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## **MODELING DEVELOPMENT OF HIGHER EDUCATION INSTITUTIONS IN THE CONTEXT OF ENSURING THEIR ECONOMIC SECURITY**

Under conditions of strengthening processes of globalization, which occur at all the levels, particularly at the educational one, the authors observe the increase of competition for applicants between higher education institutions (thereinafter – HEIs), for qualified potential graduates of HEIs between employers, and between graduates in the domestic and international labor markets. In this context, there is a need to balance revenues and expenses of HEIs owing to liquidation or at least reduction of inefficient expenses of various types of resources (particularly time for performing the works, which facilitate the increase of HEI efficiency) and channeling free funds to formation of clusters and innovative institutions. It is useful to take into account that HEIs function under conditions of a risk and uncertainty due to specificity of activity (they are conductors of innovations and knowledge centers). Therefore, the necessity of their “survival” borders on the necessity related to the increase of efficiency of functioning. In addition, against the backdrop of development of the scientific and technological progress and transition of world economies to the sixth and the seventh techno-economic paradigm, the importance of higher education grows. This leads to the increase of a need for qualified employees. Under cotemporary conditions, the Balanced Scorecard (thereinafter – BSC, which consists of financial, customer, and organizational components of education and staff development, is not commonly used at HEIs. This fact is stipulated by the following circumstances: due to subjective peculiarities of functioning, HEIs may be considered

as an economic entities, which function under conditions of a risk and uncertainty and as an important element of a social and economic system. These factors complicate a process of perceiving a set of criteria, which underlie the BSC and orient towards gaining an economic result of HEI activity regardless of a possible social effect of growth of HEI efficiency; in the practice of foreign HEIs, there is no example of BSC application. Taking into account European integration priorities, achievement of reference results (e.g. financial indices of leading HEIs of the EU or the world in general) in the future is impossible; under contemporary conditions, peculiarities of formation of the BSC for economic entities (as one of strategic management instruments) lead to difficulties concerned with harmonization of all the components of a HEI activity strategy (gradual balancing) due to existence of significant fluctuations of world conjuncture. These fluctuations are caused by prompt development of information technologies being inherent to an educational services market. They induce a HEI to correct educational programs permanently, taking into consideration the necessity of bringing labor market demands into line with requirements of the economy and employers.

Although there are some scientific contributions to examination of this sphere [1-5], economic literature does not comprise complex substantiation of aspects related to conducting thorough theoretical and applied research on ensuring economic security of higher education institutions in terms of interaction between a government, HEIs, and employers in the labor market based on the main approaches to development of the Balanced Scorecard, which would take into account its implementation at the HEI level.

Economic security is the main component of national security. According to the Methodical Recommendations on Calculation of a Level of Economic Security of Ukraine adopted by the Ministry of Economic Development and Trade of Ukraine of 29 October 2013 No. 1277, economic security constitutes “the state of the national economy, which enables to maintain resistance to internal and external threats, to ensure high competitiveness in the world economic environment and characterizes the ability of the national economy to grow steadily and proportionally” [6]. Taking

into account the sense of the economic security and the role of higher education institutions in providing sustainable economic growth, the authors highlight importance of development of measures that will conduce to enhancement of financial and economic indices of HEIs. Balancing revenues and expenses of a HEI may provide achievement of such objective. Application of the Balanced Scorecard adapted to needs of HEIs in order to undertake a strategy for “reduction of total expenses” is one of ways for attainment of the mentioned objective. It implies an automatized system of accounting and control of indices of staff labor productivity and enables to improve a system of salaries, which increases efficiency of internal business processes and enterprise activity as a whole; reduction of current expenses, creation of new sources of revenues, and the increase of expenses, mainly through usage of intellectual resources (human, information, organizational).

Implementation of the Balanced Scorecard adapted to needs of a HEI constitutes the increase of efficiency of HEI functioning. It exercise the positive influence on the increase of their economic security level<sup>1</sup> through channeling free funds to development of measures aimed at counteraction against the negative influence of factors of external and internal environments, which lead to emergence and strengthening threats to HEI functioning under market conditions and, subsequently, to the country and the national security in general. The previously mentioned assertions are relevant under contemporary conditions of development of the Ukrainian economy, particularly regarding that HEIs, which have been relocated from the temporarily occupied territories.

Higher education institutions as an element of a system exercise the significant influence on economic development of the country and conduce to qualitative reproduction of the labor force. Taking into consideration the economic security sense (particularly, HEI economic security), the role of higher education institutions, and the importance for economic development of the country, it is expedient to define and to estimate their economic security in conformity with the system approach. T.

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<sup>1</sup> Contemporary scientific papers do not propose a single definition for a category of “economic security of a higher education institution”. It is most often defined as the state of a HEI, in which there is an insufficient amount of resources for prevention, weakening, or protection of HEI activity from threats [5].

Vasylytsiv mentions that economic security should be considered “according to the system approach, taking into consideration the following factors: a set of interrelated elements of the system, in which the change of one affects the interests of the others and/or all the system elements, and its parts; a mechanism of management and general mechanisms of decision-making; a common purpose and aims; sub-systems [7, p. 24]. In formation of the HEI economic security system, the author has taken into account the similarity with enterprises and entrepreneurship as an economic sector in the context of an activity type. T. Vasylytsiv has considered this assertions in the process of examination of enterprise economic security according to the system approach [7, p. 24-25].

It is important to indicate objects and subjects of the system, to determine the main functions, methods of estimation and management, resources needed for providing efficient activity of a higher education institution, and measures of ensuring the system in the process of application of the system approach to ensuring economic security.

From the standpoint of etymology of concepts such as security, economic security, a risk, danger, there are some terms, which may be attributed to objects of the system. They are as follows: security of a higher education institution as an economic entity; security of a higher education institution as an element of the system (conduces to providing economic development of regions and the country at the expense of growth of efficiency of HEI activity).

Subjects of the system include bodies of public authority in the context of their influence on the financial and economic position of a HEI and development of normative and legal acts, enacting of which facilitate the increase of efficiency of activity of higher education institutions as economic entities.

It is expedient to indicate the main functions depending on the objects of the system. From the standpoint of providing economic security of a HEI as an economic entity, the functions include: formation of prognosticative figures of HEI financial reports; extension of HEI autonomy; improvement of HEI equipment; enhancement of management efficiency, formation of optimal organizational structure of HEI

management; providing HEIs with highly qualified academic staff for the purpose of formation of intellectual potential of higher educational institutions; protection of information concerned with scientific and methodical results.

From the standpoint of ensuring economic security of a HEI as an element of the system, the functions of higher education institution encompass: society development due to performing a function of a “social lift”; ensuring efficiency of activity of economic entities, which demand for specialists trained at a higher education institution; providing social and economic development of regions and the country through harmonization of labor market demands and requirements of the economy and employers; enhancement of competitiveness of the economy on the world stage, particularly through the increase of higher education quality, expert potential development, namely high technological products; the decrease of an unemployment rate and the increase of an employment rate.

Methods of estimation comprise universal (constitute usage of official statistics information) and special (economic and statistical methods based on application of statistics software) ones. Methods of management are divided into economic, organizational, information, legal, and administrative. Resources needed for providing efficient activity of a HEI and means of ensuring the system consist of financial (HEI are funded at the expense of budget, individuals, and legal entities in the form of tuition fees), staff (providing a HEI with highly qualified academic staff), and equipment (renovation of HEI equipment). Means of ensuring the system include: permanent monitoring of labor market needs, requirements of the economy and employers, an economic security rate of a HEI; development of measures for the increase of HEI economic; development of measures for the increase of HEI competitiveness, etc.

In case of inefficient functioning of the system, particularly related to the absence of two-way linkages between the objects and the subjects of the system, improper determination of the main functions, methods of estimation and management, improper determination of an amount being essential for providing efficient activity of a HEI and means of ensuring the system, economic threats and

dangers arise and spread.

In general, contemporary scientific literature does not propose a single definition for concepts of a “threat”, particularly “economic threat”, and “economic danger”, which are directly related and contradictory terms. In the broad sense, terms “danger” and a “threat” are referred to as synonyms. However, in the narrow sense, they are different depending on a manifestation form and an object of influence, because a set of threats forms danger in some situations.

In a general manner, danger is “an opportunity of emergence of circumstances, under which matter, a field, and information or their combination may influence a complicated system. This process will lead to deterioration or impossibility of functioning and development of the system” [8].

Particularly, N. Riznyk considers danger as an alternative term to safety. The author mentions, “If safety is the most conducive state of a research object, danger is the most unconducive and crisis one” [9, p. 122]. Simultaneously, T. Vasylytsiv applies terms a “risk” and “danger” as synonyms. He mentions that “...it is expedient to consider that spheres, in which threats to economic security of entrepreneurship may arise, particularly in the context of different directions: production, sectoral, political, economic, financial, innovative, and legal risks” [7, p. 28]. O. Bandurka, V. Dukhov, K. Petrova, and I. Cherviakov consider a threat as a potential possibility of damaging economic agents on the part of particular factors of internal and external environments [11]. V. Yachmeniova states that a threat is a consequence of uncontrolled combination of circumstances, conditions, and events of an external environment, which are perceived as the reality by market entities (enterprises), and impossible circumstances, which should be eliminated when there is a sufficient amount of resource reserves. If managers cannot prevent these circumstances, they have to learn to co-exist with them [12, p. 313].

At the same time, in the context of ensuring economic security of a HEI, the authors highlight that a threat is a certain form of danger (arises under the negative influence of factors of external and internal environments). Particularly, economic danger is a potential possibility of taking a loss (a loss of profit).

The authors have examined efficiency of involvement of academic staff for meeting demands of the economy. To achieve this purpose, they have applied the above-mentioned system approach ensuring economic security of a HEI and considered an example of a typical HEI, which train students in different fields and from different regions of the country. Simultaneously, the authors have taken into account peculiarities of application of the Balanced Scorecard at the HEI level in the context of a staff component (academic staff). Subsequently, the authors have analyzed structure of factual expenses of time of the academic staff (using the MS EXEL spreadsheet) owing to application of the ABC analysis. A modified version of the latter consists in division of figures into four groups – ABCD. Results obtained in the process of analysis (Table 1) indicates division of types of the works according to the following groups: A – the most labor-intensive types of the works, which determine the main result of organization activity, the content, and quality of internal processes and accounts for 50 % of working time, tending to increase; B – types of the works that may play a minor role in attainment of strategic and current goals; each of them accounts for at least 2 % of total labor intensity; C – types of the works, labor intensity of which accounts for less than 2 %; their total amount accounts for not more than 10 % of working time, tending to increase; D – types of the works, labor intensity of which accounts for less than 1 %; their total amount accounts for 5 % of working time, tending to increase. The above-mentioned calculations (Table 1) indicate that only 18 of 96 types of the works, which may be performed by the academic staff, account for more than 1%. Their total amount is 87,2 % of the total expenses of time of the university academic staff. At the same time, approximately 1/5 (18,8 %) of working time of the academic staff is spend on organizing (preparation) of an educational process. This is fully justified under conditions of implementation of a strategy for “reduction of total expenses”.

The authors have conducted a next stage of research aimed at determination of significant independent variables, using the multiple regression method. The authors have applied the Statistika software to simplify complicated calculations. Then, the authors have built a model for expenses of time of the academic staff for specialties,

which are demanded in a labor market [13] and are prospective under conditions of transition to the knowledge economy.

Table 1

**ABC (ABCD) – Analysis of structure of time expenses by types of the works of the university academic staff in certain specialties (educational programs of related specialties)**

Types of the works of the academic staff belonged to groups A and B (an internal process or a work direction)	A weight of time by types of the works performed by the university academic staff	A accumulated weight of time by types of the works performed by the university academic staff	Structure of expenses of time by types of the works performed by the academic staff in certain specialties (educational programs of related specialties), %								
			Chemical Technologies and Engineering, Biological Technologies and Biological Engineering, Pharmacy	Technologies of Light Industry	Design	Marketing, Economics, Accounting and Taxation, Finances, Banking, and Insurance	Computer Sciences and Information Technologies, Automatization and Computer-integrated Technologies	Finances, Banking, and Insurance	Management	Marketing, Economics	
Preparation for lectures, workshops, and seminars (methodical)	18,8	18,8	16,2	18,4	20,5	17,9	18,7	13,7	11,3	15,4	
Running workshops (educational)	17,9	36,7	-	10,1	29,3	24,0	6,0	13,4	12,0	10,8	
Providing consultations on disciplines (educational)	7,9	44,6	7,0	7,5	7,9	8,9	8,0	11,0	13,4	7,7	
Holding lectures (educational)	6,6	51,2	5,7	8,8	-	5,1	8,8	7,1	4,8	8,6	
Running laboratory sessions (educational)	6,3	57,5	10,2	9,1	-	-	15,8	-	-	4,7	
Supervising a Master's thesis (project) (educational)	5,4	62,9	6,6	-	4,4	5,9	8,0	5,2	9,8	-	
Preparation of electronic educational and methodical complex for a discipline (methodical)	3,7	66,6	3,6	7,2	-	-	-	6,3	-	-	
Carrying out semester control (educational)	3,1	69,7	-	-	-	-	-	-	-	-	
Supervising the educational practice and production practice at an enterprise (educational)	2,5	72,2	-	-	-	-	-	-	6,4	-	
Publishing articles (in a specialized journals) (scientific)	2,4	74,6	-	-	-	-	15,7	6,1	-	-	
Grading tests, research papers, analytical reviews, translations, interpretive papers (educational)	2,1	76,7	-	-	-	-	-	-	3,6	-	
Supervising and grading term papers and projects (educational)	1,9	78,6	-	-	-	-	-	-	-	-	
Publishing a monograph, a thesaurus, a handbook (scientific)	1,8	80,4	-	-	-	-	-	4,7	-	-	
Preparation and publishing a textbook (scientific)	1,7	82,1	-	-	-	-	-	-	-	7,1	
Doing research funded under an international program, a government program, a commercial agreement; obtaining international grants (scientific)	1,4	83,5	9,0	-	-	-	-	-	-	-	
Supervising scientific papers of students (scientific)	1,4	84,9	-	-	-	-	-	-	-	-	
Publishing articles in foreign scientific journals (scientific)	1,2	86,1	-	-	-	-	-	-	-	-	
Dissertation defense (scientific)	1,1	87,2	3,7	-	-	-	-	-	-	6,7	

The authors have not taken into account labor productivity of the university staff performing administrative functions, who are involved in providing and organizing university internal processes due to indirect participation in training future professionals and, subsequently, in enhancement of competitiveness of the HEI and providing it economic security. Results of the conducted regression analysis based on the multiple regression for determination of significant independent variables in the model for expenses of time of the academic staff by types of the works<sup>2</sup> are captured in Formula 1.

$$Y_t = 0,810847 \times X_2 + 0,160941 \times X_7 + 0,114316 \times X_{17} + 0,056014 \times X_{12} - 0,065677 \times X_5, \quad (1)$$

2 According to the model results, durability of the following work have turned out to be the most significant for providing effectiveness (quality) of internal processes among all the types of the works: preparation for lectures and workshops, X2; holding lectures, X5 (a reverse relation); supervising the educational practice and production practice at an enterprise, X7; preparation and publishing a textbook, X12; publishing articles in foreign scientific journals, organizing and running scientific and methodical seminars with the participation of lecturers, representatives of enterprises and foreign firms, X17.



where  $Y(i)$  is durability of performing  $i$ -type of the works.

Taking into consideration the results of the conducted ABC (ABCD) and regression analysis of expenses of time by types of the academic staff works, the authors conclude that balancing internal process figures and figures of financial and customer components have individual characteristics within a particular educational program proposed by a certain HEI depending on target and factual financial figures of university activity, a degree of staffing, involvement of information technologies in management and an educational process. Balancing conduces to formation of particular differences between the structure of expenses of time by certain groups of specialties and the structure of the total university expenses (Table 1).

Taking into consideration requirements of internal processes and data of ranking of the academic staff involved in implementation of certain groups of educational programs, the authors indicate types of the works, which determine a level of development and learning. Using these data, the authors have developed an optimistic scenario of the influence of figures on internal process effectiveness and on undertaking a component of a strategy for development and training the academic staff. In terms of application of this scenario and normalized data, the authors have conducted regression analysis based on multiple regression aimed at determination of significant independent variables in the model for expenses of time of the academic staff<sup>3</sup>, which are related to development and learning (Formula 2).

$$Y_i = 1,113464 \times X1 + 0,246725 \times X7 - 0,200039 \times X5 - 0,198496 \times X14, \quad (2)$$

where  $Y(i)$  is total expenses of time of the academic staff.

Within this model, a figure concerned with expenses of time for preparation for all types of face-to-face classes draws special attention. This figure has been included into both regression models as a factor of total expenses of time of the academic staff (Formulas 1 and 2). Therefore, under attainment of European integrational priorities and rehabilitation of living conditions in the temporary occupied territories, there will

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<sup>3</sup> X 1 – expenses of time for preparation for lectures, workshops, seminars, and individual classes (a direct relation); X 7 – expenses of time for doing research funded under an international program, a government program, a commercial agreement (a direct relation); X 5 – expenses of time for writing and publishing articles in foreign journals (a reverse relation); X 14 – expenses of time for preparation and printing methodical materials in a foreign language and reprinting methodical materials in a foreign language (a reverse relation).

be an urgent need for qualified professionals being able to compete in the domestic as well as international labor markets. Such process requires development of adequate measures oriented towards enhancement of labor productivity of academic staff according to types of the works included in the model (Formula 1), which are prospective for ensuring development of HEIs and their economic security. Thus, it is expedient to rationalize the structure of academic workload (besides legislatively regulated types of the works) through the increase of factual expenses of time for: preparation for lectures, workshops, seminars, and individual classes; doing research funded under an international program, a government program, a commercial agreement; obtaining international grants; writing and publishing articles in foreign journals; preparation and printing methodical materials in a foreign language and reprinting methodical materials in a foreign language. Such rationalization of the workload structure will facilitate: rational usage of different types of resources, particularly intellectual ones; the increase of quality of students' knowledge, their competitiveness in the domestic as well as international labor markets in the long run, elimination of a discrepancy between education, science, and production; the decrease of a threat to economic security and, subsequently, the increase of a level of HEI economic security, economic security of the country, and national security in general.

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