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THE METHOD OF ADAPTATION OF A PROJECT-ORIENTED ORGANIZATION'S STRATEGY TO EXOGENOUS CHANGES

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МЕТОД АДАПТАЦІЇ СТРАТЕГІЇ ПРОЕКТНО-ОРІЄНТОВАНОЇ ОРГАНІЗАЦІЇ ДО ЕКЗОГЕННИХ ЗМІН

Purpose. To research the features of the management strategy of a project-oriented organization in a generally unstable environment through the example of a university, and to develop the method of adaptation of the strategy to exogenous changes.

Methodology. The research evaluated the degree of correlation of the observed phenomena (the content of the strategic plan and the university's position in the rating) by Spearman's rank correlation coefficient. The colligation of the studied factors was assessed applying the Chaddock's scale. The authors' proposals were based on the method of Balanced Scorecard (BSC).

Findings. We proposed a method of adaptation of the strategy of a project-oriented organization (POO) to exogenous changes based on the Balanced Scorecard (BSC) with the potential for use of integrated computer technology. We developed a case study of the operation of Ukrainian universities in current business environment. The analysis of the correlation between the availability and the content of the strategy of a university, on the one hand, and its position in the Consolidated Rating of Ukrainian Institutions of Higher Education, on the other hand, has revealed a significant rank correlation between the qualitative characteristics.

Originality. The proposed method is based on the BSC application for strategic management of a university with the some changes introduced because of the specific features of functioning of the organization, namely the development of strategic maps in two planes: 1) 4 original 'perspectives' of BSC (finance, customers, internal business processes, learning and growth); 2) functional task forces of the university (educational activities management, research activities management, international promotion and public image of the university, expanding the range of additional educational services, staff motivation, monitoring, and development).

Practical value. For the senior management of each organization, it is extremely important to choose the method of strategic management that will give the desired results in a turbulent environment. The strategy adaptation method proposed by the authors has practical value to higher educational institutions of Ukraine as it takes into account the specific features of their activities. We demonstrated the possibility of use of modern information technologies for the realization of the proposed method.

Keywords: *project management, BSC, strategy, reformation of the system of higher education*

Introduction. Nowadays a number of large-scale reforms are being implemented with varying intensity in the economic system of Ukraine. Therefore, the majority of business entities have to adjust the existing processes which were previously used in a particular sphere of activity. Since the state reforms affect the underlying processes of the economy, with the aim of

adoption of the European model of an efficient economic structure of the state, at the level of individual actors it is necessary to search for more effective models and management practices, primarily at the strategic level.

We suggest considering a university as a project-oriented organization (POO), which operates under the system of exogenous changes.

In the conditions of reformation of higher education in Ukraine, there is no doubt that the adjustment of the universities' strategies is inevitable if they are going to adapt to new challenges. The tightening of the requirements for the institutions of higher education [1] should be considered a precondition for the reconsideration and amendment of the strategies of each institution to sync with the vector of the reform of the higher education system of Ukraine, rather than for updating plan figures for reporting purposes.

The unsolved aspects of the problem. As stated in the "Guide to the Project Management Body of Knowledge", projects are often used as a means of direct or indirect achievement of the goals of organization's strategic plan [2]. Despite their temporary nature, the projects may also contribute to the achievement of the goals of the organization if they are brought into line with the organization's strategy. In this regard, the methodology PMBoK gives the main role to the Project Management Team, which integrates data and information obtained from projects and evaluates the degree of fulfillment of the strategic objectives of a higher level. The Project Management Team is a natural link between portfolios, programs, projects and corporate organization evaluation systems such as the Balanced Scorecard (BSC).

The BSC has been widely used since 1990 up to the present and has proved its efficiency for the management of the companies of different scale and specialization, belonging to different industries as evidenced by a number of scientific publications of domestic and foreign researchers. The use of the BSC in the municipal and regional management was covered by Paul R. Niven [3], K. Johnson, I. Beiman, J. Thompson, N. P. Pan, M. V. Ivanov, A. V. Veligura, A. Yu. Tishchenko, I. A. Chikarenko, O. V. Fedorchak, and others. In their works, G. A. Pudycheva, S. N. Glovatskaya described the peculiarities of the development of the Balanced Scorecard for educational institutions; I. V. Barilyuk, I. V. Didovets, O. G. Musayev implemented the BSC to control banks; V. N. Orlov, and Yu. Pasenchenko studied its utilization at trade enterprises; G. N. Tarasiuk and others researched the BSC implementation at industrial enterprises.

Many scholars have raised questions about the search of effective approaches to the strategic management of an organization, taking into account specific features of its activities. The subject of this research is the management strategy of a project-oriented organization.

In this particular context, we consider the management of institutions of higher education as a process that is extremely important for the development of the state economy. The methods chosen to control the state will determine its effectiveness.

Objectives of the article. The purpose of this study is to develop a method of adaptation of the strategy of a project-oriented organization to exogenous changes on the example of a university based on current trends in the development of management science.

For the purpose it is necessary to perform the following tasks:

- to determine the features of the strategy management at project-oriented organizations in a generally unstable environment;

- to evaluate the colligation of the presence and the content of the strategy of a university on the one hand and its position in the Consolidated Rating of Ukrainian Institutions of Higher Education on the other hand;

- to develop a method of adaptation of the strategy of a project-oriented organization to exogenous changes;

- to develop the method providing for the possibility of use of the integrated computer technology in its realization;

- to prove the possibility of use of the method developed for national higher educational institutions functioning in the conditions of the higher education system reform in Ukraine.

Results and discussion. Characteristics of the source data used in the research. The evaluation of the colligation of the presence and the content of the strategy of a university on the one hand and its position in the Consolidated Rating of Ukrainian Institutions of Higher Education on the other hand was based on the results of the "Monitoring of the Transparency of National Universities 2015" that was held by the CEDOS [4] and the Consolidated Rating of Ukrainian Institutions of Higher Education 2015 [5].

Methodology. The degree of correlation of the content of the strategic plan and the official rating position of the university was evaluated by means of Spearman's rank correlation coefficient. We assessed the colligation of the studied factors applying the Chaddock's scale.

The proposed method of adaptation of the strategy of a project-oriented organization to exogenous changes is based on the Balanced Scorecard (BSC) and has the potential for employment of integrated computer technology.

The hypothesis about the presence of a correlation between the content of the strategic plan and the official rating position of the university. We do not call into question the importance of the strategic planning and management, which was confirmed by international practice but research the relationship intensity between the qualitative content of university's strategy and the resulting position of the institution in the Consolidated Rating of Ukrainian Institutions of Higher Education. The content of the strategies was evaluated in the CEDOS survey "Monitoring of the Transparency of National Universities 2015" [4], which involved 96 higher educational institutions. The content of the strategic plan is one of the four indicators which made up the integrated index of transparency; it was calculated by the following formula

$$X_i = \sum_{j=1}^{m} g_{ij}; \quad i = \overline{(1, n)}; \; j = \overline{(1, m)}, \qquad (1)$$

where X_i is the rate of the content of strategic plan assessment for the ith institution of higher education made by CEDOS in 2015; i is the reference number of an observation in the set; n is the number of observations, which is 96 (the number of higher educational institutions involved in the research); g_{ij} is the value received in the assessment of the jth feature of the strategic plan of the ith institution of higher education; j is the reference number of a feature of the strategic plan; m is the number of the features assessed, which makes 9.

At the same time, there is a long-standing practice of rating universities in Ukraine. The overall rating is the Consolidated Rating of Ukrainian Institutions of Higher Education, which includes the results of ranking made by the "TOP-200 UKRAINE", Webometrics and Scopus. These rankings do not consider the content of university's strategy as a parameter for evaluation in an explicit form. At the same time, the strategy contributes to the growth of the main indicators of an organization by default, that is to say, the commitment to the development and implementation of the strategy may indirectly affect the rating position of a university. We tested the hypothesis about the existence of a correlation between the content of the strategic plan and the official position of a university in the rating.

We suggested evaluating the degree of correlation of the content of the strategic plan and the official rating position of the university by means of Spearman's rank correlation coefficient r_{emp} [6] by the formulas

$$r_{emp} = 1 - \frac{6 \sum_{i=1}^{n} d_i^2}{n(n^2 - 1)}; \qquad (2)$$

$$d_i = X_i' - Y_i', \qquad (3)$$

where n is the number of observation pairs; d_i is the rank difference of the arrays X and Y; X_i', Y_i' are the ranks of the ith object of the arrays X and Y; X is the university's strategy content assessment data array [4]; Y is the rating positions data array according to the Consolidated Rating of Ukrainian Institutions of Higher Education 2015 [5].

Since there are equal ranks in both source data arrays, we made the amendments in the formula of Spearman's rank correlation coefficient and calculated them as follows

$$D = \frac{A + B}{12} = \frac{\sum_f (A_f^3 - A_f) + \sum_k (B_k^3 - B_k)}{12}, \qquad (4)$$

where A_f is the number of equal ranks in the fth group of the data array X which is being ranged; B_k is the number of equal ranks in the kth group of the data array Y which is being ranged.

Table 1

Chaddock's scale

Spearman's rank correlation coefficient	Characteristics of the colligation between the factors
$\lvert r \rvert \le 0.1$	near-zero correlation
$0.1 < \lvert r \rvert \le 0.3$	weak correlation
$0.3 < \lvert r \rvert \le 0.5$	moderate correlation
$0.5 < \lvert r \rvert \le 0.7$	apparent correlation
$0.7 < \lvert r \rvert \le 0.9$	strong correlation
$0.9 < \lvert r \rvert \le 1$	very strong correlation

Then we obtain the following

$$r_{emp} = 1 - \frac{6 \sum_{i=1}^{n} d_i^2 - D}{\sqrt{(n^3 - n - A)(n^3 - n - B)}} = -0.542. \qquad (5)$$

Table 1 presents the Chaddock's scale that allows evaluating the colligation of the studied factors [7].

The target value received should be interpreted as follows: the features X and Y have an apparent inverse correlation.

To all intents, before being ranged the array X consisted of the data on the point assessment (maximand), but the array Y consisted of the data on the rating positions (minimand). Therefore, the correlation is inverse, which is caused by the features of the source data. Conceptually it should be interpreted as follows: the position in the Consolidated Rating of Ukrainian Institutions of Higher Education has an apparent correlation with the quality of the strategy elaboration.

We estimated the received empirical value of Spearman's rank correlation coefficient and compared it with the corresponding critical value for a given level of significance.

For the sample with the number of observations $n = 96$ and the level of significance $p = 0.05$ the critical value of the Spearman's rank correlation coefficient is $r_{cr\,0.05} = 0.1716$, while for the level of significance $p = 0.01$, it is $r_{cr\,0.01} = 0.2279$. As we can see, $r_{cr\,0.05} < \lvert r_{emp} \rvert$ and $r_{cr\,0.01} < \lvert r_{emp} \rvert$ (Fig. 1), consequently, the Spearman's rank correlation coefficient is statistically significant and the rank correlation of the studied features is sufficient.

The assessment of the significance of the Spearman's rank correlation coefficient showed that the qualitative characteristics (the presence and the content of the strategy of a university on the one hand and its posi-
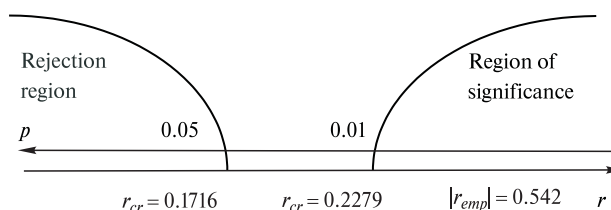

Fig. 1. Determination of the significance of the rank correlation

tion in the Consolidated Rating of Ukrainian Institutions of Higher Education 2015 on the other hand) have a significant rank correlation.

The development of the method and formalization of the process of adaptation of the university's strategy to external changes. Based on the research previously made [8], we concluded that the efficient strategic management of a higher educational institution should have the Balanced Scorecard in its base, which, in its turn, should be amended in accordance with the specific features of organization's activity.

This is why we propose the method of adaptation of university's strategy to external changes, which is based on the idea that the strategic maps should be constructed in two planes:

1) traditional 'perspectives' of BSC [9]. We call the range of the 'perspectives' L. Then

$$L = \{l_1, l_2, l_3, l_4\} = \begin{cases} \text{finance} \\ \text{customers} \\ \text{internai business processes} \\ \text{learning and growth} \end{cases}; \quad (6)$$

2) a functional task groups of the university. We call the range of them $F = \{f_1, ..., f_n\}$, where n is the number of the functional task groups, which were organized in the process of university's strategy development.

If C is the range of the university operation processes results, we should determine the correlation between its elements and the elements of the ranges L and F. $C = \{c_{ij}\}$, where c_{ij} is determined by the base-two system depending on the existence of the relation between the result of university's operation process and ith perspective or jth functional task group. Table 2 presents the schema of the matrix of the university operation processes results.

According to the authors' approach, which is based on the study of stakeholders' interests [10], we should consider 6 functional task groups of the university to take into account all aspects of strategic importance but without going into excessive details:

Table 2

The matrix of the university operation processes results

l_i \ f_j	f_1	f_2	...	f_n
l_1	c_{11}	c_{12}	...	c_{1n}
...	...	...	...	...
l_4	c_{41}	c_{42}	...	c_{4n}

- educational activities management;
- research activities management;
- international promotion and the public image of the university;
- expanding the range of additional educational services;
- staff motivation;
- monitoring and development.

The correlation of the university operation processes results by the 'Perspectives' of the BSC and Functional task groups is shown in Table 3. We marked the matching of the results of the both planes with "+". Not all the cells in Table 3 have the sign according to the principle described above.

The influence of the result of one process within the target groups on the effectiveness of another is shown with arrows. The thickness of the arrows indicates the strength of the influence.

There are 'tunneled' arrows that point to the empty cells. They mean that the result of the initial process influences the efficiency all the other processes within the given BSC 'perspective'. The analysis of this relationship allowed prioritizing processes that require control action, which is reflected in the intensity of the background fill of the table cells.

The method of adaptation of the strategy to the exogenous changes, which is based on the above, implies the presence of the strategy itself. Fig. 2 shows the process of adaptation of the strategy of a project-oriented organization to exogenous changes according to the developed method.

The method includes the following steps:

Table 3

Correlation between the university operation processes results according to Balanced Scorecard 'perspectives' and functional task groups

'Perspectives' of the BSC \ Functional task groups of the university	Educational activities management	Research activities management	International promotion and public image of the university	Expanding the range of additional educational services	Staff motivation	Monitoring and development
Finance	+	+	+	+	+	+
Customers	+	+	+	+		+
Internal business processes	+	+	+	+	+	+
Learning and growth	+	+			+	

- *Step 1*: in case the project-oriented organization has no strategy, it should be developed and formalized in the form of a strategic plan.

- *Step 2*: the monitoring of the state of the environment should be organized in order to identify the strategic changes relating to technology, economy, market
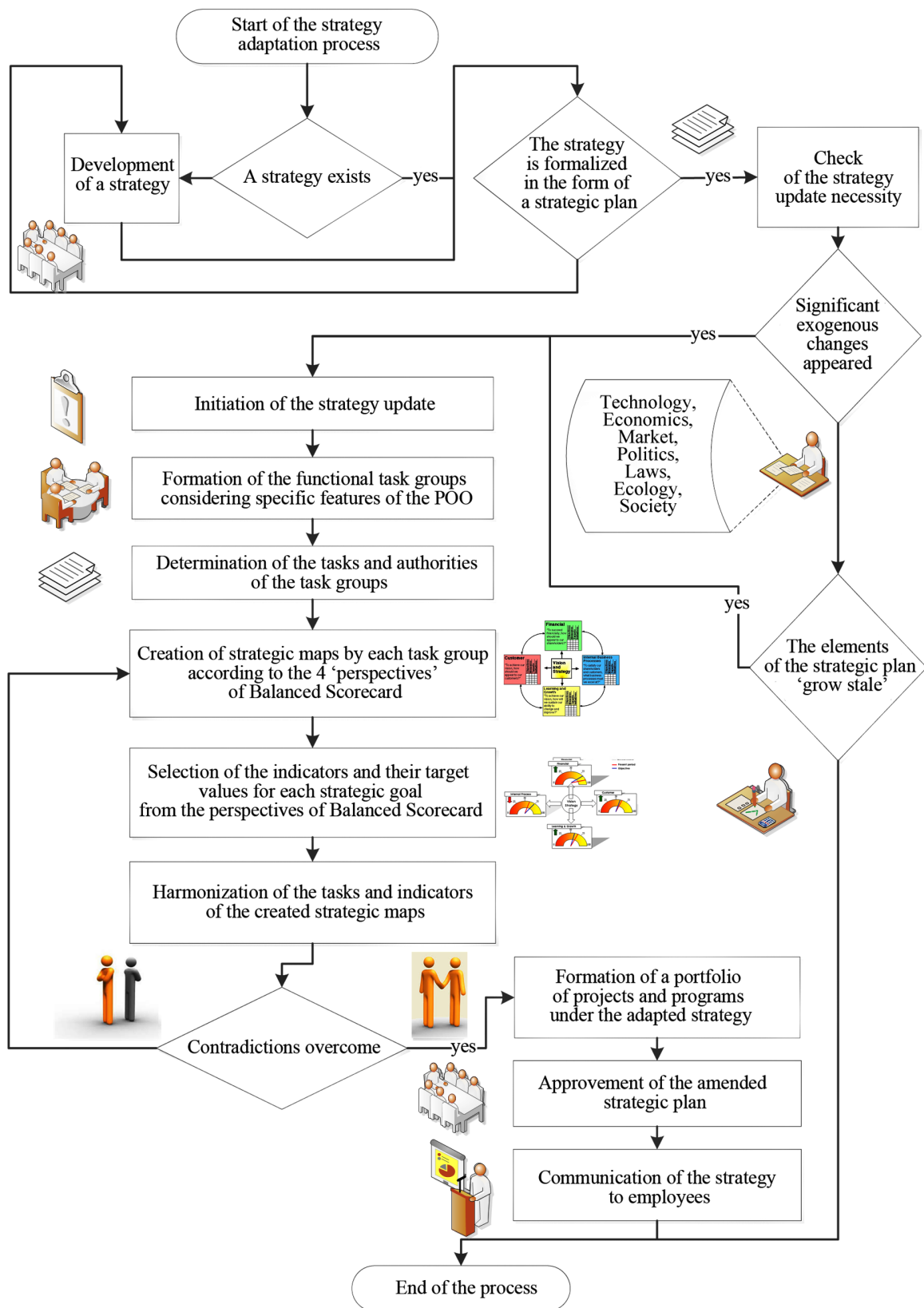

Fig. 2. The process of adaptation of the strategy of a project-oriented organization to the exogenous changes by the developed method

conditions, policies, legislation, environment, and society.

- *Step 3*: the detection of significant exogenous changes should initiate the strategy adjustment. If there are no significant external changes detected, the relevance of the content of the strategic plan should be checked, as it can be lost for other reasons. In current situation, this step should be performed every 1—2 years.

- *Step 4*: to distribute the tasks on the adjustment of the strategy, the functional task groups should be formed taking into account the specific features of the project-oriented organization.

- *Step 5*: each task group should develop a strategic map according to BSC methodology specifying the indicators and their target values.

- *Step 6*: upon overcoming of contradictions the task groups should form a portfolio of projects and programs under the adapted strategy.

- *Step 7*: when the strategy is approved by the executives, it should be communicated to the employees involved in the process of its fulfillment.

- *Step 8*: return to Step 2.

Conclusions and recommendations for further development. The evaluation of the colligation between the presence and the content of the strategy of a university on the one hand and the position of the institution in the Consolidated Rating of Ukrainian Institutions of Higher Education on the other hand was carried out with the assumption that the institutions, which have obtained zero values for 'Content of strategic plan' during evaluation by CEDOS, have no strategy formalized in the form of a plan indeed. In fact, we assume that the absence of this document on the official website of some universities may be explained by the delays in the implementation of new requirements, in particular the requirement of making university's strategy publicly available. This study, combined with the data on the indicators dynamics over the next few years will, in our view, provide interesting scientific results.

It should be emphasized that Spearman's rank correlation coefficient that was used to determine the colligation of the studied features remains constant at any strictly increasing transformation of the observation results measurement scale. In other words, it fits adequately to the ordinal scale, which is important for the further study of the dynamics of the dependencies under consideration.

Thus, even if in a while the dimensions of the indicators will change in the methods of universities rating, the results of which are the source data for this study, the use of Spearman's rank correlation coefficient will still give a valid assessment of the relationships between the qualitative characteristics.

The research presented in this paper allowed us to propose a method of adaptation of the strategy of a university as a project-oriented organization to exogenous changes. The application of the proposed method should be supported by an appropriate information technology for an effective implementation.

The method proposed in the previous research [10] should be used to assess the prospects of an information technology introduction to the management process in the university. It allows determining the expectations of stakeholders and adjusting them by means of managerial influence to ensure the viability of the project product.

Thus, we have developed the method of adaptation of the strategy of a project-oriented organization to exogenous changes based on the Balanced Scorecard with the potential for use of integrated computer technology.

The analysis of the correlation of the presence and the content of the strategy of a university on the one hand and its position in the Consolidated Rating of Ukrainian Institutions of Higher Education 2015, on the other hand, showed that the qualitative characteristics have a significant rank correlation. We believe that further research of the dynamics of this relationship would be interesting from a scientific point of view and its results will be in demand for practical needs.

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Мета. Досліджуючи на прикладі ВНЗ особливості стратегії управління проєктно-орієнтованих

організацій в умовах нестабільного оточення, розробити метод її адаптації до екзогенних змін.

Методика. Ступінь зв'язку між аналізованими факторами (вмістом стратегічного плану та рейтингової позицією ВНЗ) оцінюється в даній роботі за коефіцієнтом рангової кореляції Спірмена. Для оцінки тісноти кореляції між досліджуваними факторами використана шкала Чеддока. Пропозиції авторів базуються на методиці збалансованих показників (BSC).

Результати. Пропонується метод адаптації стратегії проектно-орієнтованої організації до екзогенних змін на основі збалансованої системи показників BSC і можливісті застосування інтегрованих комп'ютерних технологій. Матеріал розкривається на прикладі сучасних умов функціонування вітчизняних ВНЗ. Проведений кореляційний аналіз (між наявністю й вмістом стратегії ВНЗ з одного боку та позицією в консолідованому рейтингу ВНЗ України з іншого боку) показав, що між розглянутими якісними ознаками існує значущий ранговий кореляційний зв'язок.

Наукова новизна. Запропонований авторами метод базується на застосуванні BSC для стратегічного управління ВНЗ з таким доповненням у зв'язку зі специфікою функціонування організації. Розробляти стратегічні карти необхідно в розрізі двох площин: 1) класичні проекції BSC (фінанси, клієнти, внутрішні процеси, розвиток персоналу); 2) функціональні цільові групи ВНЗ (управління освітньою та науковою діяльністю, міжнародне просування й імідж ВНЗ, розширення спектра додаткових освітніх послуг, мотивація співробітників, моніторинг і розвиток).

Практична значимість. Запропонований авторами метод адаптації стратегії має практичну цінність для вітчизняних ВНЗ, оскільки розроблений з урахуванням специфіки їх діяльності. Продемонстровано можливість застосування сучасних IT-технологій для реалізації запропонованого методу.

Ключові слова: *проектний менеджмент, BSC, стратегія, реформування системи вищої освіти*

Цель. Исследуя на примере ВУЗа особенности стратегии управления проектно-ориентированных организаций в условиях нестабильного окружения, разработать метод ее адаптации к экзогенным изменениям.

Методика. Степень связи между анализируемыми факторами (содержанием стратегического плана и рейтинговой позицией ВУЗа) оценивается в данной работе по коэффициенту ранговой корреляции Спирмена. Для оценки тесноты корреляции между изучаемыми факторами использована шкала Чеддока. Предложения авторов базируются на методике сбалансированных показателей (BSC).

Результаты. Предлагается метод адаптации стратегии проектно-ориентированной организации к экзогенным изменениям на основе сбалансированной системы показателей BSC и возможностью применения интегрированных компьютерных технологий. Материал раскрывается на примере современных условий функционирования отечественных ВУЗов. Проведенный корреляционный анализ (между наличием и содержанием стратегии ВУЗа с одной стороны и позицией в консолидированном рейтинге ВУЗов Украины с другой стороны) показал, что между рассматриваемыми качественными признаками существует значимая ранговая корреляционная связь.

Научная новизна. Предложенный авторами метод базируется на применении BSC для стратегического управления ВУЗом со следующим дополнением в связи со спецификой функционирования организации. Разрабатывать стратегические карты необходимо в разрезе двух плоскостей: 1) классические проекции BSC (финансы, клиенты, внутренние процессы, развитие персонала); 2) функциональные целевые группы ВУЗа (управление образовательной и научной деятельностью, международное продвижение и имидж ВУЗа, расширение спектра дополнительных образовательных услуг, мотивация сотрудников, мониторинг и развитие).

Практическая значимость. Предложенный авторами метод адаптации стратегии имеет практическую ценность для отечественных ВУЗов, поскольку разработан с учетом специфики их деятельности. Продемонстрирована возможность применения современных IT-технологий для реализации предложенного метода.

Ключевые слова: *проектный менеджмент, BSC, стратегия, реформирование системы высшего образования*