TYPOLOGY OF UNIVERSITIES AS A STRUCTURAL BASIS OF THE NONLINEAR MODEL HIGHER EDUCATION IN THE RUSSIAN MACRO-REGION

Garold Zborovsky, Varvara Katashinskikh

Ural Federal University (RUSSIAN FEDERATION)

Abstract

The Russian Federation is divided into 8 federal districts – so called macro-regions and 85 constituent regions. In each of these units there are, which are functioning and aimed at addressing economic, social, scientific, cultural issues of the regions and macro-regions. The study shows that the basis for their successful activity is the transition from a linear (vertical) to a nonlinear (horizontal) model of higher education and to its basic element – network interaction between universities. This requires knowledge and use of the typology of the universities in the macro-region. The typology acts as the structural basis of the nonlinear model of higher education.

The object of the author's research are the universities of the Ural macro-region, one of the most developed macro-regions, regarding the socio-economic area. It is characterized by the presence of the variety of quantitative characteristics, areas of training, branches, level of subordination of the universities. The subject of the study is their typology according to the certain criteria. The goal of the research is to develop a typology of higher education institutions of the macro-region, which would meet the needs of its development in the most adequate and substantial way.

The theories of the system, nonlinear, network, and typological analysis form the methodological basis of the study, as well as various typologies of universities that exist in the modern foreign and Russian science. The empirical base includes the statistics of more than 50 universities in the Ural macro-region, as well as the results of a semi-formalized in-depth expert interview (N=30).

As a result of the analysis, the authors identified the following criteria for the typology of universities in the Ural macro-region: quantitative characteristics, level of subordination, geography of influence, and branch affiliation. The latter is the most significant regarding the nonlinear model of interactions in higher education. The dialogue between the higher education institutions, the economy, the science and the stakeholders should be organized exactly in the framework of these branches. Therefore, in order to understand the specifics of the educational space of the Ural macro-region, its full typology that could become the basis of the nonlinear model of higher education, it is necessary to take into account the specialization of universities and their branches’ structure.

As a result of the study, the authors identified four possible typologies of universities in the Ural macro-region, which form the basis for a nonlinear model of higher education. This allows us to consider typologies as an impulse which stipulates the creation of a new system of interactions in higher education in the Russian macro-region.

Keywords: Typology of universities, nonlinear model of higher education, Russian macro-region.

1 INTRODUCTION

The Russian Federation is divided into 8 Federal districts – macro-regions and their 85 member regions. Each of them are universities designed to solve economic, social, scientific, cultural problems of regions and macro-regions. The basis of their success is the transition from the linear (vertical) to nonlinear (horizontal) model of higher education and its basic element – inter-university networking.

The objects of the author’s research are the universities of the Ural Federal District (UrFD), which is one of the most developed in the socio-economic area. It is characterized by the presence of various quantitative characteristics, areas of training, industry sector, level of universities subordination. The subject of the research is the typology of them according to certain criteria. The main goal was to develop such a typology of universities of the Ural macro-region, which meet the needs of its development in the most adequate and substantial way under the conditions of higher education transition in the Ural Federal district to the nonlinear model.
According to the author, the macro-region in modern Russia should represent, educational space, including the different networks of universities, higher education stakeholders, which would meet the objectives of the entire macro-region, contributing to the development of the main directions of its activities. Such networks will constitute the structure of the nonlinear model of higher education in the Ural macro-region [1], [2].

The structure of the nonlinear model of higher education include: 1) a fundamentally new system of governance – from the local authorities of the macro-regional level to the separate universities; 2) relationship between the educational communities of professors, students, managers, based on the principles of cooperation, participation of all communities in management, as well as the formation of the real motivation of students regarding education and science; 3) relationship between individual educational direct trajectories of students and professional trajectories of professors; 4) academic mobility within the macro-region; 5) development of the network of interactions between universities in the macro-region [3]. It requires knowledge and use of the typology of universities in the macro-region. The typology serves as a structural basis of nonlinear models of higher education.

The issue of typology of universities in modern science has not been attended properly, although it has been elaborated to a certain extent. Analysis of the Western literature showed that the bulk of the existing typologies does not affect the educational organization in general, but only some aspect of its activities. Types of the universities can be identified based on their localization in the urban space. Localization is directly proportional to the complexity of the structure of the University and its infrastructure (social and medical institutions, educational organizations, research, etc.) [4]. In this respect, the University is perceived as the key to progress in megalopolises areas with a high proportion of young people. The typology of universities as engines of urban renewal also appears to be of certain interest [5]. The issue of typologies of additional revenues universities is often addressed. For example, this refers to the typology of university companies in the selection / creation of enterprises based on the several variables, including the type of sponsorship of universities, the participation of the university in the establishment of the company, the nature of knowledge applied and co-localization of the founders [6].

Another typology, which is devoted to the universities spin-offs, is based on the two key discriminatory factors, in particular the status of individuals involved in the new business venturing process (researchers or students) and the nature of knowledge transferred from the university to the new venture (codified or tacit) [7]. Another direction of the research is related to the typologies of University governance [8], [9]. In one of them [8] there has been an attempt to analyze and classify university governance regimes, their dynamics and trends regarding the international perspective.

In recent years, the interest to these issues has grown in Russia. The typologies that already exist are based on the variety of criteria. These includes: proportion of young employees; budget funding; the total amount of students; the share of funds for innovation and development, received from extra-budgetary resources [10], [11]; research and development; applied research; areas of training (specialization, branch); target group [12]; geography (radius) of influence; role in the production of the academic product [13]; mission; partnerships necessary for the development of the missions; optimal spatial model; prospective model of management [14].

2 METHODOLOGY

Methodological basis of the research was formed by the theory of the system, nonlinear, network, typological analysis, as well as the various typologies of universities that exist in modern foreign and Russian science. Empirical materials were collected by the research team including the authors, in 2016-2017. Field research was carried out in two stages. During the first stage (May – October 2016) expert interviews were conducted and the method of in-depth and semi-formalized interview were used. Thirty (30) experts were polled, including representatives of the professional pedagogical community, who are actively engaged in the processes of reform of higher education, administration of institutions of various levels (rectors, vice-rectors, directors of institutes, deans, heads of departments, etc.), the business community directly related to educational and/or management process in the university. The results of the research formed the basis for the development of the theory of a nonlinear model of higher education. The information obtained was compared to the data statistics, secondary research, online survey of teachers (N=233 people). During the first phase seven focus groups with key informants to test conception and elements of nonlinear model of higher education were conducted.
The second phase of the study (January – March 2017) consisted of the mass survey of teachers and students of the Ural Federal district (included 51 University UrFD). The study implemented a quota sample, it was based on the statistical data related to the educational communities of the regions of the UrFD (Sverdlovsk, Chelyabinsk, Tyumen, Kurgan regions, Khanty-Mansi autonomous district. Yamalo-Nenets autonomous district was not included in the sample because there are no separate universities there. There were quotas established in areas of training within each region (technical, natural, humanitarian, socio-economic). Here, we used open available information posted on the University websites. The sample of teachers included 810 people, the sample of students – 1860 people (the respondents were the junior and senior students as well as graduate students).

In this article, we present the materials of expert interviews and data obtained during the survey of the university teachers. In the selection of the types of universities we geared ourselves towards the elements of nonlinear model that are associated with different aspects of professional activities of teachers.

3 RESULTS

3.1 The typology of universities

We will focus primarily on the typology of universities of the Ural macro-region, because it should become the structural basis of the transition to a nonlinear model of higher education. The types of universities depend on the various kinds of interactions between them in the macro-region. The total number of students in it is about 350 000 people, teachers – about 18 000 people. Today there are 51 University within the UrFD. Speaking about their typology, we have identified the following criteria: the level of subordination, size, degree of influence, and branch accessory. Based on these criteria we have proposed four typologies of the universities.

I. On the level of subordination we distinguish six types of universities that are defined not only based on the status of the founder of the university, but also on the degree of financial security and independence.

1 Federal autonomous universities. This group includes three universities, located in the major cities of the Ural macro-region – Yekaterinburg, Chelyabinsk and Tyumen. Federal autonomous universities are included in the Russian project of academic excellence «5-100». The goal of the «5-100» Project is to maximize the competitive position of the group of leading Russian universities in the global research and education market. A group of federal autonomous universities is small, but it is represented by the strongest educational institutions of the UrFD. It is worth noting that a large number of their teachers are involved in innovative activities, programs of academic mobility. It does not come as a surprise, because the mentioned universities have more financial resources in comparison with the universities from other groups. Therefore, they are seen as leaders in the development and implementation of the a nonlinear model of higher education in the UrFD.

2 Federal budget-funded universities. This group includes 30 educational organizations. The main differences between budgetary and autonomous universities have to do with the characteristics of the financing, and significant budgetary constraints. Those experts, who are working in such universities, mention the following facts: «Today in many universities there is no possibility for the teachers to go on a business trip to another city or abroad, primarily due to the lack of funding» (E.B., Head of the Institute); «network education is an interesting and promising direction, universities really need it, but now it lacks material basis, financial investments from the state» (N.V., Center for Innovative Technology Head). Therefore, the implementation of the elements of the nonlinear model of higher education in such universities face serious barriers. Ways of their overcoming will be developed and discussed with all the stakeholders of higher education in the macro-region.

3 Federal government universities. They are related to the field of defense and are funded in a special way.

4 Universities of regional subordination. Their founder is the government of the region. Despite serious limitation of powers, which is imposed on the management of universities of this type, they are highly effective, as they work for the needs of the region, considering the peculiarities and tasks of the regional labor market. In the Ural macro-region there are five regional
universities, and they often serve as good examples of interaction between authorities and higher education.

5 Universities of the municipal subordination. There are founded by the municipalities, and they are created for solving problems of municipalities and separate cities. There is only a few number of such universities, because not every municipality can afford their support due to their financial capabilities.

6 Private or non-state universities. Their founders are «physical» persons. In modern conditions when requirements to training are becoming tougher, many private universities no longer fit into the general scheme and lose state accreditation. Despite their decline, private universities from almost 2.6 % of higher education market of the UrFD, which is about 8 000 students.

2. One of the important criteria of the typology is the size of the university. This is primarily determined by the number of students. Despite the fact that we sought to abandon the formal division of universities into groups, this typology is quite indicative referring to their market share in the macro-region. The market share occupied by the university in the macro-region is calculated as the ratio of the number of students to the overall student population in the UrFD. The more students are enrolled in the university, the greater its importance in the market of the macro-region is. The sizes that we allocate include very large, large, medium, and small universities. The largest group is medium-sized universities (37 %), those defined as little go second (33 %). There are more than 20 000 students in very large universities, from 15 to 20 000 in large, from 5 to 15 000 – in the middle, and less than 5 000 – in the small ones.

3. In order to describe the importance of universities for the macro-region one should understand the meaning of the selection groups according to the degree of influence, geography of activities, presence of real relationships with other educational institutions, numbers of foreign students. In this respect we distinguish: 1) Universities of federal degree of influence (of federal significance). These are very large multidisciplinary universities that have relations with partners in Russia and abroad. They were designed to present the Russian education on the global level, participate in the development programs of the competitiveness in order to be included into the international ratings. There are students not only from the entire UrFD, but also from other regions and macro-regions of the country. There is a quite high proportion of foreign students. 2) Universities of macro-regional degree of influence (of macro-regional importance). These are large and medium-sized universities, which are considered to be attractive for the students from the entire UrFD due to the certain areas of training, and their reputation. They are training specialists for various branches of economy, social sphere and culture. 3) Universities of regional degree of influence (importance). These are small or medium-sized educational organizations that operate only in their region. They train professionals for domestic market. 4) Universities of local degree of influence (of local importance). Their target group is the population of just one city (see Figure 1).

![Figure 1. The typology of universities in the UrFD at the degree of influence, %](image)

According to the typology of universities (referring to the degree of influence) educational institutions of the macro-regional and regional importance are of special significance, because they are designed to be involved in the economy of the macro-region and its constituent regions. The basis of nonlinear models of higher education is creating a network of interactions with stakeholders around specific development challenges of the particular site. Meanwhile, interest towards the universities of federal significance is growing. This is due to the fact that they are already included in different kinds of
interaction, not only on the regional and macro-regional, but also on the national and international level.

4. The typology of universities that deals with their branch structure is of particular importance for the Ural macro-region. This is the most significant sectoral focus of higher education. In accordance with these criteria we distinguish the following groups of universities. 1. Multidisciplinary universities. They include primarily very large and large educational institutions with a big number of students, and occupy a significant market share of higher education. They trained from 40 to 60% of the students in technical specializations, which reflects the specificity of the UrFD as an industrial macro-region. At the same time, other groups of training areas are represented by many universities. 2. Classical universities. Traditionally, they are diversified, and aimed at training specialists in different areas. Regarding the structure of training areas, this group is the most diverse. In some universities there is high prevalence of technical areas, in others, – humanitarian ones. 3. Universities with a dominant specialization program. In the following group we have included the universities, where the number of students enrolled on core areas forms three quarters of the total student body. 4. Universities of one specialization program, that are aimed at preparing specialists for the particular branch of the macro-regional and regional labour market. These are educational institutions that teach students in related areas of training. This is the largest group of universities in the UrFD, allocated in the sectoral basis. It consists of 24 universities (see Figure 2).

![Figure 2. The typology of universities in the UrFD based on the specialization, %](image)

Each of the universities identified under the typology according to the criteria of specialization, needs to find its location in the new nonlinear system of interrelations in the higher education of the UrFD. In a long-run, the specialization of the university may become the basis for its future development.

At this stage we do not set such goal as establishment of the common formal typology of universities based on the above criteria. The main objective is to build some chains, universities and areas of training that form the basis for network interactions. Thus, the four selected typologies of universities of the Ural macro-region may be seen as the basis for a nonlinear model of higher education. This allows us to consider typology as an impetus for the creation of the new non-linear system of interactions in the higher education of the Russian macro-region.

### 3.2 The elements of nonlinear model of higher education in the macro-region

The authors develop the concept of higher education, which includes a number of conditions that somehow should be implemented in the process of transition to the nonlinear model. The following elements were considered in the framework of this study:

- the changing nature of innovation activity and its transformation into a dominant one;
- growth of innovative potential;
- democratization of university management through participation in all educational communities;
- transformation of the academic mobility with external (foreign) to internal (macro-regional) orientation;
- expansion of interaction of the university with its stakeholders;
- development of network interactions with other universities in the macro-region.
These are the elements that to a greater extent are determined by the type of the university. After a study conducted with the help of the teachers, we were able to identify some of the features of the modern linear model of higher education and the perspectives of transition to nonlinear model. The specifics of universities of different types has been taken into account.

The first important element is the level of innovative activity of the teachers (see table 1).

**Table 1. Participation of teachers in innovative activities, % of respondents.**

<table>
<thead>
<tr>
<th>Do you participate in innovation activities (innovation projects), implemented in the field...</th>
<th>% of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>teaching activities</td>
<td>34.1</td>
</tr>
<tr>
<td>the interaction of «higher education – academic science»</td>
<td>11.9</td>
</tr>
<tr>
<td>the interaction of «higher education – business»</td>
<td>10.2</td>
</tr>
<tr>
<td>the interaction of «higher education – state (regional, municipal) authorities»</td>
<td>6.7</td>
</tr>
<tr>
<td>Do not participate</td>
<td>49.2</td>
</tr>
</tbody>
</table>

As we can see, almost half of the teachers are not involved in any type of innovative activity. About one-third of the teachers are engaged in the innovative pedagogical activity, every tenth is engaged in the interaction of «higher education – academic science» and «higher education – business». The least amount of all the teachers is involved in the interaction of «higher education – public authorities» (6.7 %), which indicates a certain distance between the universities and the governing structures in the modern world. However, this does not mean that teachers do not want to act as the stakeholders of higher education. Data from our studies show the opposite (see table 2). The problem is more likely to be related to the fact that the points of interactions are not particularly well developed at the present stage. Meanwhile, for the development of the entire system of higher education, existing and new linkages between educational organizations and stakeholders require significant growth in terms of innovation potential. Therefore, the rise of innovative activity of teachers in each of the above areas is extremely important. The possibility of increasing teachers’ personal innovative activity is being considered by them.

**Table 2. Perspectives of teachers participation in innovative activities, % of respondents**

| The real participation of teachers in the field... | The nearest perspectives of teachers participation in the field... |
| --- | --- | --- | --- | --- |
| | Teaching activities | The interaction of «higher education – business» | The interaction of «higher education – academic science» | The interaction of «higher education – public authorities» |
| teaching activities | 73.3 | 31.7 | 33.3 | 27.5 |
| the interaction of «higher education – business» | 31.3 | 85.4 | 41.7 | 41.7 |
| the interaction of «higher education – academic science» | 44.4 | 48.1 | 68.5 | 22.2 |
| the interaction of «higher education – state (regional, municipal) authorities» | 58.6 | 37.9 | 27.6 | 55.2 |
| Do not participate | 68.8 | 34.4 | 44.6 | 33.1 |

As the results show, almost 70 % of those who did not take part in any types of innovative activity, intends to do so in the near future in terms of teaching activities, roughly half – in cooperation with science, about the third of respondents predict increased innovation activity in terms of cooperation with business and authorities. In other words, teachers are prepared to be actively involved in the
system of interaction with stakeholders of higher education, proving the need for the transition to a new nonlinear model of the system of higher education. Meanwhile, all types of universities, and on average, two-thirds of teachers believe that their innovation activity will be at the same level in the future as it is today. There is a high proportion of those who forecast growth of personal innovation activity in the same areas in which they have already shown interest.

Speaking about the type of governance in the higher education system, three quarters of university teachers noted pressure from «above», bureaucratization and forced dynamics of changes in universities. Among them, 75% believe that the formation of the strategic initiatives «from below» at the university level and the social partners will only be possible in the distant future. Once again, this proves the necessity of transition to the new type of management at the university, when each of the subjects of the educational process is able to participate in management and show initiative.

However, 86% of teachers are willing to participate in the discussion of important management issues within the university, which showed their high interest in changing the present system of management. At the same time, more than half of them are not sure that this action would lead to a positive result. Moreover, the problem of serious remoteness that exists between the faculty and the administration was mentioned by the teachers.

Another essential element of the non-linear model of higher education is the high level of academic mobility. According to the conducted research, only 16% of the teachers participated in some programs of academic mobility. However, more than half are interested in the development of both internal and external academic links. But, the implementation of this idea is associated with a variety of barriers, primarily financial ones. Many universities simply do not have the material capabilities to develop the academic mobility and support the teachers. While talking about cross-country mobility, the language barrier becomes a serious obstacle for the Russian teachers. Currently this problem is being solved in some universities by providing funding and conducting different kinds of language courses. However, this does not refer to all the educational institutions. Low salaries become another obstacle for the teachers, as a result they simply cannot afford to pay for participation in programs of academic mobility.

In terms of cooperation between the university and employers, teachers consider the following options as the most promising: greater involvement of employers and practitioners in the educational process, creation of the business base for full internship and graduate design students, targeted training. Those are the options that are related to the direct involvement of employers in the educational process.

The results of the study showed that teachers are generally in favor of transformations in the higher education system towards the idea of non-linearity: flexibility, dynamism, openness, extension, academic relations, exchange of experience, interactions with stakeholders.

4 CONCLUSIONS

The allocation of universities of different types allows us to define the specifics of each of them, regarding the nonlinear model of higher education. It also enables us to talk about the possibilities and limitations of participation of particular educational institutions in the system of higher education, which is new to Russia, identify problems and prospects of study of educational organizations based on their typological features. A detailed study of the specificity of the universities of each of the proposed types makes it possible to assess their place and evaluate their role in the new nonlinear model of higher education.

The importance of typologies for building nonlinear model of higher education is obvious due to the fact that they promote practical implementation of the model, in particular, construction of network interaction. This can be implemented by building a set of branch criterion: medical, legal, educational, engineering, economic and other universities. Within their branch, they are able to interact via educational programs, research, and other activities. Possible ways of interaction between universities and stakeholders in higher education, which will contribute to the effective development of the entire macro-region should be created referring to each possible network.

ACKNOWLEDGEMENTS

The article was prepared with support of the Russian Science Foundation Grant (№ 16-18-10046) «Forming nonlinear model of the Russian higher education in the region in the context of economic and social uncertainty».
REFERENCES


