Spatial Organization of the University Network: An European Case-Study

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Abstract—**The spatial strategy of the Russian Federation implies the university network development in compliance with the new conditions of economic development, geographic concentration of labour, scientific and technological, innovative activities. For a long time, a geographic aspect has not been addressed while reforming higher education in spite of a lot of research and managerial experience in spatial university distribution worldwide. In this regard, the study is aimed at grounding the prospects for improving spatial university distribution based on the European experience of countries with different educational models. Based on the methodology of the empirical and statistical analysis, rankings, the authors researched into the theoretical backgrounds of university network distribution, the classification of spatial specifics of European educational models, the conditions for the successful adaptation of the European experience in Russia. The novelty of the research is in the working-out of the university network spatial organization based on the case study of countries with different educational models that have been proved successful. The authors used the methodology of empirical, systemic and comparative analysis. Rankings and general purpose and special purpose applications (Microsoft Excel, Statistica 8.0) were used to observe and classify raw data and calculate integrative indicators. The main results of the research could be used for further research into the spatial distribution of economic resources, for strategic planning activities.**

Keywords—university network; spatial organization; analysis; European case-study.

I. INTRODUCTION

The Strategy of the Russian Federation Spatial Development sets out a new framework for national universities associated with the reduction in regional disparities and the improvement of competitive economies of Russian subjects [1]. order to respond to these requirements, university network spatial distribution needs to be aligned with the economic distribution throughout the country and concentrated labour, scientific and technological, innovative activities. Particular significance is assumed here by the European experience where a university network is arranged throughout the countries and preserves and develops human capital both in the centres of economic growth and small and medium-sized urban areas [2]. The analysis of the European experience in the university network spatial organization in continental European countries and the UK may help substantially in addressing that problem and be used while grounding the prospects for the Russian university network development.

II. LITERATURE REVIEW

The studies of the European university networks usually use the binary typology of educational models based on the differences in educational policies in Anglo-Saxon countries and the states in the continental Europe. Referring to the models of higher education, the terms 'Anglo-Saxon' and 'continental' have been applied for the educational models of the countries belonging to a certain linguistic group since the 19th century.

A detailed comparative analysis of the Anglo-Saxon and continental models was carried out by V.S. Vahstain who proved that the continental model is guided by the principle of free access to education while the Anglo-Saxon one is primarily based on a commercial nature and realized by marketing instruments [3]. Most researchers consider that such dissimilar characteristics arise from the role of the government in managing higher education and different levels of university autonomies [4-6].

However, scholars are still far from coming together around the causes of the unfolding trend toward the convergence of those models. The incorporation of the features of the Anglo-Saxon and continental educational models creates a new university model evolving from the variety of approaches: from 'knowledge economy' [7] to 'cluster approach to a university as an educational and scientific centre and a driving force for regional development [8, 9]. G. Goldstein and J. Drucker point out the shift in the traditional university functions (education and research) toward entrepreneurship. This entrepreneurial function consisting in innovative commercialization creates a network cooperation between universities, businesses and government and increases the role of universities in geographic development [10]. H. Etzkowitz presents a spatial interaction between universities, businesses and government as a triple-helix model that is a three-element structure and a managerial tool for providing regional innovative development through an innovative initiative [11]. On the basis of the British experience, Chatterton and Goddard add the function of cooperation with local community (business and local authorities) to the list of classical university functions [12-13]. Kohoutek and Pinheiro stress out the importance of university contribution to the regional economies and the development of their strategies according to the needs of local industrial clusters [14]. Harrison and Turok focus the analysis regional socio-economic development on the specifics of university development and work out econometric methodology for assessing the impact of university research on regional development [15]. Pugh analyses the opportunities of university impact on the economies of underdeveloped and depressive regions [16]. Based on the Israeli case-study, Frenkel and Leck research into spatial aspects of higher education and develop forecasting models for peripheral universities graduates' desirable job opportunities in high-tech industries [17].

The argument for the geographic factor being the key one in the convergence of the Anglo-Saxon and continental educational models determines the significance of the geographical context in the development of higher education and the need to research into the European experience in university network spatial organization.

III. METHODOLOGY AND METHODS

The working methodology includes:

1) an empirical analysis of institutional differences between the Anglo-Saxon and continental educational models;

2) a statistical analysis of the geographic distribution of top master's programmes in European countries based on Eduniversal Masters Ranking (Eduniversal). It is a universal platform created by the Paris consulting company to promote academic programmes globally. Their ranking uses a scoring system based on their own interviews and expert assessment. The value of such information source is defined by two factors: the geography of academic programmes under analysis and the list of estimates based on their methodology using the criteria of university publicity and its prestige among employers,

graduates' average wage levels, students' satisfaction with educational results; all higher education programmes are ranked according to bachelor's, master's and doctoral sectors.

A. An Empirical Study

The features of the Anglo-Saxon educational model are historically based on the traditions of the British system of higher education. The Anglo-Saxon model is extremely heterogeneous in most institutional features: types of universities, sources of funding, regulations and managerial practices. The types of higher education institutions are defined by generational specifics of higher education in the UK pointed out by V. Vahstein [3], associated with the degree of university prestige.

An important feature of the Anglo-Saxon model is the independence of higher education from state regulation, a large proportion of a commercial sector, the influence of private universities on the institutional framework of the educational market. The degree of the academic freedom of universities is only limited by their economic and marketing characteristics.

According to its institutional features, the Anglo-Saxon model of higher education is traditionally opposed to the continental one typical for Germany, France, Italy, Switzerland, Scandinavian countries. The differences are based on the state control over universities, a stratified access to university education (free of charge as a rule). The state educational policy is based on governments and intergovernmental bodies performing the most of regulation and coordination.

The Humboldtian university model is the foundation for the continental model of higher education with its principles of academic freedom, the cohesion of research and teaching which enables to consider education as an institutional governmental function. Continental universities used to have been connected with government and rarely interacted with market until nowadays. Governments created and financed universities, regulated their activities while business community was only a potential employer of their graduates. Traditionally close integration of universities and governments resulted in the latter, not market, starting reforms in higher education, supporting universities and set rules of competition. However, governmental control does not devalue one of the main features of national university networks of the continental model – their orientation on current developments of countries. This is realized through universities being dynamic in responding to the challenges, risks, practical needs of economy and social sphere in the framework of direct cooperation between business and scientific community through enterprises financing research and the creation of enterprises at the universities.

B. A Statistical Research

The European case-study of the university networks spatial organization is conducted according to the following principles:

- considering institutional differences between the Anglo-Saxon and the continental models;

- based on the analysis of the 3 top master's programmes spatial distribution from the ranking across comparable training programmes.

The specifics of the university geographic distribution in France and Germany reflect the spatial organization of the university network in the continental educational model (see Tables I and II) in comparison with the Anglo-Saxon model of the UK (see Table III).

The uniformity of university distribution in the countries of the continental educational model is shown through geographic distribution of three top master's programmes in France and Germany (see Tables I and II).

TABLE I. GEOGRAPHIC DISTRIBUTION OF THE TOP 3 MASTER'S PROGRAMS IN THE EDUNIVERSAL BEST MASTERS RANKING IN FRANCE IN THE 2018/2019 ACADEMIC YEAR[a]

Programme	University
Accounting	ESCP Europe Business School, **Paris** Université Paris-Dauphine - Paris 9, **Paris** Toulouse Business School, **Toulouse** *Number of programmes in the ranking* - 12
Corporate Finance	Emlyon business school, **Lyon** Université Paris 1 Panthéon-Sorbonne, **Paris** Université Paris-Dauphine - Paris 9, **Paris** *Number of programmes in the ranking* - 9
Communications	Université Paris-Dauphine - Paris 9, **Paris** NEOMA Business School, **Paris** Aix-Marseille University, **Marseille** *Number of programmes in the ranking* - 10
Marketing	ESCP Europe, **Paris** ESSEC Business School, **Paris** NEOMA Business School, **Paris** Number of programmes in the ranking - 13
Energy and Natural Resources	Grenoble Ecole de Management, **Grenoble** Université Grenoble Alpes, **Grenoble** University Clermont Auvergne, **Clermont-Ferrand** *Number of programmes in the ranking* - 3
International Business Law	Université Panthéon-Assas - Paris 2, **Paris** ESSEC Business School, **Paris** Emlyon business school, **Lyon** *Number of programmes in the ranking* - 10
Industrial and Operations Management	Emlyon business school, **Lyon** Université Paris-Dauphine - Paris 9, **Paris** KEDGE Business School Toulon, **Toulon** *Number of programmes in the ranking* - 4`
Innovation and Project Management	Emlyon business school, **Lyon** HEC Paris, **Paris** ESSEC Business School, **Paris** *Number of programmes in the ranking* - 11
International Management	ESSEC Business School, **Paris** HEC Paris, **Paris** ESCP Europe, **Paris** *Number of programmes in the ranking* - 12
Management	Université Paris-Dauphine - Paris 9, **Paris** Université Paris 1 Panthéon-Sorbonne, **Paris** KEDGE Business School Toulon, **Toulon** *Number of programmes in the ranking* – 3
Data Analytics	TELECOM ParisTech, **Paris** Grenoble Ecole de Management, **Grenoble** Université Lumière Lyon 2, **Lyon** *Number of programmes in the ranking* - 7
Information Systems Management	Université Paris-Dauphine - Paris 9, **Paris** ESSEC Business School, **Paris** Grenoble Ecole de Management, **Grenoble** *Number of programmes in the ranking* - 4

Programme	University
Public Administration	SciencesPo Paris, **Paris** Université Paris 1 Panthéon-Sorbonne, **Paris** Ecole de Management de Normandie, **Cannes** *Number of programmes in the ranking* - 7
Number of programmes in the ranking	*105*
Incl. Top 3	*39*
Number / per cent of them in Paris out of Top 3	*24/61,5*
Number / per cent of them in Paris out of the ranking	*24/22,8*

[a] Worked out by the authors according to: Eduniversal best Masters ranking in France, http://www.best-masters.com/ranking-master-in-france.html

39 out of 105 French master's programmes are in Top 3 Eduniversal ranking, 24 of them are being implemented in Paris. The proportion of top-rated programmes of the metropolitan universities amounts to 61.5 per cent of Top 3 programmes, or 22.8 per cent of all programmes included in the ranking. 15 programmes (38.5 per cent) are implemented by universities of the largest French cities: Lyon, Grenoble, Marseille, Toulon, as well as of smaller ones - Clermont-Ferrand, Cannes.

TABLE II. GEOGRAPHIC DISTRIBUTION OF THE TOP 3 MASTER'S PROGRAMS IN THE EDUNIVERSAL BEST MASTERS RANKING IN GERMANY IN THE 2018/2019 ACADEMIC YEAR[a]

Programme	University
Accounting	WHU – Otto Beisheim School of Management, **Vallendar** School of Finance & Management, **Frankfurt am Main** Reutlingen University, **Reutlingen** *Number of programmes in the ranking* - 3
Corporate Finance	Goethe Universität Frankfurt Am Main, **Frankfurt am Main** Frankfurt School of Finance and Management, **Frankfurt am Main** HHL Leipzig Graduate School of Management, **Leipzig** *Number of programmes in the ranking* - 3
Communications	University of Mannheim, **Mannheim** LMU München, **München** FH Pforzheim University, **Pforzheim** *Number of programmes in the ranking* - 3
Marketing	Absent in the ranking
Energy and Natural Resources	Frankfurt School of Finance & Management, **Frankfurt am Main** TU München - School of Forest Science and Resource Management, **München** Humboldt-Universität zu Berlin, **Berlin** *Number of programmes in the ranking* - 9
International Business Law	University of Mannheim - School of Law and Economics, **Mannheim** WHU – Otto Beisheim School of Management, **Vallendar** Frankfurt School of Finance & Management, **Frankfurt am Main** *Number of programmes in the ranking* - 4
Industrial and Operations Management	Reutlingen University, **Reutlingen** Rwth Aachen University Fakultät Für Wirtschaftswissenschaften, **Aachen** FH München University, **München** *Number of programmes in the ranking* - 3

Programme	University
Innovation and Project Management	EBS Universität - Business School, **Estrich-Winkel** *Number of programmes in the ranking* - 1
International Management	WHU – Otto Beisheim School of Management, **Vallendar** University of Cologne - Faculty of **Management**, Economics and Social Sciences, Cologne Reutlingen University - ESB Business School, **Reutlingen** *Number of programmes in the ranking* - 4
Management	EBS Universität - Business School, **Wiesbaden** University of Mannheim, **Mannheim** Frankfurt School of Finance & Management, **Frankfurt am Main** *Number of programmes in the ranking* - 7
Data Analytics	Frankfurt School of Finance & Management, **Frankfurt am Main** Technical University of München, **München** *Number of programmes in the ranking* - 2
Information Systems Management	University of Mannheim, **Mannheim** FH Pforzheim University, **Pforzheim** University of Cologne - Faculty of Management, Economics and Social Sciences, **Cologne** *Number of programmes in the ranking* - 6
Public Administration	Freie Universität (FU) Berlin, **Berlin** University of Münster, **Münster** Universität Freiburg - Faculty of Economics and Behavioral Sciences, **Freiburg** *Number of programmes in the ranking* - 5
Number of programmes in the ranking	*50*
Incl. Top 3	*33*
Number / per cent of them in Berlin out of Top 3	*2/6,1*
Number / per cent of them in Berlin out of the ranking	*2/4,0*

^a worked out by the authors according to: Eduniversal best Masters ranking in Germany- http://www.best-masters.com/ranking-master-in-germany.html

The uniformity as a principle of geographic organization of university networks in the continental model is the same in Germany. 33 out of 50 German master's programmes are in Top 3 Eduniversal ranking, only 2 of them are being implemented in Berlin (or 6.1 per cent of Top 3 programmes; 4.0 per cent of all programmes included in the ranking). In this country, universities are mainly located not only in large industrial cities, but also in smaller urban areas – traditional and new university centres of the country.

The geographic distribution of Top 3 master's programmes reveals their equal distribution throughout the UK – the country of the Anglo-Saxon model (see Table III).

TABLE III. GEOGRAPHIC DISTRIBUTION OF THE TOP 3 MASTER'S PROGRAMS IN THE EDUNIVERSAL BEST MASTERS RANKING IN THE UK IN THE 2018/2019 ACADEMIC YEAR ^A

Programme	University
Accounting	LSE - London School of Economics and Political Science, **London** Warwick Business School - University of Warwick,
	Warwick Alliance Manchester Business School - The University of Manchester, **Manchester** *Number of programmes in the ranking* -14
Corporate Finance	London Business School, **London** LSE - London School of Economics and Political Science, **London** University of Cambridge, **Cambridge** Judge Business School, **Cambridge** *Number of programmes in the ranking* - 11
Communications	LSE - London School of Economics and Political Science, **London** The University of Manchester, **Manchester** Imperial College London, **London** *Number of programmes in the ranking* -11
Marketing	Warwick Business School - University of Warwick, **Warwick** Alliance Manchester Business School - The University of Manchester, **Manchester** Cranfield School of Management, **Cranfield** *Number of programmes in the ranking* - 8
Energy and Natural Resources	University of Oxford, **Oxford** University of Edinburgh, **Edinburgh** Cranfield University, **Cranfield** *Number of programmes in the ranking* -17
International Business Law	University of Oxford, **Oxford** University of Cambridge, **Cambridge** LSE - London School of Economics and Political Science, **London** *Number of programmes in the ranking* - 6
Industrial and Operations Management	University of Warwick, Warwick Aston University, **Birmingham** The University of Nottingham, **Nottingham** *Number of programmes in the ranking* - 5
Innovation and Project Management	Imperial College London - Dyson School of Design Engineering, **London** Lancaster University, **Lancaster** University of Bath School of Management, **Bath** *Number of programmes in the ranking* - 5
International Management	London Business School, **London** LSE - London School of Economics and Political Science, **London** Warwick Business School - University of Warwick, **Warwick** *Number of programmes in the ranking* - 14
Management	London Business School, **London** University of Oxford, **Oxford** LSE - London School of Economics and Political Science, **London** *Number of programmes in the ranking* - 9
Data Analytics	University of Warwick, **Warwick** Imperial College London, **London** Aston University, **Birmingham** *Number of programmes in the ranking* - 11
Information Systems Management	LSE - London School of Economics and Political Science, **London** Warwick Business School - University of Warwick, **Warwick** Aston Business School Birmingham, **Birmingham** *Number of programmes in the ranking* - 8
Public Administration	LSE - London School of Economics and Political Science, **London** University of Oxford, Blavatnik School of government, Science The University of Manchester – School of environment, education and development, **Manchester**

Programme	University	
	Number of programmes in the ranking - 28	
Number of programmes in the ranking		*147*
Incl. Top 3		*39*
Number / per cent of them in London out of Top 3		*14/35,9*
Number / per cent of them in London out of the ranking		*14/9,5*

[a] worked out by the authors according to: Eduniversal best Masters ranking in the United Kingdom: http://www.best-masters.com/ranking-master-in-united-kingdom.html

39 out of 147 British master's programmes belong to Top 3 in the ranking while 14 of them are implemented in London. Thus, the proportion of top-rated programmes of London universities amounts to 35.9 per cent of Top 3 level, or 9.5 per cent of all programmes in the ranking. Thus, 64.1 per cent 25 master's programmes are implemented outside the capital city. The presented distribution reflects high quality of higher education not only in the capital city and historically established and globally well-known university centres, but also in the urban areas of national importance.

IV. RESULTS

The practical significance of the European experience analysis in the geographic distribution of university networks consists in its comparison with the geographic distribution of top-rated master's programmes in Russia. Such a comparison reveals substantive differences in the geographic distribution of universities in the European countries and Russia and could be used for grounding the prospects for improving spatial organization of the Russian university network (see Table IV).

The analysis reveals that 32 programmes out of 45 master's programmes in the Eduniversal ranking are among Top 3. The proportion of programmes being implemented in Moscow amounts to 65.6 per cent (21 programmes). Outside the capital city, the rest 11 top-rated programmes are implemented in St Petersburg, the second largest city in Russia, in Kazan and Ekaterinburg – Russian industrial centres. Obviously, these four cities of Top 3 master's programmes are indicative of the greatest concentration of the university network and disparities in its geographic distribution.

TABLE VI. GEOGRAPHIC DISTRIBUTION OF THE TOP 3 MASTER'S PROGRAMS IN THE EDUNIVERSAL BEST MASTERS RANKING IN RUSSIA IN THE 2018/2019 ACADEMIC YEAR [a]

Programme	University
Accounting	Kazan Federal University Higher School of Business, **Kazan** *Number of programmes in the ranking* - 1
Corporate Finance	St. Petersburg University, **St. Petersburg** The Russian Presidential Academy of National Economy and Public Administration, **Moscow** Plekhanov Russian University of Economics - International Business School (IBS Plekhanov), **Moscow** *Number of programmes in the ranking* - 6
Communications	St. Petersburg University, **St. Petersburg** The Russian Presidential Academy of National Economy and Public Administration, **Moscow** Lomonosov Moscow State University - Faculty of Philosophy, **Moscow** *Number of programmes in the ranking* - 3
Marketing	The Russian Presidential Academy of National Economy and Public Administration, **Moscow** National Research University Higher School of Economics - Faculty of Business and Management (BM HSE), **Moscow** Moscow International Higher Business School MIRBIS (Institute), **Moscow** *Number of programmes in the ranking* - 4
Energy and Natural Resources	Business School of Ural Federal University named after the first President of Russia B.N. Yeltsin, **Ekaterinburg** *Number of programmes in the ranking* - 1
International Business Law	The Russian Presidential Academy of National Economy and Public Administration, **Moscow** St. Petersburg University, **St. Petersburg** *Number of programmes in the ranking* - 2
Industrial and Operations Management	St. Petersburg University, **St. Petersburg** International Higher Business School MIRBIS (Institute), **Moscow** The Russian Presidential Academy of National Economy and Public Administration, **Moscow** *Number of programmes in the ranking* - 4
Innovation and Project Management	The Russian Presidential Academy of National Economy and Public Administration, **Moscow** National Research University Higher School of Economics - Faculty of Business and Management (BM HSE), **Moscow** International Higher Business School MIRBIS (Institute), **Moscow** *Number of programmes in the ranking* - 5
International Management	Graduate School of Management, St. Petersburg University, **St. Petersburg** The Russian Presidential Academy of National Economy and Public Administration, **Moscow** Plekhanov Russian University of Economics - International Business School (IBS Plekhanov), **Moscow** *Number of programmes in the ranking* - 4
Management	Graduate School of Management, St. Petersburg University, **St. Petersburg** The Russian Presidential Academy of National Economy and Public Administration, **Moscow** National Research University Higher School of Economics - Faculty of Business and Management (BM HSE), **Moscow** *Number of programmes in the ranking* - 6
Data Analytics	Lomonosov Moscow State University, **Moscow** National Research University Higher School of Economics (BM HSE), **Moscow** Business School of Ural Federal University named after the first President of Russia B.N.Yeltsin, **Ekaterinburg** *Number of programmes in the ranking* - 4
Information Systems Management	Lomonosov Moscow State University Business School, **Moscow** Graduate School of Management, St. Petersburg University, **St. Petersburg** *Number of programmes in the ranking* - 2
Public Administration	St. Petersburg University, **St. Petersburg** The Russian Presidential Academy of National Economy and Public Administration, **Moscow** Lomonosov Moscow State University, **Moscow** *Number of programmes in the ranking* - 3

Programme	University	
Number of programmes in the ranking		*45*
Incl. Top 3		*32*
Number / per cent of them in Moscow out of Top 3		*21/65,6*
Number / per cent of them in Moscow out of the ranking		*21/46,7*

ª worked out by the authors according to Eduniversal best Masters ranking in Russia: http://www.best-masters.com/ranking-master-in-russia.html

V. CONCLUSION

The European case-study revealed the uniformity in the geographic distribution of top ranked master's programmes throughout all countries of different educational models. Theoretical relevance of the research is in the validation of the hypothesis on the convergence of higher education models. Being a common feature for both models, such uniformity points to the need for improving spatial organization of the Russian university network. The most concentration of Top 3 master's programmes in Moscow and insignificant number of those in St Petersburg, Kazan and Ekaterinburg reveals an excessive concentration of universities in the capital region, in a small number of largest agglomerations. Such a geographic distribution does not fully correspond with the needs of regional well-balanced sustainable development through the efficient geographic distribution of economic resources.

Based on the European experience, in order to improve the geographic organization of the Russian university network, it is necessary to broaden the 'geography of economic growth' through:

- university cooperation with business and regional governments based on triple helix model and its initiative realization. This direction is guaranteed by the plan of launching 15 world-class research and educational centres, competence centres of economic growth [1];

- priority state support of universities enabling the development of high-tech and knowledge-based industries;

- national and regional technological initiative provided by universities, the creation of research and technology centres as elements of the innovative infrastructure of the Russian subjects;

- strategic planning of the university network development within large and largest urban agglomerations, small and medium-sized urban areas, rural territories.

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