

# Resources and competencies as major determinants of university models 4.0

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**Abstract.** The article considers the concept of resources and competences in the context of the transition of universities to a new generation model - "University 4.0." Based on an analysis of the historical variability of university models, it is justified that resources and competencies act as the main determinants of the 4.0 university model in the modern realities of higher education. The analysis of sources claims that the movement from University 1.0 to University 4.0 increases the level of "transition" of talent and knowledge. In this way, the authors reach to the concept of "resources," as supra-competent determinants of the growth of the university. Based on the analysis of the global challenges of the modern world, the need to distinguish the spiritual mission of universities as important actors in the development of modern society is justified. Is presented the model of the University of the Fourth Generation, developed by Al-Farabi KazNU.

## 1 Introduction

In recent years, the competency approach has been defined as a methodological benchmark for modernizing modern education, defining new methods and technologies of education that contribute to the development of independence, initiative, creativity, critical thinking among students, guiding them to a specific effective result.

The concepts of "competency" and "competence" began to spread actively in the mid-1960s. Works of foreign authors: V. Hutmacher, N. Chomsky, J. Raven, T. Hoffmann, J. Delora, M. Draycott, D.Rae who are psychologists, teachers and political figures, acted as the basis for the development of the competent approach in education [1].

Among the Russian researchers who consider in their works the competent approach in various types of activities, it is possible to distinguish authors: Y.G. Tatur, I. A. Zymnaya, V.I. Baidenko, A.Kasprzhak, N.S. Saharov, A.V. Khutorsky, V. Landsheer, A.K.Markova, M.A. Kholodnaya, and V.I. Zagvyazinsky [2]. The relationship between the competency approach and organizational management models was first reflected in the work "Testing for Competence Rather Than Intelligence" by American Professor of Psychology at Harvard University David McClelland in 1973. The authors translate the title of the article into Russian in different ways, so, for example, options were proposed: "Testing: competences

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against intelligence," Testing for competence, not intelligence, "Testing competence, not intelligence," Measuring competence against measuring intelligence" [3].

The content of the competency approach and the problems encountered in its implementation are widely reported in the modern literature. It is understood that the emergence of the competency approach is a natural step that reflects the response of society to the emerging new requirements for the quality of education. In many countries, there is an interest in research, in which the competences of graduates of pedagogical universities are discussed and the quality of work of teachers is assessed.

In doing so, particular attention is given to research aimed not on vocational training but on the work of teachers in the classroom [4, 5].

There is some interest in studies that address the competencies of future managers, focal points or other leadership positions. There are regular surveys of students in teaching courses who often have no experience as a teacher [6, 7, and 8]. In most cases, all these studies are qualitative. Note that the orientation to test practical skills rather than test knowledge checks is typical in the requirements for teacher positions in Brazil, Great Britain, Australia, South Korea, and USA [9, 10, and 11].

The purpose of the article is to show the mutual condition of resources and competences through analysis of historical variability of university models, to prove that resources and competences act as the main determinants of the university 4.0 model in modern realities of higher education.

Objectives of the article:

- Analysis of four formats of the University model that were formed at different historical stages.
- Correlation of the evolution of universities and required competencies.
- Correlation of the evolution of universities, the necessary resources and the result of educational activities.
- Identifying the interdependence of resources and competencies by analyzing the historical variability of University models.
- Substantiation of the role of resources and competencies as the main determinants of the University 4.0 model in the modern realities of higher education.

## **2 Research methodology and methods**

The justification of the most promising format of the University in relation to changes in the required competencies and resources was carried out on the basis of a complex socio-philosophical methodology that combines system, activity and historical approaches, as well as General scientific methods of thinking (analysis, synthesis, induction, deduction, etc.) and cognition (comparison, comparison).

The concepts of the University and its social role that were formed by the beginning of the XIX century in Western European classical philosophy were further developed in sociology, mainly within the framework of system (system-organizational), stratification, institutional and functional approaches.

Classical theories and approaches to determining the role of universities in society draw attention to the traditional (classical) functions of universities, including:

- function of training and moral education;
- the function of science development through the implementation of scientific research and combining scientific fields of knowledge within the University's activities;
- the function of integrating the research community and involving students in joint research activities within the University;
- the function of cultivating the social layer of the intelligentsia to preserve the spiritual and ideological component of society;

- the function of selecting gifted and talented individuals in order to cultivate the social layer of the intelligentsia in order to preserve the spiritual component of society;
- the communicative function of the spiritual life;
- the function of meeting the educational needs of citizens in the conditions of democratization of society.

It is important to note that, as a reflection of political, social-economic and cultural conditions, the classical theories of universities approach the understanding of the social role and place of the University in a special way.

### **3 Competencies in the light of studying University models**

In the context of globalization, we have seen an intense evolution in the format of university activities, which, according to the established view of researchers, as "corporations of knowledge and competence" have gone a long way in the development of their missions.

The goal of the first generation universities (University 1.0) that emerged in the pre-industrial era was to educate a narrow circle of people through broadcasting cultural experiences of the past. From the beginning of the 19<sup>th</sup> century the formation of the second generation of universities (University of 2.0) began: in addition to educational, they realized the second goal - production of scientific knowledge through research. As is known, the most complete expression of unity of educational and research missions was received in V. Humboldt 's project "Universities litter arum" [12].

I.e. Historically, universities (so-called 1.0 universities) have engaged in knowledge broadcasting, training, and played the role of a social elevator. The first serious incentive to expand the functionality of universities was an order from the state and large business. In order to solve the tasks of the state, technological business turned to universities as centers for creating new knowledge. Universities began to carry out researches, generate new ideas, and gradually the connection between business and educational institution turned out to be so strong that it became difficult to distinguish what part of the activity takes place at the university and which - in business. That was university 2.0.

In the post-industrial era, the mission of universities of the third generation (University 3.0) becomes innovation and entrepreneurship, universities act as subjects of the economy of knowledge and commercialization of research [13]. In summary, university 3.0 is a new type of university that performs not only educational and research functions, but the function of integrator of the main processes within the innovation ecosystem: the university should actively participate in processes related to technological entrepreneurship, business development, and formation of new markets.

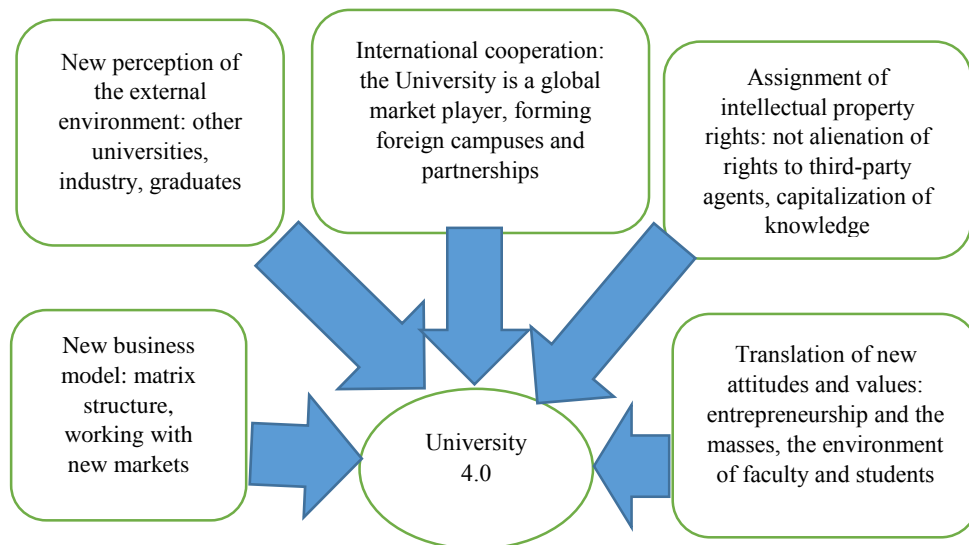
In the implementation of model 3.0, the axiological basis is the "competency model," especially in the early stages [14], as an attempt to reorganize the educational process. The trans-discipline as the complex instrument of knowledge and search of opportunities of pedagogical work with implicit knowledge [15] and understanding of the principles [16], including through a matrix of competences (knowledge, abilities, skills) develops. The educational process is increasingly produced through group (network) interaction - forms such as "inverted class" appear [17].

Today it is claimed that "University 4.0": the institution of society, which implements the function of a provider of knowledge about the future, it becomes the leader of the development of high-tech industries [13].

The tasks of the educational process in the conditions of transition to Model University 4.0 are "modern technologies in the educational process," interdisciplinary, "new competencies," project approach, "digital economy."

In addition, it is planned to include entrepreneurial competencies in the list of skills and knowledge due to the internationalization of the University (increasing the mobility of

teachers and students, developing international projects, etc.) (see Fig.1).



**Fig. 1.** The "University 4.0" format in terms of integration into new technology markets

As a result, the image of the University of Virtual, in which there are no people, there is a built technological matrix, on which information flows, and the person is dissolved in this matrix, comes to the agenda. Moreover, it is not fantastic. It already occurs. What do the world's universities do by creating online courses, MOOC, and building distance education, registering tens of millions of students? This is the matrix. There are no people. They do not have to think. They connect to this mega-machine, pay for the service and get a portion of the information. It is not good or bad. It is just the fact.

According to Kah Shengelia, President of the International Association of University Rectors, (USA) "Universities 4.0 should promote global awareness and competence in an increasingly interdependent world. Competitiveness, desire for partnership, ethics and evolution in modern society are four elements of fourth generation universities that serve to improve regional progress and global development" [18].

Some believe that the 4.0 model of the university should include, in addition to education, science and innovation, the formation of a creative environment. Others, as the fourth component, put forward resources and competencies to address unrealized industrial challenges [19].

The main product in the market of educational services of higher education in the implementation of the University 4.0 model is educational program [20].

It can be said that the evolution of the development of universities to the model "University 4.0", as a model of the return of universities to the economic and social development of society - is the evolution of educational programs (hereinafter EP). In these circumstances, education becomes a business process.

Parameters of evaluation and accreditation of educational activities are: number of enrolled at EP, quality of EP implementation, number of "practitioners" participating in EP implementation, number and level of employers for EP graduates, etc. Today the employer wants to see among his employee's specialists with not only professional competences and skills, but also the ability to work in the team, make decisions, and take responsibility. I.e. become the organization's primary resource.

**Table 1.** Correlating the evolution of universities and required competencies

University models	Axiological basis	Required competencies
Format 1.0 model: corporate University	"Cultural model" of intelligence, the criteria components of which were the Trinity: the culture of thinking, the culture of the profession, the culture of the University Corporation	Knowledge of your profession from the inside, specialized ritual practices; preparation for life and work; General cultural competence.
Format 2.0 University: research University	Academic model (knowledge of the classics in the original, ability to hypothetical-deductive thinking)	The ability to think, to make your own thinking the subject of your thinking; research and dialogue, the so-called "Socratic" communication; knowledge of the classics in the original and the ability to hypothetical-deductive thinking.
3.0 format University: technocratic (innovative) University	"Competence model" through the integration of three key categories - "Education", "Science" and "Business»	Basic components of competence: idea, technology, and capital. Competencies: the ability to integrate key processes within the innovation ecosystem; participate in processes related to technological entrepreneurship, business development, and the formation of new markets; and the ability to create startups.
University format 4.0: biodigital University	Multiple intelligence model (criteria are specified in the specified conditions)	Key categories of competence: "Creativity "(a person who acts as a Creator, Creator and Creator)," ecosystem "(the development and sometimes creation of Which will become one of the key educational goals), and" Business "(as a regulator of inter-institutional relations). Competencies: the ability to understand and solve global and local problems; creating a viable product, contributing to the development of the society's ecosystem

The university is also interested in having strong and successful business companies as its partners. This causes four main directions of interaction of the university with business: analysis of career growth of the graduate, information of the graduate about new products - educational programs, attraction of financial funds, and analysis of the need for new personnel. A graduate career analysis is necessary to understand the advancement of a university product. This is a kind of feedback that allows you to assess the quality of the university's work in providing the main service - educational.

Thus, "University 4.0" is able to exercise the function of capitalization of own knowledge as effectively as possible. At the same time, the requirements not only for knowledge, skills and skills, but also for the level of development of the individual, which determines the quality of human capital, are increased.

## 4 Important Role of Resources in the 4.0 University Model

Moving from University 1.0 to University 4.0 increases the level of "change" of talent and knowledge: more and more additional value is produced on the campus of the university, rather than transferred to the economy in the form of "semi-finished products": specialists

and general knowledge. Here it is possible to speak already about resources, as overcompetent determinants of university growth.

**Table 2.** Correlating the evolution of universities, necessary resources, and results

University models	Resources	Result
Format 1.0 model: corporate University	Rational theological doctrine and market relations	- Corporation of students and teachers. - Reproduction of the elite, which later has the levers of society management.
Format 2.0 University: research University	- Expanding the horizons of human thinking. - Life guidelines and eternal values laid down by the age of Enlightenment	- Link between the University and the state. - Quality of education measured at different levels. - Narrow specialist.
3.0 format University: technocratic (innovative) University	- Profile matching. - Group (network) interaction. - Breakthrough nature of the learning process.	- A combination of University, state, and production. - Crisis of classical science. - Providing conditions for student self-determination. - The phenomenon of "academic capitalism»
University format 4.0: biodigital University	The hidden potential of the human intellect	- Physical and virtual (cloud) existence of the University, network organization. Metaindividual students.

In this regard, the Global Citizenship EDUCATION program initiated by the United Nations, which involves the training and education of a young person as a member of a global society and a citizen of the world, has become very timely. On the basis of this program, KazNU as the Global Hub of the UN program "Academic Impact" on sustainable development and as a university bearing the name of the great Al-Farabi, developed its own model of the University of the next generation 4.0.

This model is based on the symbiosis of the development of a high-tech and spiritual-moral platform and combines the implementation of four missions: educational, research, innovation-entrepreneurial and spiritual-moral. The guide for the development of the model was the program of modernization of public consciousness "Ruhani zhangyru."

Based on the idea of Al-Farabi that "knowledge without upbringing, without moral beginning can bring harm, not benefit," a humanistic goal is invested in the fourth mission - formation of spiritual and moral values, attitudes and skills of responsible behavior in the young generation, education of citizens of the country and the world. The main parameters of the implementation of the University 4.0 model are the orientation of educational programs to achieve a high and harmonious level of combination of professionalism, intellectual, spirituality and morality; promoting the preservation of national identity and national cultural code as an integral part of human society; education of global citizenship and ethics of social responsibility of young people for the future of their country and humanity as a whole.

The Al-Farabi model of the University 4.0 developed by KazNU was presented in May 2018 at the UN Headquarters in New York City, where it was recognized as a civilized alternative to the global trends of dehumanization and moral self-destruction of the modern world and recommended for wide dissemination at the international level. This project has also received the support of the world community in Israel, Austria, Egypt, Russia, Belarus

and is becoming a promising model for the development of universities at the current stage, which meets world trends.

In designing the University 4.0 model, many key hypothetical provisions were laid down: an educational space in which 1,000 personal learning paths would be implemented simultaneously; extreme intensity, highest concentration of human capital; new educational formats; artificial intelligence, which provides recommendations for building development paths, contacts and command formation; digital profile of competences of each trainee; harmonization of scientific, educational, technological and humanitarian space of the university through implementation of educational and value projects [21,22].

One of the most important projects on the way of implementation of the model of the University 4.0 for Al-Farabi KazNU is the project "Al-Farabi University - Smart City". (Today, it claims itself as a mechanism for training a graduate who can formulate a task in a professional language and solve it using blockchain technology [23].

The model of the 4th generation university is developed on the basis of international experience and it is based on symbiosis of high-tech and spiritual and moral platforms. It aims to build the social responsibility of the younger generation as citizens of the world for building a more virtuous and sustainable society.

## 5 Conclusion

Only that university will be really competitive and modern, which will build not practical-oriented education (it is a trap, practice turns out to be flawed), but personal-oriented education. Around a particular person, it is necessary to build education, not to embed it in mega-machines. Only then do resources and competencies act as the main determinants of the 4.0 university model.

Determinants, necessity and essence of the new model of the university remain a debating issue in the academic community. One conclusion is obvious - changes in the concept of the university itself are inevitable. Thus, the general essence of the concept can be defined as follows: it is a shift not only of the paradigm, but also of the essence of the prior to some degree of classical education, which will be replaced by the model of higher education, which unites the main components of the future economy.

Russian researcher Neborsky E.V. argues that model 4.0 is likely to be replaced by a model of multiple intelligence, when evaluation criteria are specified under specified conditions, adapting to the peculiarities of human thinking, rather than the other way around [24]. In the implementation of this model, the disciplinary core will be finally destroyed, which will be replaced by thematic education, when the phenomenon is investigated, which will strengthen transdominarity in both science and education [25].

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