDP doubled. Nevertheless, this figure, which in 2013 was 1.2 percent of GDP, still lags far behind such leading

countries as South Korea (2 percent), Great Britain (1.8 percent), the Netherlands (1.7 percent), and so on [21].

Such public and private expenditures are considered to be investments that promise a significant return on higher education in the future. This future return is not limited to just the “salary bonuses for education” that are reaped at the individual and societal levels (through the growth of tax revenues from higher wages). They are also expected to manifest themselves in system-wide positive externalities. In some countries, the higher education sector has already become one of the key industries within the country’s own economy. For example, revenues from the export of educational services in Australia rank fourth among all of the country’s major exported goods and services. Educational services are second in revenue only to the export of ore, coal, and gas [9]. In 2015, foreign students brought USD 30.8 billion in additional revenue to the U.S. economy. For Great Britain, this figure was USD 16.1 billion, and for Australia it was USD 10.5 billion [10].

The aim of this study is to assess the contribution of regional higher education systems to the socio-economic development of the regions on the basis of existing approaches. The study ranks the Russian Federation regions in terms of how their higher education systems contribute to their socio-economic development. We have identified three key areas where we can assess the level of contribution of regional higher education systems to regional development: (a) economic development, (b) human capital development, and (c) innovative development.

This study consists of three parts: In the first part, we describe the existing foreign and Russian approaches to assessing the contribution of higher education to regional socio-economic development. These materials, which are supplemented by an analysis of the specific Russian features characterizing the development of higher education as well as available statistics, make it possible for us in the second part of the study to propose a methodology for assessing the contribution of regional higher education systems to the development of the constituent entities of the Russian Federation. Finally, the third part presents the

results of calculations and identifies the main groups of regions by the level and nature of the contribution of the individual regional higher education systems to their development.

Review of approaches to the assessment of the contribution of regional systems of higher education to regional socio-economic development

In recent decades, several approaches have been developed that assess the contribution of higher education to various areas of public life. Particular attention has been paid to three areas, namely economics, science and innovation, and human capital. There are several assessment models depending on the selected subject of analysis:

- The traditional “economic-based” approach to the assessment of economic influence
- The “skill-based” approach
- The assessment of the contribution of the university as a facilitator of the region’s innovative activity

In addition, the methodology for assessing the impact of higher education on regional economic development that was developed by the OECD is popular and well established.

The presented approaches provide a toolkit of basic methods for assessing the impact of higher education systems on regional development. This study has considered them in pioneering its own methodology for assessing the contribution of regional higher education systems to the socio-economic development of the regions of the Russian Federation.

Traditional economic-based approach

The traditional economic-based approach sees the university as the region’s economic powerhouse. It is funded by investments in education, including public funding, tuition fees, housing payments by students from other regions, industry-sponsored programs of study, etc. The funds introduced in this way into the regional economy serve

to spur economic growth, which is reflected in the rising incomes of the local population and the emergence of new jobs.

According to Elliott, Levin, and Meisel [16], the main goal of this approach is to answer the questions: “What would happen if there were no universities in the region?” and “How much would people’s incomes and the number of jobs decline in that scenario?”

The process of assessing economic influence under this approach consists of the following six basic sets of criteria:

1. Identification of the type and scale of the locality under analysis
2. Interviewing faculty and staff members as well as students at local universities, identifying the proportion of students who could move to other regions if the universities where they are currently enrolled were to disappear
3. Calculation of the funds received by the university from external sources (for example, in the form of state subsidies and grants)
4. Aggregating the results obtained in criteria number two and three
5. Selection and numerical calculation of the possible multipliers for determining the final economic impact of the university
6. Assessment of tax contributions to the regional budget.

Skills-based approach

The traditional economic-based approach provides a fairly clear idea of the impact that institutions of higher education have on the economy, but it ignores a number of indirect factors, such as changes to the level of employee qualifications caused by higher education and the acquisition of new competencies. Bluestone’s study [14] expands the criteria for assessing the impact of higher education on the regional economy. He supplements the traditional approach with components that are designed to assess the skills of workers (“skill-based” approach). According to this approach, more qualified workers study at and graduate from universities. They have higher levels of income and consumption, which means that they are responsible for making higher tax contributions to the government budget.

The skills-based approach does not contradict the traditional economic-based approach. Rather, it supplements it. Thus,

Bluestone incorporates three additional steps to the process of assessing the university's economic impact:

- Calculation of the net income of all university graduates who stay and work in the given region after graduation minus the net income that they would have received if they had no higher education
- Discounting of the obtained result while taking into account the change in the level of salary in the future (including both increases and reductions)
- Assessment of the region's tax receipts from increasing salaries as the result of more workers obtaining a higher education while taking into account the region's expenditures on education.

Traditionally, this approach is used to analyze the indicator of the salary bonus that is received due to obtaining a higher education, meaning the amount of salary that workers with higher education receive over those with only a secondary education. This method makes it possible to estimate the opportunity costs associated with a situation where a person enters the labor market instead of continuing education and obtaining a higher level of qualification.

Battu, Finch, and Newlands [11] propose a new classification that includes a dichotomy of effects over the short and long terms. In the short term, it is possible, for example, to estimate budgetary inflows attributable to the expenses paid by students, teachers, and the universities themselves. By contrast, economic factors associated with advanced-skill workforce and various types of tangible capital take longer to fully transpire and start generating sizeable payoffs. Thus, as universities produce a new class of highly qualified talent as well as new markets, companies, and startups (founded by university graduates and instructors), which emerge over the long run, assessing the effects from such social, technological, and infrastructural developments also becomes possible.

The university as a driver of the region's innovative development

The third approach assesses the contribution of the university to regional innovative development, namely, effects attributable to

the creation of a sustainable innovative system in the region and the strengthening of the role of universities in expanding the region's innovative potential.

Researchers first tried to assess the contribution of universities to innovative regional development in the 1990s. These issues have been investigated in particular by Robert Huggins, Philip Cook, David Charles, Paul Benneworth, Henry Etzkowitz, Derek Bok, etc. [19]. Many of these researchers have analyzed how universities are able not only to produce new knowledge and technology, but also to implement them in regional socio-economic and production systems [13]. The regional nature of this influence allows us to say that the outcomes of the innovative activities of universities (patents, licenses, know-how, etc.) are mainly localized in the regions immediately surrounding the university campuses [23].

As an example, we can list the parameters that were used to assess the innovative and research contributions of the University of Birmingham to its region's development [22]:

- Number of inventions
- Number of patents
- Number of new spin out or spin off companies
- Publishing of articles by university faculty members in academic journals and collections
- The degree of global recognition of the university as a research center (place in various academic and research rankings).

The OECD approach

In 2007, the OECD published a new methodology for the integrated assessment of the impact of higher education on the regions [20]. Twelve countries participated in the sample: Australia, Brazil, Canada, Denmark, Finland, South Korea, Mexico, the Netherlands, Norway, Spain, Sweden, and the United Kingdom. Subsequently, the approach was adapted for use in Russia [7].

The methodology consists of a comprehensive assessment based on three sets of criteria.

1. The contribution of higher education to regional innovative development:
 - The creation of a sustainable innovative system in the region consisting of multinational companies and universities as well as universities and small high-tech startup companies (spin-offs and knowledge-intensive business services)
 - Strengthening the role of universities in the creation of innovations in the region
 - Strengthening cooperation in the region.
2. The contribution of higher education to regional human capital development:
 - Expanding access to higher education
 - Creating a system of continuing higher education
 - Identifying and recruiting talented students
 - Improving the workforce supply/demand balance in the region by pursuing economically justified training policies
 - Strengthening cooperation with employers
 - Supporting entrepreneurship in the region
 - Facilitating improvements in the regional employment situation
3. The contribution of higher education to socio-cultural development as well as environmental protection:
 - Improving environmental conditions in the region
 - Contributing to the region’s cultural development
 - Improving the region’s demographic and ethnic situation

Methodology used to assess the contribution of regional systems of higher education to regional socio-economic development in the Russian Federation

The assessment of the contribution of the system of higher education to regional development is complicated, on the one hand, by the strong differences between the constituent entities of the Russian Federation, which exist at different stages of

economic and socio-demographic development. Some regions possess rich environmental resources, whereas others have a shortage of them. The level of infrastructural development and many other factors determine the differences in regional economic structure. On the other hand, the regional systems of higher education are themselves highly differentiated and focused on achieving different objectives [4; 17].

That is why the optimal solution is an integrated approach that takes into account the main provisions of the methods outlined above. We propose the following as the main sets of criteria for assessing the contribution of higher education systems to the social and economic development of the regions:

- I. Contribution to regional economic development
- II. Contribution to regional human capital development
- III. Contribution to regional innovative development

The choice of indicators for each of set of assessment criteria has been informed by the presented theoretical approaches, but it also takes into account the specific nature of the Russian system of higher education and factors related to how data are collected.

The values of the indicators in each of the sets of criteria are normalized, weighed, and aggregated with identical weights into a subindex that functionally characterizes the position of the regions for each of the sets of criteria.¹ This approach is widely used in the academic literature or when conducting international comparative studies (for example, for the calculation of the Human Development Index, the Global Competitiveness Index, and the Rating of the Innovative Development of Constituent Entities of the Russian Federation).

To calculate the indicators, we used data from the Monitoring Study of the Effectiveness of Universities (2015 edition), the Monitoring of the Employment of Graduates (2015 edition), the “Priem” Federal Information System (2014), and the Federal State Statistics Service (2015). Factually speaking, all data reflect the situation for 2014.

I. Contribution to regional economic development

Six indicators are used to assess the contribution of the regional system of higher education to regional economic development.

First of all, we calculated the amount of budgetary incomes attributable to universities' tax payments. Universities in Russia operate under a special tax regime allowing them to claim many tax benefits depending on their status, specific activities, etc. [3]. Unfortunately, the fact that tax revenue data and certain features of how statistics are collected in the Russian Federation are subject to confidentiality provisions makes it impossible to obtain accurate data that take into account all of the tax benefits. Nevertheless, to achieve the stated objectives of the study, we believed that it would be expedient to analyze the amount of personal income tax (PIT) payments by university staff, since 85 percent of PIT proceeds are channeled to the budgets of the constituent entities of the Russian Federation.

The next indicator is the amount of financial resources of the university as calculated per its adjusted student cohort, which can be considered as an indicator of financial position of regional higher education systems. The effective demand for fee-paying higher education is expressed by two indicators: (1) the share of students enrolled at universities on a paid basis using their own funds, and (2) the share of students enrolled in industry-sponsored programs of study as an indicator of corporate demand for training.

As the review of approaches above has shown, the spending of students from other regions on living expenses and tuition represents additional injections into the regional economy where the university is located. That is why we will use this indicator in our analysis.

Finally, the last indicator in this set of criteria is the relationship of the salary of faculty members to the average salary in the region.

The level of salary of faculty members affects the indicator of the average level of salary in the region and, accordingly, the indicators of economic development.

The method of calculating the indicators is shown in [Table 1](#).

Table 1

List of Indicators for Assessing the Contribution of the Regional Systems of Higher Education on Regional Economic Development

List of indicators for assessing the contribution to regional economic development ^a	Calculation
Ratio of personal income tax collected from the salaries of university employees to the total amount of personal income tax collected from salaries in the region by the regional government, %	Payroll expenses of universities weighted by the personal income tax rate (13%) to the total amount of personal income tax receipts by the consolidated regional budget
University income from all sources per student in the adjusted cohort, thousands of RUB	Proportion of university income from all sources to the adjusted cohort
Annual expenses of students from other regions, thousands of RUB	The number of students from other regions in the student body multiplied by five (the average number of years of study) and multiplied by the average student spending (factored in as 70% of the average per capita household spending in the region) ^b
Share of students studying on full scholarship	Share of students studying on full scholarship out of the total student body
Share of students studying in industry-sponsored programs of study [tselevaya podgotovka]	Share of students studying in industry-sponsored programs of study [tselevaya podgotovka] out of the total student body
The average salary of faculty members compared to the average salary in the region	Ratio of the average salary of faculty members to the average salary in the region

^a In addition, during the first stage of the analysis, the “Share of university employees out of the total economically active population, %” and “Share of university revenues out of the consolidated budget revenues of the region, %” indicators were checked. However, they were excluded from the calculations due to the fact that they largely correlated with both themselves as well as with the “Ratio of personal income tax collected from university salaries to the total amount of personal income tax collected from salaries in the region by the regional government, %” indicator.

^b This indicator was calculated on the basis of average monthly cost data from the student survey that was conducted as part of the Monitoring Study of the Economics of Education (2014–2015). Then this figure was correlated with the average monthly per capita household spending in the Russian Federation.

II. Contribution to regional human capital development

As was already mentioned, this subindex includes a salary bonus indicator for higher education, which expresses the extra amount of salary that employees with higher education earn over workers with secondary general education.

In addition, universities are suppliers of highly skilled workers for local labor markets, which means that we should not ignore the employment indicators for graduates of higher education institutions in the regions where universities are located.

We used the indicators presented in [Table 2](#) when calculating the contribution of higher education to human capital development.

In contrast to the fairly widespread method of calculating the salary bonus for higher education based solely on the ratio of the salaries of employees with different levels of education, this article considers the “net” effect of having a higher education. To this end, we have used a version of the Mincer earnings function with independent variables that take into account the individual’s experience and place of work. Thus, our equation emphasizes the presence of different levels of education and other characteristics [5; 8].

Table 2

List of Indicators Used to Assess the Contribution of the Regional Systems of Higher Education on Regional Human Capital Development

List of indicators for assessing the contribution to regional human capital development	Calculation	Year
Salary bonus for higher education	Amount of increase in salary of employees with higher education over the salary of workers with a secondary general education, calculated using the Mincer earnings function	2013
Share of university graduates employed in the region of their alma mater (of the total number of employed), %	Share of university graduates employed in the region of their alma mater relative to the total number of workers who are employed	2014

$$\begin{aligned} \ln Wage = & \alpha_i + \beta_i HigherEducation + \gamma_{1i} VocationalSecondary \\ & + \gamma_{2i} VocationalBasic + \gamma_{3i} General + \gamma_{4i} WithoutGeneral \\ & + \gamma_{5i} Men + \gamma_{6i} Experience + \gamma_{7i} Experience^2 \\ & + \gamma_{8i} WorkedHours + \sum_j \delta_{ji} Industry_j + \sum_k \theta_{jk} FirmSize_k + \theta_i \end{aligned}$$

where *HigherEducation*, *VocationalSecondary*, *VocationalBasic*, and *General* = dummy variables equal to one if the worker's highest level of education is post-secondary, secondary vocational, basic vocational or general secondary education;

WithoutGeneral = does not have general secondary education;

The "basic" level of education that was used to assess the contribution of different levels of education is secondary education;

Men = gender of the worker;

Experience, *Experience*² = the number of years of experience and the number of years of experience squared;

WorkedHours = the number of worked hours per month;

Industry_j = dummy variables equal to one if the worker is employed in an industry;

j in accordance with the OECD classifier;

FirmSize_k = size of the company.

The calculations were carried out using the method of least squares, whose validity for this analysis has been demonstrated in other studies [5; 6]. The function is solved separately for each separate region *i*. The salary bonus for higher education was calculated on the basis of the obtained solutions for the coefficient β_i :

$$\text{SalaryBonus}_i = (e^{\beta_i} - 1) \times 100 \text{ percent.}$$

III. Contribution to regional innovative development

When we were assessing this set of criteria, we assumed that the level of accumulated capacity for the creation of new technologies is related to the level of innovative potential of the regions (2) and that universities play a leading role in the process of accumulating this capacity. To assess the overall level of academic potential, we incorporated indicators of the total volume of research and development in the regional system of higher education as well as the

number of citations of publications in the databases of the Russian Science Citation Index (hereinafter “RSCI”) and Scopus.

In addition to the level of accumulated academic skills and the high qualification levels of instructors and researchers, the university’s ability to successfully market its R&D pipeline is also important. That is why the indicator of the number of license agreements was added to the analysis.

Other organizations exert active influence on the development of regional innovative systems, including academic institutions, research bureaus, and corporate research and development centers. In order to distinguish the influence of the regional higher education system from the influence of external organizations, we used the index of the contribution of the university sector to the total volume of regional expenditures on research and development. We selected the indicators presented in Table 3 while taking into account available, up-to-date data for the analysis of this set of criteria.

Table 3

Indicators for Assessing the Contribution of Regional Systems of Higher Education to Regional Innovative Development

Indicators for assessing the contribution to innovative regional development	Calculation
Amount of license agreements	Number of license agreements, units
Contribution of institutions of higher education to regional research and development expenditures	Ratio of research and development costs at institutions of higher education to the total expenditures on internal research and development in the region, %
Volume of research and development	Volume of research and development at universities per total academic staff, thousands of RUB
Number of cited publications in the Russian Science Citation Index (RSCI)	Number of cited publications published over the past five years that have been indexed by the RSCI per 100 academic staff
Number of publications cited in Scopus ^c	Number of publications cited in Scopus per 100 academic staff

^c When calculating the number of publication citations in the Scopus database for the Moscow Region, we excluded data about the Dubna International University of Nature, Society and Man due to the strong deviation of this data from that of other universities.

Results

Three subindexes of the influence of the higher education system on regional development

As a result of the assessment, we obtained three subindexes: the contribution to regional economic development, the contribution to regional human capital development, and the contribution to regional innovative development. The results of the calculations for each of the subindexes are presented in [Figures 1–3](#).

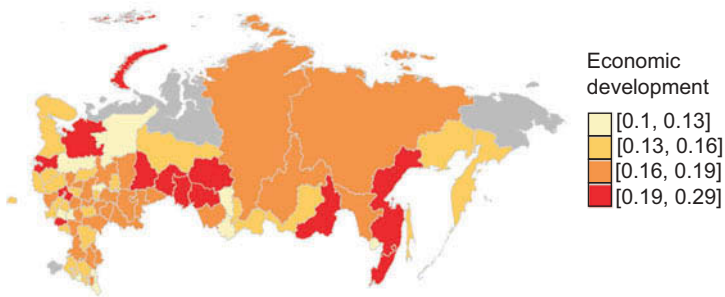


Figure 1. **Distribution of Regional Systems of Higher Education According to the Aggregate Value of the “Contribution to Regional Economic Development” Subindex**



Figure 2. **Distribution of Regional Systems of Higher Education According to the Aggregate Value of the “Contribution to Regional Human Capital Development” Subindex**



Figure 3. Distribution of Regional Systems of Higher Education According to the Aggregate Value of the “Contribution to Regional Innovative Development” Subindex

Regions with major university centers are the leaders in terms of their influence on regional economic development: Moscow and Moscow Region, St. Petersburg and Leningrad Region, Tomsk Region, Novosibirsk Region, and Sverdlovsk Region. In these regions, university revenue indicators are relatively high, which is due to the fact that major leading universities (including national research universities and institutions that participate in programs to improve the international competitiveness of Russian universities) are located here. These regions attract students from other Russian regions [1], which brings extra income to these constituent entities of the Russian Federation.

When we assess the contribution of regional higher education systems to human capital development, we obtain a different group of leading regions (Figure 2): the Republic of Tyva, Sakhalin Region, and the Republic of Sakha (Yakutia). The reasons for this situation lie, perhaps, in the specific nature of the education system of these areas. First of all, their regional systems of higher education are often small, as they typically consist of just one university and several branch campuses. In addition, these regions are also characterized by extensive networks of secondary vocational educational institutions whose coverage exceeds the average indicators for the Russian Federation. The comparatively low level of access to higher education in these constituent entities increases the perceived

value of education. These factors can condition high values of the salary bonus for higher education.

Universities in Moscow and Moscow Region, Irkutsk Region, Tomsk Region, and Stavropol Region are the leading institutions that contribute to innovative development. These are the constituent entities where major national research universities are located. They account for a significant part of the regional innovative infrastructure, which can be considered one of the main factors why these regions rank so highly for this set of criteria.

Classification of the regional systems of higher education

We classified the regions in terms of their average subindex values in order to generalize the results. To do this, the average value of each subindex was identified, after which the region was defined as relating to a group with an index value that was either above or below the average. Thus, we arrived at eight groups, which made it possible to distinguish four types of higher education systems:

- Type 1.** Regional systems of higher education that are drivers of regional development: all subindexes have values above the average
- Type 2.** Regional systems of higher education with a high level of influence: two subindexes have values above the average
- Type 3.** Regional systems of higher education with a moderate level of influence: two subindexes have values below the average
- Type 4.** Regional systems of higher education with a low level of influence: all subindexes have values below the average

It should be stressed that the identified groups do not show the level of development of the regional higher education systems, but rather their degree of contribution to the specific socio-economic situation in the region. Therefore, this type of division does not imply that the constituent entities found in the third and fourth groups are outsider regions. Rather, it only indicates the limited impact of their higher education systems on relevant aspects of regional development.

The results of the division into types are shown in [Table A1](#) (see Appendix). The data show that the first group whose higher education systems exert the highest level of influence includes both recognized educational centers such as Moscow and Moscow Region, St. Petersburg and Leningrad Region, the Republic of Tatarstan, Krasnoyarsk Region as well as regions with a small scale higher education sector with limited potential, including the Republic of Kalmykia, Republic of Chechnya, and Republic of Sakha (Yakutia).

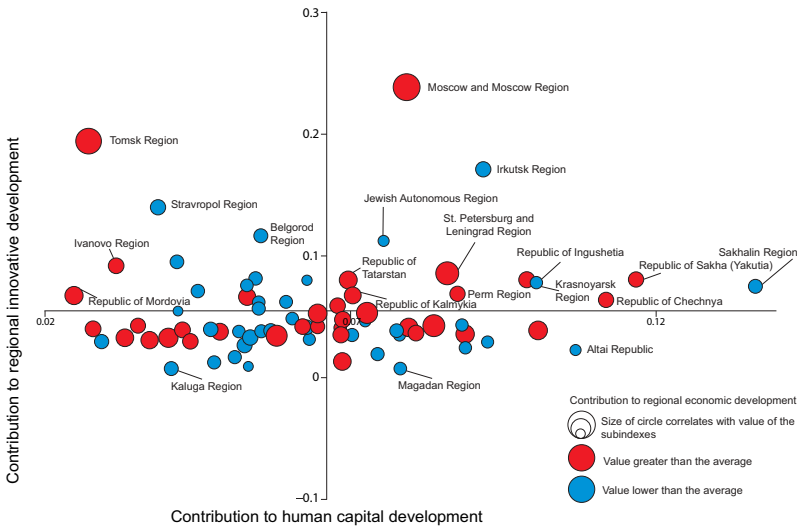
The second group of regional systems of higher education with a high level of influence includes 18 regions with two subindexes whose values are above the average. At the same time, 11 regions have achieved such values in the “Economic development” and “Human capital development” subindexes.

It should be noted that the impact of the regions on one group may be due to various factors. The fact that large and developed regions have a high level of influence in the area of “Contribution to human capital development” can be explained directly by their economic structure. At the same time, the large salary bonus for education in sparsely populated and less developed regions can be attributed to the fact that the population has limited access to higher education as well as to the fact that these regional economies are dominated by one or a handful of industries that provide a large number of jobs and relatively high salaries.

Most regions fall in the third group, which consists of regional systems of higher education with a moderate level of influence where two subindexes have values below the average. This group includes 36 regions, accounting for almost half of those included in the study.

Finally, the fourth group includes 15 regions on which the regional systems of higher education exert little influence as evidenced by values below the average for all three subindexes.

To illustrate the distribution of regions by the values of subindexes, we plotted a graph (see [Figure 4](#)) that takes into account the values of all subindexes: “Contribution to economic development” (circle size), “Contribution to human capital development” (X-axis), and “Contribution to innovative



The size of the circle correlates with the value of the "Contribution to economic development" subindex. A red circle for the "Contribution to economic development" index represents an indicator of an above average value for this region, and a blue circle represents an indicator of a below average value.

Figure 4. Distribution of the Regional Systems of Higher Education According to the Three Subindexes of Contribution

development” (Y-axis). A red colored circle for the “Contribution to economic development” subindex indicates indicator values of higher than the average for this region. The origin (the point of intersection of the X- and Y-axes) represents the intersection of the average values of the “Contribution to human capital development” and “Contribution to innovative development” subindexes.

As can be seen from the graph, the higher education system of Moscow (including Moscow Region) exerts the greatest positive effect, which is not surprising given the scale and attractiveness of the capital’s universities to the population of the whole country. The Stavropol Region is one of the leading places in the country in terms of its contribution to regional innovative development. At the same time, it is an outsider in terms of its impact

on human capital development and the development of its regional economy. In general, the country exhibits a fairly high level of dispersion of values for all three indicators.

Conclusion

In this study, we have assessed the contribution of regional higher education systems to regional development based on three subindexes: contribution to regional economic development, contribution to regional human capital development, and contribution to regional innovative development.

An analysis of the obtained groups allows us to note that they include regions with a diverse range of socio-economic characteristics. Our data show that there is no direct connection between subindexes and the level of regional development. It cannot be said that regional systems of higher education have the greatest impact on the most developed regions. Rather, the direction of influence is the reverse. This is confirmed by verifying the connection between GRP per capita as the main indicator of regional socio-economic development and the subindexes. The correlation between these indicators is rather low.

The obtained results allow us to conclude that the degree of influence of the higher education system on regional development is expressed by a complex set of characteristics that cannot be interpreted as being derivative of the indicators of the region's socio-economic development. It is important that research continue to be pursued and expanded in this area with a focus on assessing the situation separately in each region of the country while taking into account the detailed contextual characteristics in each region as well as an analysis of data trends. Such an analysis will be of indispensable value to the development of individually targeted objectives for the development of regional higher education systems. These goals will be designed to facilitate regional development to the maximum degree while taking into account the specific features of each region.

Note

1. When calculating the subindexes, we were not able to include such regions as Chukotka Autonomous District and the Yamalo-Nenets Autonomous District due to the lack of data about these places. In addition, the indicators for the Moscow and Leningrad Regions were combined with the indicators for Moscow and St. Petersburg, respectively, because of the specific features characterizing the development of these areas that have to do with the fact that they are cities of federal importance.

References







1. Kashnitskiy, I.S.; Mkrtchyan, N.V.; and Leshukov, O.V. "Mezhregional'naya migratsiya molodezhi v Rossii: kompleksnyy analiz demograficheskoy statistiki." *Voprosy obrazovaniya*, 2016, vol. 13, no. 3, pp. 169–203.
2. Lapayev, S.P. "Tipologizatsiya regionov Rossii: innovatsionnyy podkhod." http://vestnik.osu.ru/2014_8/19.pdf.
3. Leshukov, O.V., and Borisova, L.V. "Vysshieye uchebnye zavedeniya v sotsial'no-ekonomicheskom prostranstve." *Vyssheye obrazovaniye segodnya*, 2014, no. 12, pp. 34–40.
4. Leshukov, O.V., and Lisyutkin, M.A. "Upravleniye regional'nymi sistemami vysshego obrazovaniya v Rossii: vozmozhnye podkhody." *Universitetskoye upravleniye: praktika i analiz*, 2015, no. 6, pp. 29–40.
5. Luk'yanova, A.L. *Otdacha ot obrazovaniya: chto pokazyvaet metaanaliz: Preprint WP3/2010/03*. Moscow: GU VShE, 2010.
6. Mal'tseva, I.O. *Trudovaya mobil'nost' i stabil'nost': naskol'ko vysokaya otdacha ot spetsificheskogo chelovecheskogo kapitala v Rossii?: Preprint WP15/2007/01*. Moscow: GU VShE, 2007.
7. Meshkova, T.A., and Perfil'eva, O.V. "Analiz opyta federal'nykh universitetov dlya opredeleniya perspektivnykh napravleniy vzaimodeystviya vuzov s rossiyskimi regionami." *Universitetskoye upravleniye: praktika i analiz*, no. 5, 2008, pp. 23–28.
8. Oshchepkov, A.Yu. "Otdacha ot vysshego obrazovaniya v rossiyskikh regionakh." *Ekonomicheskyy zhurnal Vysshey shkoly ekonomiki*, 2010, vol. 14, no. 4, pp. 468–491.
9. "Australia's top 25 goods & services exports." <https://dfat.gov.au/about-us/publications/trade-investment/australias-trade-in-goods-and-services/Documents/fy2013-14-goods-serVICESTOP-25-EXPORTS.pdf>.
10. Basillote, Lovelaine; Gradus, Yogev; Lamb, Jeffrey; Sharoni, Tomer; and Thng, Michael. "Singapore's Higher Education Cluster." Harvard Business School, 2016. <http://www.isc.hbs.edu/resources/courses/moc-course-at-harvard/Documents/pdf/student-projects/Singapore%20Higher%20Education%202016.pdf>
11. Battu, H.; Finch, J.; and Newlands, D. "Integrating knowledge effects into university impact studies: A case study of Aberdeen University." Working paper, Department of Economics, University of Aberdeen. May, 1998.
12. Belenzon, Sharon, and Schankerman, Mark. "Spreading the word: Geography, policy and knowledge spillovers." *Review of Economics and Statistics*, 2013, vol. 95, no. 3, pp. 884–903.

13. Benneworth, P., and Charles, D. “University spin-off policies and economic development in less successful regions: Learning from two decades of policy practice.” *European Planning Studies*, 2005, no. 13, pp. 537–557.
14. Bluestone, B. *UMASS/Boston: An Economic Impact Analysis*. Boston: John W. McCormack Institute of Public Affairs. The University of Massachusetts, 1993.
15. Brown, K., and Heaney, M. “A Note on Measuring the Economic Impact of Institutions of Higher Education.” *Research in Higher Education*, 1997, vol. 38, no. 2.
16. Elliott, D.S.; Levin, S.L.; and Meisel, J.B. “Measuring the economic impact of institutions of higher education.” *Research in Higher Education*, 1998, vol. 28, no. 1, pp. 17–33.
17. Froumin, I., and Leshukov, O. “National-Regional Relationships in Federal Higher Education Systems: The Case of the Russian Federation.” Hiroshima University Higher Education Forum, 2015, no. 12, pp. 77–94.
18. *Higher education management and policy*, OECD, 2004, vol. 16, no. 3. <http://www.oecd.org/edu/imhe/46953521.pdf>.
19. Huggins, Robert, and Johnston, Andrew. “The economic and innovation contribution of universities: A regional perspective.” *Environment and Planning C: Government and Policy*, 2009, vol. 27, no. 6, pp. 1088–1106.
20. OECD. “OECD: Higher Education and Regions. GLOBALLY COMPETITIVE, LOCALLY ENGAGED.” 2007. <https://www.oecd.org/edu/imhe/highereducationandregionsgloballycompetitivelocallyengaged.htm>.
21. OECD. *Education at a Glance 2016: OECD Indicators*. Paris: OECD Publishing, 2016.
22. “The impact of the University of Birmingham (A report for the University of Birmingham).” Oxford Economics, 2013. <http://www.birmingham.ac.uk/Documents/university/economic-impact-of-university-of-birmingham-full-report.pdf>.
23. Valero, Anna, and van Reenen, John. *The Economic Impact of Universities: Evidence from Across the Globe*. Cambridge: National bureau of economic research, 2016.
24. <http://hdr.undp.org/en/content/human-development-index-hdi>.
25. <http://reports.weforum.org/global-competitiveness-report-2014-2015/rankings>.
26. <https://www.hse.ru/primarydata/rir2012>.

Appendix

Table A1

Types of Regional Systems of Higher Education According to the Three Subindexes Measuring the Contributions of These Systems to Regional Development

Type	Region	Contribution to economic development	Contribution to human capital development	Contribution to innovative development
1 Drivers of regional development	2 Moscow (and Moscow Region), St. Petersburg (and Leningrad Region), Krasnoyarsk Region, Perm Region, Samara Region, Republic of Tatarstan, Republic of Sakha (Yakutia), Republic of Kalmykia, Republic of Chechnya	3 	4 	5 
High level of influence	Astrakhan Region, Zabaykalsky Region, Kirov Region, Novosibirsk Region, Orenburg Region, Primorsky Region, Sverdlov Region, Khabarovsk Region, Chelyabinsk Region,	3 	4 	5 

(Continued)

Table A1







(Continued)

Type	Region	Contribution to economic development	Contribution to human capital development	Contribution to innovative development
Moderate level of influence	Ivanovo Region, Republic of Mordovia, Tomsk Region, Yaroslavl Region	←	→	←
	Jewish Autonomous Region, Irkutsk Region, Republic of Dagestan, Republic of Ingushetia, Sakhalin Region	→	←	←
	Altai Region, Arkhangelsk Region, Voronezh Region, Kurgan Region, Kursk Region	←	→	→
	Omsk Region, Rostov Region, Ryazan Region, Saratov Region, Tambov Region, Tyumen Region, Ulyanovsk Region	←	→	→

(Continued)

Table A1




(Continued)

Type	Region	Contribution to economic development	Contribution to human capital development	Contribution to innovative development
	Vologda Region, Kaliningrad Region, Kamchatka Region, Kemerovo Region, Krasnodarsk Region, Lipetsk Region, Magadan Region, Murmansk Region, Nizhny Novgorod Region, Altai Republic, Republic of Bashkortostan, Republic of Komi, Republic of Tyva, Khanty-Mansiysk Autonomous District			
	Belgorod Region, Volgograd Region, Kabardino-Balkar Republic, Kostroma Region, Pskov Region, Republic of Karelia, Mari El Republic, Stavropol Region, Tula Region, Udmurt Republic			

(Continued)

Table A1

(Continued)

Type	Region	Contribution to economic development	Contribution to human capital development	Contribution to innovative development
Low level of influence	Amur Region, Bryansk Region, Vladimir Region, Kaluga Region, Karachay-Cherkess Republic, Novgorod Region, Orlov Region, Penza Region, Smolensk Region, Tver Region, Republic of Adygea, Republic of Buryatia, Republic of North Ossetia–Alania, Republic of Khakassia, Chuvash Republic			

Copyright of Russian Education & Society is the property of Taylor & Francis Ltd and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.