

Portfolio analysis for the business planning development in the sphere of higher education under the digital economy conditions

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Abstract — The development of new organizational and economic methods of a higher education institution managing that meets the requirements of the digital economy is becoming a serious problem, the solution of which is possible, including the use of the portfolio analysis. The article proposes the author's entrepreneurial model of the university as the process of key competencies creating in its main functional areas. To develop business planning at the stages of entrants admission and within the framework of distribution activities, it is proposed to use the author's methodological tools based on portfolio analysis. The monitoring of the universities is carried out on the basis of the construction of n-dimensional matrices, with the help of which business units (directions of specialists training in higher education in integrated groups of specialties) can be compared with each other according to different criteria. For this purpose the use of the matrix of the "Boston Consulting Group" is being considered. The results of the calculations show that its use allows highlighting the services of the vocational education, which are in demand in the labor market, and, therefore, affecting the efficiency and effectiveness of business processes.

Keywords — *portfolio analysis, business planning, higher education, the labor market, digital economy*

I. INTRODUCTION

As applied to the system of higher vocational education under the digital economy conditions, it is advisable to consider the business planning development through the prism of the concept of an "entrepreneurial university". In the recent years the term "entrepreneurial university" is quite often used in the vocabulary of the specialists studying the issues of the vocational education economics. The main focus in the content of the notion "entrepreneurial university" is made on the innovative content of the management activity, its orientation on the constant search, energization, development and rational use of the resources [3].

The phrase "entrepreneurial organization" in the modern management refers to one of the methods of the organization internal structure, which constitutes three necessary elements: organizational action, changes initiation, money income as a goal and success criterion [7].

An entrepreneurial university means an institution of higher education that systematically makes efforts to overcome the resource constraints in three areas – knowledge generation, teaching, and the transformation of knowledge into practice – by initiating new activities, transforming the internal environment, and modifying interaction with the external environment under the digital economy conditions. The restrictions in the above areas are associated with a shortage of the main types of the resources: financial, informational and labor. The overcoming of this deficit, both on the basis of attraction from the external environment and through the development of the capabilities of the university internal environment is the most important sign of its entrepreneurship [11].

A prerequisite for the transition to an entrepreneurial development model is the introduction of strategic management, the use of modern methods of forming and implementing key competitive advantages. In this respect a significant competitive advantage is the development of an effective technology for managing the educational process quality.

Due to the transition of the state universities to autonomy, the activities conduct conditions of each of such universities change fundamentally. The image of the university, its ability to train specialists in demand on the labor market play a significant role, and, consequently, there is a problem of the university competitiveness increasing.

The following scientists were engaged in the construction of the economic models using game theory and probability theory: Borch K.H. [2]; Marinacci M. [16]; Abdellaoui M., Baillon A., Placido L., Wakker P.P. [1]; Gilboa I. [6]; Li Ya., Li Yo., Zhao Y. [12]; Manuylenko V.V., Mishchenko A.A., Bigday J.B., Sadovskaya T.A., Lisitskaya T.S. [15] and others.

Approaches to the study of the entrepreneurship are presented in the works by: Kirtsner I.M. [10]; Knight F. [9]; Maksimov Y.M., Mityakov S.N., Mityakova O.I. [13]; Mises L. [17]; Shumpeter J. [20]; Konstantinov G.N., Filonovich S.R. [11]; Mokronosov A.G., Dolzhenkova E.V., Mavrina I.N. [18]; Dolzhenkova, E.V., Iurieva, L.V. [5] and others.

Theoretical aspects of the portfolio analysis under modern conditions of risk and uncertainty, as well as methodological aspects of the practical calculations are presented in the works by: Cox, J.C., Huang, C.-f. [4]; Guidolin, M., Rinaldi, F. [8].

Digital finance issues are discussed in papers by: Ozili P.K. [19]; Teece D.J. [21].

The review of the scientific papers allowed summarizing the accumulated experience, the features of the portfolio analysis under the digital economy conditions and noting the current lack of research on the issues of forecasting the labor market needs in order to identify specialists in demand, as well as developing methodological approaches to the portfolio analysis of vocational education services.

All of the above determines the relevance of the present research topic.

II. THE RESEARCH METHOD

The implementation of the concept of an entrepreneurial university forms not only the need to develop the new

competencies in business planning, but also the creation of new organizational forms for the commercialization of knowledge and innovation, including business incubators, technology parks, technology transfer departments, etc.

Entrepreneurial university should find effective ways of structural conjugation with the external environment, be an active subject of the changes in the regional economy. The existing relations with the outside world introduce into the entrepreneurial university a project orientation of the “external players” that solve the practical problems relevant to the economic and social development of the region [14].

Thus, a university can be viewed as a process of the key competences creating within the framework of educational, research, and financial and economic activities under the digital economy conditions. The results of this process are the creation of the intelligent products, goods and services, as well as qualified and in-demand bachelor, masters, graduate and doctoral students (see a figure 1).

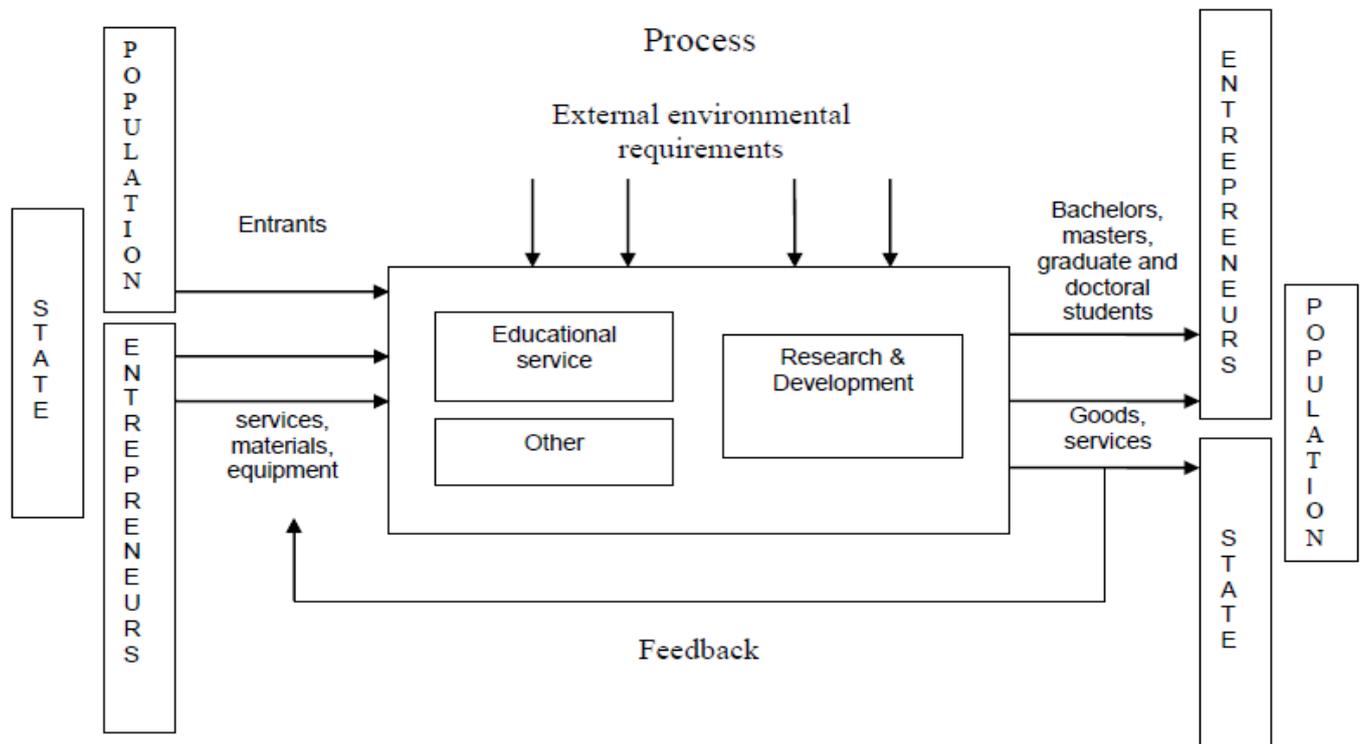


Fig. 1. The process scheme of a higher education institute functioning

According to the above scheme, in the course of the university work, three main functional areas can be distinguished:

- acceptance of the entrants and purchasing activities, when raw materials, equipment and materials are purchased, and various contractors render services to the university;
- research and development, educational, financial and economic activities, when the main products of the universities are created;

- distribution activities, within the framework of which graduates are distributed in the labor market, as well as goods and services are sold in the welfare market.

The presence of a successful course of the university functioning is provided by the feedback allowing comparing the efficiency and effectiveness of the university with its resources in the first two activities. Therefore, having the necessary information about the input parameters, planning

and obtaining the results of output activities, one can influence the value of the university entrepreneurial potential.

The university has the developed links with the external environment, and, therefore, is an open system. Therefore, the amount of the university entrepreneurial potential is influenced by the factors of its external environment. These include:

- factors of the working environment (the suppliers of the economic resources necessary for the university to perform the state task, as well as financial and economic activities, the consumers of the main results of the university, marketing, state economic structures, the media, etc.);

- environmental factors (demographic, economic, natural, technological, political, social and international factors).

Households have a significant impact on the work of the university, since it is they that ensure the level of preparation of the entrants, pay for the education of their children in universities guided by such conditions as:

- household income level;
- the image of the university;
- the demand for future profession in modern conditions;
- the location of the university, etc.

The influence of the industrial enterprises on the activities of higher education institutions is great, since it is the entrepreneurs who form the demand for labor in the labor market. In this case, the university graduates have to confront the workers, who are a part of the frictional unemployed. In such circumstances the image of the university, its ability to train specialists in demand on the labor market play a significant role.

To improve the process of the university functioning at the stages of the entrants admission and within its distribution activities, it is proposed to use the author's methodological tools based on the portfolio analysis.

Under the portfolio of the vocational education services is understood a set of services that a higher education institution provides at a given time or for a certain period of time.

To manage the portfolio of the vocational education services, it is proposed to analyze them in order to identify the most promising areas of activity of the higher educational institutions on the educational services market. For this purpose the direct, indirect, graphical, and matrix methods can be used.

Direct methods include methods based on the relationship between the quality of the services provided and the federal budget expenditures on higher professional education.

Indirect methods include methods based on the assessment of quality characteristics only, including quantitative (employment according to a specialty) and qualitative (degree of compliance with the customer requirements).

Graphical methods are represented by a variety of types of graphs (graphs, categorized graphs, sequential graphs, etc.) and methods for their visualization (data sampling, painting, projection, rotation, etc.).

And finally, matrix methods – the methods based on the portfolio analysis. The university portfolio is a combination of relatively independent strategic business units (in this article these are the training specialists directions for the integrated groups of specialties) belonging to a higher educational institution. The main technique of the portfolio analysis is the construction of n-dimensional matrices, using which the business units can be compared with each other according to the different criteria.

It should be noted that in practice, as a rule, all the above methods are combined for the analysis.

To manage the portfolio of the professional education services it is proposed to use the matrix of the "Boston Consulting Group", modified in such a way as, on the one hand, to preserve its main advantages including the simplicity of visual perception and the usual terminology, and on the other hand – to use it for the analysis of the portfolio of the professional education services, taking into account their features.

The following features of the vocational education services should be highlighted:

- intangibility – to assess the quality of the service provided is possible only in the process of its provision;

- non-transportability – the services are inseparable from the educational institution;

- risk – associated with the obtaining a profession, qualification, knowledge and work skills;

- non-storageability – the services are consumed at the time of their provision, i.e. not stockpiled;

- the impact of the learning activities – the future young specialist often takes a direct part in the learning process;

- the temporal separation between the acquisition of educational services and obtaining the corresponding end result;

- recognition of knowledge – the presence of special knowledge, focused on training of specific profiles and qualifications.

Thus, the basic unit of research is the “specific type of the vocational education services,” which is in demand on the labor market. The characteristic of each service group (a horizontal axis of the modified matrix) is the parameter K (market share is “the share of the vacancies number in one of the directions in the total amount of the required workers by economic activity” during the base period) and (vertical axis matrix) parameter T (demand on the market – “the proportion of the vacancies number in the pace of change in demand on the labor market” during the analyzed period along a linear trend).

For each group of specialties, the parameter K is calculated by the following formula:

$$K_i = (Y_i / Y_0) \times 100\% \quad (1)$$

where Y_0 is a total amount of the required workers for the reporting period (2016); Y_i is a volume of the vacancies of the i-th group for the reporting period.

As a second characteristic of the goods group (vertical axis of the matrix) the parameter T serves, which is a "specific weight of the number of vacancies at the rate of change in demand in the labor market" during the analyzed period by a linear trend.

The linear trend allows the drawing of a conclusion about the direction of the indicator movement under the influence of many factors. The formula for the linear trend of the realization volume function is the traditional equation of a polynomial of the first degree:

$$Y_0 = A_0 \times X + B_0 = A_0 \times X + B_0 \quad (2)$$

where Y_0 is an estimated volume of the demand in the labor market; X is a billing period (a year); A_0 is an estimated change (increment or decline) of the demand compared to the previous billing period; B_0 is a constant of the equation, which can be interpreted as the theoretical volume of the demand in the initial period (2016).

A similar formula determines the trend for a particular vacancy:

$$Y_i = A_i \times X + B_i \quad (3)$$

At that $Y_0 = \sum Y_i$, i.e., a single increment of the total demand consists of single increments (with both signs) of the vacancies number by the types of the economic activity.

The parameter T determines the nature and size of the contribution of each group of vacancies to the change in the total rate of demand in the labor market and is determined for each group separately by the formula:

$$T = (A_i / A_0) \times 100\% \quad (4)$$

where A_i is an i-th group trend coefficient during the reporting period; A_0 is a coefficient of the trend of the total realization volume in the reporting period.

After calculating the values of the parameters K and T for each group, we obtain a parametric graph. The "Stars": high market growth and a high market share. The market share must be maintained or increased. This group of services brings great profits. The "Cash Cows": a high market share, but low market growth. Such services must be kept and monitored as much as possible. The "Dogs": low growth and low market share. It is necessary to get rid of this group of services. The "Difficult children" must be studied. In the future, they can become both stars and dogs. If there is a possibility to transfer them to the stars then they should be invested in, otherwise – get rid of.

III. RESULTS AND DISCUSSION

Consider the activity of the labor market in Russia in 2014-2016. According to the Federal State Statistics Service, the largest number of people works in the following areas of economic activity:

- wholesale and retail trade, repair of motor vehicles, motorcycles, household goods and personal items;

- agriculture, hunting and forestry;
- manufacturing;
- transport and communication;
- building;
- education;
- health and social services.

The data of Rosstat regarding the number of required workers by type of economic activity on the Russian labor market show that the most sought-after positions in 2016 were:

- wholesale and retail trade, personal services to the population;
- manufacturing;
- transport and communication;
- education;
- financial activities, real estate operations, rent;
- health care;
- building.

Thus, the subsequent analysis will be carried out precisely in these areas of specialist training.

The results of calculating the parameter K by the formula 1 are presented in Table 1.

TABLE I. THE RESULTS OF THE PARAMETER K CALCULATION (2016)

Type of the economical activity	Specific weight (K), %
Total in the economy, including	100
wholesale and retail trade, household services to the population	18,4
manufacturing industries	14,7
transport and communication	9,5
Education	9,2
financial activities, real estate operations, lease	9,0
health care	7,9
Building	7,6

The results of calculating the parameter T are presented in Table 2.

TABLE II. THE RESULTS OF THE PARAMETER T (2016)

Type of the economical activity	A	Specific weight (T), %
Total in the economy, including		
wholesale and retail trade, household services to the population	0,2	0,33
manufacturing industries	0,15	0,25
transport and communication	0,05	0,08
Education	0,1	0,17
financial activities, real estate operations, lease	0,15	0,25
health care	0,05	0,08

Type of the economical activity	A	Specific weight (T), %
Building	0,2	0,33

Thus, for each group of vacancies, the coordinate space was defined, where one of them is K – "market share", and the other is T – "demand in the market". After calculating these values for each group, one obtains a parametric diagram (Fig. 2).

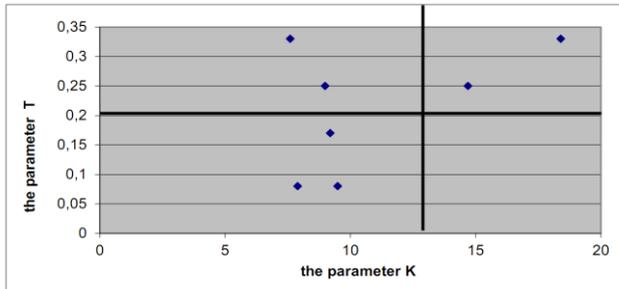


Fig. 2. Modified BCG-matrix of the professional education services portfolio

The resulting matrix allows us to draw the following conclusions. The economic activities "Wholesale and retail trade, household services to the population" and "Manufacturing industries" refer to the "stars": high market growth and a high market share. The market share must be maintained or increased. The following economic activities are classified as "difficult children" according to the resulting matrix: "Financial activities, real estate operations, lease" and "Building". These kinds of economic activities should be given special attention, because in the future they can become both stars and dogs. Therefore, it is necessary to use additional economic and mathematical methods to evaluate these types of activities in order to make a more precise decision on them: they should be developed in the higher education institution or not.

The rest of the groups of vacancies fall into the quadrant "dog": low growth and low share in the market. Thus, when training specialists, the higher education institutions in modern conditions should pay attention to two aspects: "Wholesale and retail trade, household services to the population" and "Manufacturing industries".

IV. CONCLUSION

The use of a modified matrix of the Boston Consulting Group in managing the portfolio of the vocational education services under the digital economy conditions will not only highlight the vocational education services that are in demand on the labor market, but also improve business processes at the entrants admission stage and in the framework of the university's distribution activities.

It should be noted that in order to increase the degree of the reliability of forecasts of the model relevance on the market, including competent, scenario approaches, expanding the range of the used statistical data and forecast horizon.

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