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UNIVERSITY CLASSIFICATION: CRITERIA, FEATURES, MODELS

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The subject of study is University. The aim is to analyze the existing most common classifications of the University and develop a model of its genetic typology. The method is based on a categorical-system approach using the categorical method «A Number of Information Criteria» (AIC). This article discusses the problems of classification of universities caused by imperfection of methodology. The paper gives a brief overview of the most common classifications of the University, found in the works of Russian and foreign researchers, studied in detail the most representative of them. The article also critically analyzes the concepts used by researchers to classify universities. The paper examines the classification criteria underlying the systematization of universities. It is shown that none of the existing classifications is correct and justified, does not reflect the system of universities and does not allow to cover all their existing types. The article also substantiates the application of the categorical-system approach as a methodology for systematization of the species diversity of universities. The paper proposes the application of a categorical-system approach using the categorical method «A Number of Information Criteria» as a methodology for systematization of the species diversity of universities, on the basis of which the genetic typology of universities is developed. The article considers a number of information criteria reflecting the basic processes, the carriers of which are structural units (components) of the University, such as production, provision, service, consumption, research, export, self-education. A model of genetic typology of the University was developed. It is concluded that after the formation of new and more complex characteristics of a system object, such as a University, its systemic and organizational complexity increases. The obtained model of genetic topology of the University serves as a basis for the development of conceptual, structural, functional, target and evolutionary aspects of the subject area under study, as well as contribute to the development of the scientific theory of the University.

Keywords: university, classification of university, genetic typology of universities, classification criteria, categorical method of a number of information criteria

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КЛАССИФИКАЦИЯ УНИВЕРСИТЕТОВ: КРИТЕРИИ, ПРИЗНАКИ, МОДЕЛИ

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Предмет исследования – университет. Цель – анализ существующих наиболее распространенных классификаций университета и разработка модели его генетической типологии. Метод – категориально-системного подхода с использованием категориального метода «Ряд

информационных критериев» (РИК). Рассматриваются проблемы классификации университетов, обусловленные несовершенством методологии. Дан краткий обзор наиболее распространенных классификаций университета, встречающихся в работах российских и зарубежных исследователей, детально изучены наиболее представительные из них. Критически проанализированы основания, применяемые исследователями для классификации университетов. Изучены классификационные критерии, используемые при систематизации университетов. Показано, что ни одна из существующих классификаций является корректной и обоснованной, так как не отражает природу университета, его целевую функцию, универсальный элементный состав, структуру, качественные характеристики и закономерности развития. Обосновано применение категориально-системного подхода в качестве методологии систематизации видового разнообразия университетов. Предложено применение категориально-системного подхода с использованием категориального метода «Ряд информационных критериев» в качестве методологии систематизации видового разнообразия университетов, на базе которого разработана генетическая типология университетов. Рассмотрен ряд информационных критериев, отражающих базовые процессы, носителями которых являются структурные подразделения (компоненты) университета, такие как производство, обеспечение, обслуживание, потребление, исследование, экспорт, самообучение. Разработана модель генетической типологии университета, в основе которой лежит теория выделения двухкомпонентного системообразующего ядра в рамках категориально-системного подхода с использованием категориального метода «Ряд информационных критериев». Данная модель характеризует последовательное развитие университета, то есть увеличение его системной и организационной сложности путем обретения им новой качественной характеристики. Сделан вывод, что по мере формирования новых, более сложных характеристик системного объекта, такого как университет, его системная и организационная сложность возрастает. Полученная модель генетической топологии университета служит базой для разработки понятийного, структурного, функционального, целевого и эволюционного аспектов исследуемой предметной области, а также способствуют развитию научной теории университета.

Ключевые слова: университет, классификация университетов, генетическая типология университетов, классификационные критерии, категориальный метод ряда информационных критериев

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Introduction. In the conditions of changing socio-economic epochs and the formation of the knowledge economy based on the production of human capital, universities as institutions of higher education have become quite popular objects of research in the scientific community. The economic system is currently undergoing fundamental changes both in the structure of the economy itself and in its institutions, associated with the strengthening of the role of knowledge and intellectual capital [1-3]. The main reason for the increased attention to the development of higher education is the transition to

the knowledge economy, leading to the transformation of the forms of universities.

Historical experience shows that the content, structure, organization and functions of the education system are constantly changing under the influence of external impulses [4, 5]. On the one hand, this is due to the increasing role of higher education institutions in the development of the economy and society, on the other – due to the lack of development of their concept in the new economy.

One of the problematic elements of the scientific theory of the formation and development of

Universities is the systematization of their varieties. The complexity of the structure, the diversity of its activities (educational, scientific, innovative) leads to the emergence of different forms and types of universities. In this regard, a wide variety of approaches and classifications based on them have been proposed. Modern classifications of universities do not fully reflect the essence of the University as a system object, its similarities and differences from other forms of socio-economic entities, component composition and stages of its formation and development.

Thus, the diversity of topologies of universities leads to the fact that the question of systematization of varieties of Universities in the economy remains uncertain. In this regard, the urgent task is to find and apply such a methodological approach to the systematization of varieties of Universities, which would describe the existing characteristics, forms and functions of universities, as well as new varieties that appear in accordance with the trends in the development of the economic system and subsystem of higher education. The significance of the task is determined by the fact that the state policy of higher education in general, and universities in particular, should be effective in accordance with the type, form and level of development of the University [6–9].

The solution of the problem of systematization of varieties of universities in this study is depend on a critical analysis of the existing classifications in the modern economic literature, as well as the search for a methodological approach to their universal systematization, based on the ideas formed at the previous stage of the study about their essence and their composition [10].

Purpose. The main purpose of the article is to analyze the existing most common classifications of the University and to develop a model of its genetic typology using the categorical method «A Number of Information Criteria» (AIC) in the framework of the categorical-system approach.

Review of current classifications of Universities. The review of modern researches of University has shown that the most widespread classifications of universities are the following (Tab. 1).

The most representative are the classifications of Universities developed by Kuzminov Y.I. and Titova N.L.

In the works of Kuzminov Y. I. there are four naturally occurring types of Universities that make up the system of higher education today [12]:

1. Research type – national leaders focused on attracting talented youth from all over the country, whose effectiveness is based on existing or newly emerged research base.

2. Infrastructure type – Universities that provide training for the needs of the regions in such areas as education, health, trade, housing and communal service, transport without large-scale research activities.

3. Sector type – industry Universities that produce personnel for a specific labor market.

4. Actual general higher education type – Universities provide access to education to all segments of the population and their main function is to «socialize» in the absence of a scientific component.

Titova N.L., proposes to group Universities by their ability to adapt to the external environment. The author proposes to consider such basic characteristics as indicators of the level of resource provision of the educational process, the degree of financial performance, the intensity of the use of non-core activities, the scale of quantitative growth [17]. Depending on these characteristics Titova N.L. distinguishes the following types of universities:

- «Leaders» – the type corresponding to harmonious development in several directions;
- «Accumulators of material and human resources» – type of intensive development carried out at the expense of capitalization of financial resources and their investment in personnel and material base;
- «Accumulator of financial resources» – type of intensive development aimed at maximizing the financial results of core activities;
- «Diversifiers» – a type of behavior in which non-core activities predominate;
- «Expansionists» – type of development with rapid quantitative growth of the main activity (number of divisions, specialties, volume of admission, etc.);

Table 1

Classification of Universities

Classification parameter	Allocated types	Authors
Branch affiliation	<ul style="list-style-type: none"> -classical (research in the field of natural Sciences and Humanities); -technical; -technological; -agricultural; -medical; -pedagogical; -other (artistic, musical, etc.) 	Ushakov G.A. Shuruev A.S [11]
Personnel needs of the economy	<ul style="list-style-type: none"> -research; -infrastructural; -sector; -actual general higher education 	Kuzminov Y.I. et al. [12]
Geography (radius) of influence	<ul style="list-style-type: none"> -local; -regional; -national; - global 	Vashurina E.V. et al. [13]
Size (number of teachers and students)	<ul style="list-style-type: none"> -very small; -small; -medium; -large; -very large 	Carnegie E. [14]
	<ul style="list-style-type: none"> -large; -medium; -small 	Bernardo A. [15]
Organizational structure	<ul style="list-style-type: none"> -project-oriented, -entrepreneurial, -network, etc. 	Konstantinova A.V. [16]
Strategy of adaptation to environmental changes	<ul style="list-style-type: none"> -«Leaders»; -«Accumulators of material and human resources»; -«Accumulator of financial resources»; -«Diversifiers»; -«Expansionists»; -«Conservatives»; -«Outsiders» 	Titova N.L. [17]
Type of economic model	<ul style="list-style-type: none"> -«State employee»; -«Selling»; -«Budget diversified universities»; -«Diversifiers» 	Abankina I. V. [18]
	<ul style="list-style-type: none"> -state; -private commercial; -non-profit private 	Ivanov, S. S. [19]
Functionality	<ul style="list-style-type: none"> -«University as a temple of wisdom»; -«The University as a training camp for the professions»; -«University as a social service station»; -«The University as an Assembly line for the creation of man» 	Wolf R. [20]
	<ul style="list-style-type: none"> -«University-researcher»; -«University-system integrator»; -«University-regional integrator»; -«University-personnel designer» 	Knyazev E. A., Drantusova N. V. [21]

- «Conservatives» – a type of development that does not lead to significant progress in any areas;
- «Outsiders» – the type corresponding to lagging behind other objects in most areas of development.

All the above approaches to University classification are attempts to systematize universities identified and described by researchers. However, they are contradictory and generally do not contribute to a deeper understanding of the phenomenon of the University in Economics. This is due to the fact that they poorly reflect the nature of the University, its target function, universal elemental composition, structure, qualitative characteristics and patterns of development. It is also unclear how all these types and forms of Universities relate to each other. In addition, the considered classifications of universities do not identify the instruments of state support for a certain type of University at a certain stage of development, and therefore are not relevant in the development of strategies for the development of economic spheres and regions.

Research methods. To solve the problem of typologization of Universities, a categorical-system methodological platform was applied using the categorical method «A Number of Information Criteria» (AIC) [22]. This method allows to systematize both manifested in the environment and hypothetical varieties of the object.

The categorical AIC method is based on the concept of information criteria describing the qualitative characteristics of the system object, located in a certain sequence. Each subsequent qualitative characteristic reflects the greater consistency of the object compared to the previous one [22]. This method allows us to develop a typology based on the fact that the University is a system object that develops, changes its organizational and systemic complexity.

AIC method is implemented in the following sequence: first, the selection in the object basic quality characteristics; secondly, identifying the logic of the appearance of the object selected quality characteristics; thirdly, the formation of the qualitative model of the object.

Research Result. A critical analysis of the classification criteria used in the systematization of universities has led to the conclusion that the current classifications of universities do not reflect their system and do not allow to cover all their existing types. This is due to the fact that universities are characterized by a large number of functions and processes that can not be reflected in the elemental composition and structure of universities, which are also very complex. The classification criteria proposed by the authors of the classifications do not allow to classify universities unambiguously. In our opinion, the most complete and qualitative taxonomic aspect in the study of universities can be reflected in their typology.

The University is a system object in which several activities are concentrated, which indicates its intersectoral nature, and the implementation of the function of training for various sectors of the economy. This circumstance leads to the fact that the application of such classification criteria as «industry affiliation» and «personnel needs of the economy» is not completely incorrect and does not allow to classify complex intersectoral structures.

The division of universities by geography (radius) of influence is also impractical due to the fact that the structural feature of the University is the following: all units tend to be located in one place, so spatial localization is a universal feature of the University. In this regard, this characteristic is characteristic of any type of University and it is also inappropriate to apply it as a classification criterion. Classifications, based on the geographical factor, are relevant, while it is necessary to determine for them the nature of state support (federal, regional), but do not reflect the essence of the University as an object of economy.

The parameter «size (number of teachers and students)» is also difficult to apply due to the fuzziness and high mobility of the boundaries of the concept of «University».

Interactions between the participants of the structural units of the University are quite complex, so we can consider the allocation of universities on the classification parameter «organizational structure» incorrect.

The criterion «strategy of adaptation to changes in the external environment» evaluates the University on a limited set of basic characteristics that do not fully reflect the real potential of the University.

It is also difficult to separate universities according to the criteria of «type of economic model» and «functional purpose».

In modern Russian science there is no clear separation of the concepts of «University» and «Institution». Therefore, in the current study of University classifications, these concepts were accepted as identical.

Thus, modern scientific theory, solving the problem of classifying universities, does not consider them as objects with uniform qualitative parameters, but at the same time characterized by a variety of forms.

Categorical approach to the systematization of varieties of universities. Representation of the University as system objects assumes allocation at it of the structural components reflecting its essential characteristics. On the basis of them typologization of all variety of forms of universities can be realized. The University implements a number of internal functions, such as production, provision, service, consumption, research, export, training, in order to perform its main function, namely, the production (training) of personnel, ensuring sustainable progressive

development of society. These functions appear in the process of its development in a certain sequence.

Thus, a number of elementary qualitative characteristics of the University –internal functions – in the AIC method is represented by the processes reflected by the following information criteria [20]

- K1 production;
- K2 support;
- K3 service;
- K4 consumption;
- K5 examination;
- K6 export;
- K7 self-study;
- K8 university.

These processes are implemented by structural elements of the University –departments.

The above sequence of elementary characteristics (and processes) reflects the logic of progressive development of the University, accompanied by an increase in systemic and organizational complexity.

The parameter «two-component (two-process) kernel» acts as a typologization criterion. The application of this criterion allows us to distinguish many different types and forms of the University and arrange them in a certain way. This typology of universities is genetic in nature, as it reflects its evolutionary aspects (Fig. 1).

						8university 7self-study 6экспорт
					8university 6export 5examination	8university 7self-study 5examination
				8university 5examination 4consumption	8university 6export 4consumption	8university 7self-study 4consumption
			8university 4consumption 3service	8university 5examination 3service	8university 6export 3service	8university 7self-study 3service
		8university 3service 2support	8university 4consumption 2support	8university 5examination 2support	8university 6export 2support	8university 7self-study 2support
	8university 2support 1production	8university 3service 1production	8university 4consumption 1production	8university 5examination 1production	8university 6export 1production	8university 7 self-study 1production
8university 1production 0	8university 2support 0	8university 3service 0	8university 4consumption 0	8university 5examination 0	8university 6export 0	8university 7self-study 0

Fig. 1. Genetic typology of the University

Each of the horizontal and vertical levels in the scheme is represented by a set of cells consisting of two-component nuclei, in which one of the core-forming components is constant, and the second is consistently changing in accordance with the list of activities of the University. As a permanent component, there is the following, more complex type of activity, denoted by an information criterion of a higher order. This approach characterizes the consistent development of the University, that is, increasing its systemic and organizational complexity by acquiring a new qualitative characteristic.

In the presented genetic typology, all types of University reflected by a horizontal row, part of the nucleus have components designated by information criteria from K1 to K6, and vertical—from K2 to K7. The lower topological level is represented by a University implementing one type of activity (K810-870).

- K810 – «University of producers». University only with divisions-producers (excluding other participants);
- K820 – «University of suppliers». University only with departments-suppliers (excluding other participants);
- K830 – «University serving». University only with serving divisions (excluding other participants);
- K840 – «University of consumers». University only with divisions-consumers (excluding other participants);
- K850 – «Research University». University only with research units (excluding other participants);
- K860 – «Export University». University only with export divisions (excluding other participants);
- K870 – «Self-study University». University only with units responsible for self-study (excluding other participants).

These types of University can be interpreted as Universities that have the opportunity to develop into a full-fledged University.

The next level of topology is represented by Universities operating on the basis of a two-component core consisting of production as a constant component in combination with a variable component (K821-K871):

- K821 – units-producers/units-suppliers;
- K831 – units-producers/service units;

- K841 – divisions-producers/divisions-consumers;
- K851 – producers units / research units;
- K861 – units-producers/export units;
- K871 – producers units/units responsible for self-study.

The third level of the scheme characterizes the types of University with a core in which a permanent component is the provision of the production process. The variable component participates according to the list of activities (K832-K872).

The typology cells located in the upper part of the diagram (Figure 1), as the core in which the most complex activities are implemented, such as research and export activities, self-study activities, corresponds to the University with the highest development. A University with complex activities as a core component is characterized by a higher level of systemic and organizational complexity compared to a University based on simpler activities.

All options for the formation of the core of the University are defined by the list of basic processes implemented at the University and recorded by the AIC.

Two-component University core does not imply the absence of processes outside the core. In addition, all processes reflected by information criteria of a lower order than the corresponding core components are necessarily present in the University system. Но с точки зрения назначения университета, его роли во внешней среде эти процессы и компоненты, их реализующие, играют подчиненную по отношению к ядру роль. Two-component University core does not imply the absence of processes outside the core. In addition, all processes reflected by information criteria of a lower order than the corresponding core components are necessarily present in the University system. In terms of the purpose of the University, processes and components that implement its role in the external environment, play a subordinate role in relation to the core. It is the components of the core in the University of the corresponding type that determine the purpose of its development, the principles of combining departments into the University, the mechanisms of its interaction with the environment. The competitiveness of the University in these specific conditions depends on the composition and level of development of the core.

Thus, the components that are not part of the core of the University do not determine the goals and trajectories of development. For example, the University K851 production / research is characterized by active interaction of production units with research units engaged in scientific activities. The supply and service units at the University play a significant but not a leading role. Its competitiveness and prospects for progressive development determine the interaction between producers and researchers.

On the other hand, the logic of the genetic topology of the University does not exclude processes reflected by information criteria of a higher order compared to the corresponding components of the core. However, as practice shows, they are fragmentary and in the structure of the University are one of the types of infrastructure elements.

The developed typology of universities has the following advantages. Firstly, all the types and forms of Universities described in the scientific literature can be qualified as a specific type and form within a given typology. Secondly, the allocated types and forms which do not have the corresponding description in the special literature, allow to carry out their purposeful search in the economic environment, and also their purposeful creation. Thirdly, a reasonable disposition of species and forms of universities includes both static and dynamic aspects, and allows to identify possible trajectories of their development and ensure it in the right direction.

Conclusion. The study showed the following results:

1. The imperfection of the modern methodology of systematization of varieties of universities leads to

problems in their classification as systemic objects in the economy.

2. The classification criteria of universities used in their systematization in the works of domestic and international researchers do not reflect the nature of the University, (target function, universal elemental composition, structure, qualitative characteristics and patterns of development).

3. The study of such a phenomenon as a University, the process of its origin, functioning and evolution, can be carried out on the basis of the developed model of genetic topology of Universities, based on the theory of allocation of two-component system-forming core within the categorical-system approach using the categorical method «A Number of Information Criteria» (AIC).

4. The developed model of genetic topology of the University allows not only to organize the types and forms of the University and study its organizational structure, but also to track the emergence of new functions, processes, structural components, which is a sign of the emergence of new species and forms of the University.

Direction of further research. The obtained model of genetic typology of the University using the categorical method «A Number of Information Criteria» (AIC) within the framework of the categorical-system approach serves as a basis for the development of conceptual, structural, functional, target and evolutionary aspects of the subject area under study.

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СПИСОК ЛИТЕРАТУРЫ

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