

CDSSES 2020**IV International Scientific Conference "Competitiveness and the development of socio-economic systems" dedicated to the memory of Alexander Tatarkin****FEATURES OF HIGHER EDUCATION INSTITUTIONS ON THE EXTREME NORTH OF RUSSIA**

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Abstract

The higher education system's quality is essential for any modern society, as it directly affects social and economic development. This article covers higher education in the Extreme North, a region being of vital importance for the Russian Federation. To analyze the National Ranking of Higher Education Institutions by Interfax and the official statistical data, we compare higher education institutions located in the Extreme North regions with those located in the rest of the country. Most of the parameters reviewed show that the Extreme North higher education institutions are inferior to those located in other Russian regions. However, in most of the cases, such inferiority is statistically insignificant and can be eliminated within a fairly short period of time. The most significant development areas for the higher education system in the Extreme North include an increase of funding to purchase new equipment and developing academic chairs that focus on research and development.

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1. Introduction

In the knowledge economy, the education system becomes a driver for the country's socio-economic development and global competitiveness. Considering the population decline, higher education quality is particularly important, as it is essential for better-qualified personnel that can partially compensate for population decline.

The quality of higher education is one of the most essential components in any modern country's development. Having paid attention to it for a long time, economically developed countries have accumulated significant quality management experience (Alzafari & Ursin, 2019; Jackson, & Bohrer, 2010). Russia has adopted this experience and uses it actively. However, in recent years, the developing countries have also begun to pay attention to their higher education (López et al., 2020; Wariyo, 2020). Although these countries fall behind Russia, their experience can be quite useful in terms of the economic development level. For example, in Bangladesh, the number of private higher education institutions (HEIs) has considerably increased in the recent years (Rahnuma, 2020). However, such private HEIs do not guarantee the due quality of education, so the government needs to make considerable efforts to maintain the acceptable quality of higher education. Considering that in Russia the process of entering the market for private HEIs is far from being complete and that the quality of education offered by such HEIs is often below the standards, rejecting the experience of countries that face similar problems only by reason of their lower economic development level seems to be a wrong solution.

This issue is particularly important for Russia, as no technological breakthrough or sustainable economic growth can be achieved without a high-quality education system. Higher education in Russia has undergone numerous reforms and the country is still in search of the national education quality model to address the requirements of both internal and external stakeholders. Presently, the country faces some serious problems related to higher education (Boguslavsky & Neborskiy, 2017; Ignatov, 2013a; Ignatov, 2013b; Senashenko, 2017; Verevkin, 2017).

2. Problem Statement

In the modern paradigm of the country's development, the Extreme North is treated as a mineral resource source. However, both experts and regional authorities believe that the northern regions need to diversify their development (Sinitsa, 2019). First of all, as far as the service sector is concerned. Nowadays, the Extreme North faces a continuing population outflow caused by underdeveloped social infrastructure and a low share of the service sector.

In this context, the education system makes no exception. Many young people born in the Extreme North get their education outside the Extreme North regions. The vast majority of educational migrants do not plan to return home. A significant share of schoolchildren residing in the Extreme North do not see their professional future in these regions (Simakova, 2019). Most regions in Russia face this problem. However, in the case of Extreme North, it becomes of particular relevance, as a low population in these regions is a strategic threat to the country's security in the broad sense of the term. One of the most efficient ways to address this problem is to improve the quality of education at all levels, especially at the higher education level (Sinitsa, 2019). For the territories of the North, sustainable development largely

depends on improving the education system, since HEIs being the centres of local and larger communities, become the key to the existence of such communities..

3. Research Questions

What is the main difference between the Extreme North higher education system and that of the rest of the country? Considering its smaller scale, one can expect lower values of indicators used to assess the qualitative differences. These include income earned by the higher education institutions, development level of their infrastructure, foreign students' share in the total number of students, average estimates of the Unified State Exam (USE), etc.

4. Purpose of the Study

In an article written earlier but not yet published, we reviewed the Extreme North HEIs in the international rankings of HEIs compared to the other Russian HEIs and identified strengths and weaknesses of the Extreme North HEIs. Tomsk State University and Tomsk Polytechnic University are in the top list of Russia's HEIs. Siberian Federal University and Far Eastern Federal University may have been included in the international rankings, but they lack in scoring. Other Extreme North HEIs are seldom included in such rankings and we would like to find out if the top list HEIs implies any difference between the two types of rankings. This will give us a more general view. Quantitative indicators forming a detailed description of the higher education quality in the Extreme North additionally contribute to a better comprehension of its state.

5. Research Methods

According to the literature, higher education quality is an extremely broad concept that includes many aspects (Harvey & Green, 1993; Kumar, & Sarangapani, 2004). Selecting the quality criteria is of top importance as it is a very complicated process that can involve a huge number of assessment options (Tambovtsev & Rozhdestvenskaya, 2020). Every country addresses this issue in its way, taking into account the national specifics, as doing otherwise may result in setting wrong benchmarks.

Russia makes no exception. Improving the quality of higher education in the country is a matter that is regularly put on the highest level agenda as such quality is often assessed as low. Disputes about indicators to be focused on are still pending, whereas different models of and approaches to varying degrees of compliance with the standards are being proposed. Nevertheless, Russian laws and theoretic approaches prevailing in the country still have considerable gaps (Tambovtsev & Rozhdestvenskaya, 2020).

Though most of the authors consider the quality of higher education by defining the terms and criteria, there are also those who assess the quality of education using quantitative methods of analysis (Allam, 2020; López et al., 2020). This approach is viable as it allows comparing HEIs and regions. Here we will apply both quantitative and qualitative approaches as such a combination allows us to evaluate the position of the Extreme North HEIs and to determine their place in the country's higher education system.

Having reviewed the position of the Extreme North HEIs on a global scale, we would like to understand how these are represented at the national level. For this purpose, we have chosen the National Ranking of Higher Education Institutions by Interfax. While it accounts for the national specifics of the higher education system much better and to a much fuller extent than the international rankings, its results match the position of the Extreme North HEIs in the international rankings. The Interfax ranking includes 35 indicators divided into six groups. We will consider many of these in relation to particular HEIs, which determined the choice of this ranking.

Secondly, we will put to analysis the performance indicators of HEIs as calculated by the Russian Ministry of Education and Science. We have chosen 19 indicators out of the initial 120 ones. Finally, we compared HEIs of the Extreme North and those located in the other regions for the year 2019.

Unlike our previous works, this time we consider all the HEIs located in regions that are fully or partly classified as areas of the Extreme North and equated localities. Besides, most educational migrants study within their home region, i.e. in HEIs that may not be located in the areas of the Extreme North within their regions, but where young people from these areas study. As a result, we consider HEIs in 24 regions of Russia: Amur, Arkhangelsk, Irkutsk, Magadan, Murmansk, Sakhalin, Tomsk, and Tyumen Oblasts; Republics of Altai, Buryatia, Karelia, Komi, Sakha (Yakutia), and Tyva; Zabaykalsky, Kamchatka, Krasnoyarsk, Perm, Primorsky, and Khabarovsk Krai; Nenets, Khanty-Mansi, Chukchi, and Yamalo-Nenets Autonomous Okrugs.

6. Findings

Table 1 below presents the distribution of HEIs according to their positions in the Interfax HEIs ranking for the years 2015-2020. During this period, the total number of ranked HEIs increased, but the share of HEIs located in the Extreme North remained almost unchanged. It was 21.4–22.1%. It was only in 2018-2019 that it reached 23.4%. HEIs of the Extreme North had lower scores, but only in 2018-2019, a statistically significant difference can be noted between the two populations. As for the other years, we cannot reject the hypothesis that the mean values are equal at the significance level of 0.05.

Table 1. Descriptive statistics on HEIs included in the Interfax HEIs ranking

HEIs	Number of HEIs	Mean	Median	Std. dev.
2015				
Extreme North	37	115.20	129.00	67.997
Rest of the country	171	102.24	103.00	59.294
2016				

Extreme North	42	121.21	111.00	75.634
Rest of the country	196	119.13	120.50	67.507
2017				
Extreme North	47	139.00	148.50	83.932
Rest of the country	216	131.11	129.50	74.889
2018				
Extreme North	54	167.11	182.75	95.814
Rest of the country	231	139.77	139.50	79.252
2019				
Extreme North	62	190.32	215.75	104.75
Rest of the country	265	157.84	157.50	91.110
2020				
Extreme North	61	184.61	207.50	106.61
Rest of the country	276	165.53	163.50	95.109

Tomsk State University and Tomsk Polytechnic University were in the top ten, ranked as high as 7-10. Siberian Federal University was in the top twenty (ranked 13–18). At first, Far Eastern Federal University was ranked 25, but in 2018 was ranked as high as 17. Then its position slightly worsened, though it still remained in the top 20. Petrozavodsk State University, Irkutsk State University and North-Eastern State University have also scored relatively high.

Initially, there were 10-11 HEIs of the Extreme North in the rank of top 50 HEIs, but in recent years only nine of them have managed to keep their positions. A higher value of standard deviation allows for the conclusion that the top HEIs of the Extreme North are developing faster than the higher education system in the Extreme North as a whole. The latter had weaker values than the higher education system outside the Extreme North. However, throughout the period under consideration, the increase in

mean and median values in the Extreme North and outside this macroregion was very similar. The difference did not exceed two percentage points for the mean and five percentage points for the median.

What are the driving factors that make HEIs get their positions in the ranking? In terms of individual components of the ranking, we considered about 150–160 leading HEIs. As for the other HEIs, it is important for them to be included in the ranking, and the differences for them matters less. By education, we provide data for 2018-2020, and for the other enlarged groups, the data for 2017-2020 are reviewed.

In terms of education (USE score, educational programs, cost of education, internship, cooperation with schools, number of participants in the Academic Olympiads) in 2018-2019, the Extreme North HEIs had slightly higher scores than the final ranking, but in 2020 they faced some downfall. In the Extreme North, there is a notable group of leading HEIs. HEIs located in the middle of the HEIs ranking had a major weakness. We can assume that they had fewer participants in the Academic Olympiads.

As for the brand, the Lomonosov Moscow State University stood out very strongly. The rest of the universities did not earn many points. HEIs of the Extreme North were noticeably behind by this criterion (media activity, the rank of the HEI in Science & Education Similar Web, Alexa Global Rank, and perception by the academic community) and were not ranked very high in the final generalized rating. Though we should note that weak publicity is a problem faced by most Russian HEIs.

As for research activities (training graduates of master's or higher programs, contributing to the scientific and educational elite, evaluating of distributed computer networks, number of publications and citations according to the of international and domestic citation bases, the share of expenses for R&D in the total HEI budget), the HEIs of the Extreme North are also far from being in the top list. The average level was reached only in 2018. It can be assumed that the majority of HEIs faced a lag in all directions. This is especially true for international citation bases and contribution to the elite as very few HEIs of the Extreme North have scored by these criteria.

Every year HEIs of the Extreme North had much higher scores for socialization (salaries of academic and teaching staff, further education, dormitories, social programs of HEIs, creating territorial development programs) than scores in the final ranking. This was particularly visible during the years 2018-2020. All HEIs in the Extreme North had high scores. We believe that the reason for this is the participation of such HEIs in the further education programs and contributing to the creation of territorial development programs.

As for internationalization (number of foreign students and international conferences, position in Alexa Global Rank, cooperation with foreign HEIs, number of academic programs in foreign languages), the position of the Extreme North HEIs was slightly better or the same as compared to the final ranking. The values for this component are the closest to those in the final ranking. This result is rather unexpected as HEIs of the Extreme North have weak publicity abroad. Such scores, however, may result from close links with HEIs located in the ex-USSR Republics that have now formally become foreign countries. Anyway, this is an area of further research.

Innovation activities (media activity in this area, number of patents, cooperation with high-tech companies, innovation infrastructure, the share of revenues generated by extra-budgetary R&D, number of industrial chairs) also generate scores above the final ones. Thus in 2017, the Extreme North HEIs had

an average score by this parameter. However, there is a distinct group of leaders among the HEIs of the Extreme North.

The above allows for the conclusion that the leading Extreme North HEIs hold well-deserved places in the ranking. However, there are also outsider HEIs with much lower scores in this macroregion, which significantly affects the overall result. This is due to a greater difference between the mean and the median compared to the rest of the country and a higher value of standard deviation. Thus, the Extreme North HEIs prove to be rather heterogeneous.

However, to rank many important parameters remain omitted, as only a small part of all the HEIs are ranked. To assess their state, we need to consider the most critical indicators for each particular HEI. Usually, they used to assess the quality of higher education by considering the quality of research activities, but in the last two decades, considerable attention was also paid to the quality of academic activities (Henard & Roseveare, 2012). Here we do our best to avoid the research parameter in assessing such quality and use only one indicator (number of publications). Thus, we focus on academic activities as these are of higher importance for our purposes.

Table 2 shows that the difference between the HEIs located in the Extreme North and those located in the rest of the country is not as great as we originally expected it to be. Though, the scores in the Extreme North are slightly worse. This means that the quality of education in this region may be improved through solving the problems that are common to the education system all over the country and that specific issues of education development in the Extreme North are less important for that purpose.

Table 2. Indicators describing tuition

Indicator	Region	Mean	Median	Std. dev.
Share of full-time students studying under bachelor's, specialist's or master's programs in the total number of students	Extreme North	41.03	43.21	28.109
	Rest of the country	42.82	41.33	28.937
Share of extramural students studying under bachelor's, specialist's or master's programs in the total number students	Extreme North	54.08	53.62	27.670
	Rest of the country	51.32	52.49	28.624
Average USE score of students enrolled in bachelor's and specialist's degree programs (all forms of studies)	Extreme North	53.30	57.81	18.788
	Rest of the country	56.70	60.27	18.450
Average USE score of full-time students studying	Extreme North	40.89	53.25	26.037

under fee-based bachelor's and specialist's degree programs (paying the tuition fees themselves and or sponsored by companies)	Rest of the country	49.18	57.80	23924
Average minimum USE score of full-time students studying under bachelor's and specialist's degree programs	Extreme North	38.55	44.08	19.065
	Rest of the country	42.78	46.03	18.007
The share of bachelor degree students in the total number of students studying under bachelor's, specialist's, and master's degree programs	Extreme North	75.39	85.75	29.485
	Rest of the country	76.22	84.33	28.323
Share of international students in the total number of students studying under the bachelor's, specialist's, and master's degree programs	Extreme North	2.24	0.00	5.703
	Rest of the country	3.41	0.00	7.673
Share of international students in the total number of postgraduate (adjunct) students, residents, assistants-interns at the HEI in the total number of such students	Extreme North	2.54	1.26	4.232
	Rest of the country	5.68	3.35	7.755
Share of full-time students studying under bachelor's, specialist's, and master's degree programs who have studied abroad for at least a semester (trimester), in the total number of full-time students	Extreme North	0.20	0.00	0.609
	Rest of the country	0.15	0.00	0.662

In terms of USE scores, median values are relatively low, which means applicants do not have to meet very stringent eligibility criteria. This is because many HEIs will not be able to gain the required number of students with higher threshold values. Another reason is that many private HEIs do not have any USE score requirements for those who plan to study extramurally. Though scores in the Far North HEIs are lower, the difference between HEIs from this macroregion and the rest of the country is small.

The average USE score for students who pay tuition fees is expected to be lower. Thus, it is below 50 meaning that the quality of the student in-flow is poor. Given that most of these students pursue not the knowledge but the diploma, it is not surprising that their training quality is rather low.

The average minimum USE score required to enter some HEIs is so low that it can only be accepted as a minimum for secondary vocational education. The level demonstrated clearly does not meet students who intend to study under higher education programs.

The macroregion's spacious territory combined with poor transport accessibility result in slightly higher share of extramural students in the Extreme North. However, the very fact that extramural students account for more than 50% of all students represents a negative trend, as the quality of extramural training is lower as compared to full-time training programs. In these terms, there is not much difference between the HEIs of the Extreme North and the other HEIs.

The vast majority of all students are bachelors-to-be (the median value is very high). Because earlier a four-year study program was not deemed to be enough for a completed higher education, we can assume that the quality of graduates does not always meet the requirements of the economy, as far from 100% of bachelor degree holders are willing and able to continue their education under the master's degree programs. This parameter shows that there is not much difference between the HEIs of the Extreme North and those located in the rest of the country.

The difference between the HEIs of the Extreme North and other HEIs is statistically significant only when it comes to foreigners' share among all students. This difference is visible both at the initial and higher levels of the higher education system. The reason for this is that HEIs of the Extreme North are less known abroad. It should be noted that the share of international students is larger at higher levels. This fact partly contradicts our previous results (Sinita, 2020) and requires further analysis.

In the Extreme North, the share of HEI students who studied abroad for at least one semester is higher, but generally their share in the total number of students is extremely low. This means that most HEIs have not fully launched student exchange programs and that additional efforts are required.

Table 3 shows that HEIs of the Extreme North have a different level of infrastructure development as compared with the other HEIs. This means that the quality of applicants all over the country is more or less the same, while the difference in the higher education system is mainly due to differences in infrastructure.

Table 3. Indicators Describing HEIs infrastructure

Indicator	Region	Mean	Median	Std. dev.
Share of the cost of machinery and equipment that is	Extreme North	30.06	26.84	24.094

not older than 5 years in the total cost of machinery and equipment	Rest of the country	36.15	30.60	29.557
Share of academic and teaching staff (holders of candidate/doctor of sciences academic degree) in the total number of staff members	Extreme North	72.37	75.07	18.978
	Rest of the country	76.73	79.93	17.338
Share of teaching staff under 65 years of age	Extreme North	83.70	85.48	14.328
	Rest of the country	83.31	85.00	13.201
Total number of publications per 100 academic and teaching staff members	Extreme North	244.17	161.47	467.61
	Rest of the country	319.27	221.80	504.87
Share of HEI income generated by academic activities in the total HEI income	Extreme North	83.93	89.17	14.614
	Rest of the country	83.49	89.10	16.131
Share of HEI income generated by R&D in the total HEI income	Extreme North	4.69	3.07	6.315
	Rest of the country	6.85	4.48	8.229
Number of companies having signed contracts for training with HEIs	Extreme North	43.27	4.00	108.210
	Rest of the country	44.75	1.00	145.000
Number of companies that offer internship to students and that have formalized contractual relations with HEIs	Extreme North	228.40	46.00	711.820
	Rest of the country	240.31	49.00	538.820
Share of students having no access to dormitory facilities in the total number of students who need access to such facilities	Extreme North	11.24	0.00	27.295
	Rest of the country	12.54	0.00	29.197

Share of foreign citizens among academic and teaching staff in the total number of academic and teaching staff members	Extreme North	0.45	0.00	1.212
	Rest of the country	0.49	0.00	1.717

The median number of companies having signed contracts for training specialists is generally small but as far as the Extreme North HEIs are concerned, this number is higher. The mean values are much higher. The high standard deviation means a great heterogeneity. The number of companies that offer internships to students is much higher. This positive trend allows for the conclusion that the skills and knowledge acquired in the course of education can be applied practically. In the Extreme North, the number of such companies is less, though the difference between this region and the rest of the country is little.

Teaching personnel in most HEIs are under 65 years of age. HEIs of the Extreme North make no exception in these terms. However, this does not mean that the region does not face the problem of staff reproduction. As far as the share of foreign citizens in the total number of academic and teaching staff members is concerned, HEIs of the Extreme North share the general trend with the rest of the country. Although it should be noted that this share is rather small. Besides, there is statistically significant inferiority of Extreme North universities in terms of the share of staff members holding academic degrees. In other words, employees in these HEIs are less qualified; however, the share of employees holding academic degrees in these HEIs is still quite high.

As for the number of publications, the Extreme North HEIs are behind other HEIs, though the statistical difference is insignificant, although close to the area of accepting the alternative hypothesis. High standard deviation values for this indicator allow for the conclusion about a considerable heterogeneity of HEIs.

Figures show that academic activities generate the main HEIs income. This is true both for the Extreme North and the other regions as the difference between them is small. In terms of revenues generated by R&D, the Extreme North HEIs are significantly inferior to those located in the rest of the country. Therefore, additional measures are required to upgrade HEIs machinery and equipment. The share of modern equipment owned by HEIs is not very high, and the situation for HEIs in the Extreme North is worse than in the other regions.

Another important parameter of education quality is the availability of dormitories. Generally, the share of those students of Russian HEIs who need a dormitory but have no access to it is low. In these terms the difference between HEIs in the Extreme North and other regions of the country is insignificant.

7. Conclusion

Our study shows that HEIs in the Extreme North have, on average, lower values for most indicators as compared to the other Russian HEIs. In most cases, the difference is not statistically significant, but such difference is quite noticeable for some indicators. Such indicators include share of

foreign students, share of revenues generated by R&D in the total HEI budget, share of modern equipment, and share of employees holding academic degrees.

The shortcomings identified are not critical and can be eliminated within a reasonable time. However, this requires political will and greater spending on higher education in the Extreme North. Such a policy will definitely contribute to the macroregion's social and economic development and slow down population outflow.

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