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SYNCHRONIZATION OF THE FORMALIZED ASSESSMENT OF THE IMPACT OF MODERN FACTORS ON THE ACTIVITY AND MANAGEMENT SYSTEM OF THE ENTERPRISE: AN ALTERNATIVE ANALYTICAL MODEL

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Портоварас Т. Синхронізація формалізованої оцінки впливу сучасних факторів на діяльність і систему управління підприємством: альтернативна аналітична модель. *Вісник економіки*. 2023. № 2. С. 130–142. DOI: <https://doi.org/10.35774/visnyk2023.02.130>

Abstract

Introduction. *In the process of making management decisions, an important element is not only informational and analytical data about the results of activities, but also the magnitude of the influence of internal and external factors on them. In the process of making management decisions, an important element is not only informational and analytical data about the results of activities, but also the magnitude of the influence of internal and external factors on them. This task requires clarification of impact indicators, trends in their changes, and effectiveness. The study of the influence of various factors is quite common in scientific thought. However, this subject of scientific research continues to be relevant. The explanation for this is the fact that external and internal factors significantly affect the development of a business entity in a competitive environment.*

The purpose of the study is to substantiate and formalize the factors that reflect the degree of influence on the quality of management of the economic entity, their effectiveness and determine the strategy of its activity in the long term.

Methods. *In the course of the research, methods of induction and deduction were used, which allowed to assess individual and general economic regularities. Empirical methods and identification in order to determine the factors influencing the management of the business entity. Latent-semantic and structural-logical method - for processing information and*

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clarifying factors that are related to the determination of indicators of effective management of the enterprise's activities, and elimination of negative influencing factors in the process of making managerial decisions. Methods of generalization and abstraction, which allowed to determine the forms of management and the system of instability factors that have an impact on the development system of the business entity in uncertain conditions.

The information base of this study consists of scientific works of Ukrainian and foreign scientists on the assessment of the level of the management system of an economic entity, materials of international scientific and practical conferences, results of personal experience and observations.

The results. *An economic-mathematical model of the evaluation of the control system, taking into account the necessary components, is proposed. This will make it possible to assess the potential of the business entity in a competitive environment. Identification of the form of management of the enterprise was carried out, which will allow determining positive and negative indicators of influence on the process of management decision-making. In the course of the conducted research, it is proposed to divide the factors of instability into basic and specific ones, which show their structural and logical connection with the internal and external environment.*

The weighting factor, which characterizes the degree of influence of other factors on enterprise management, was analyzed and alternative directions for its determination were proposed. The approaches are based on: the income level of the business entity; the extent of computerization of business entities; branch of the national economy; the purpose of the entity's activity. An algorithm for calculating the weighting coefficient of influence is proposed, which allows taking into account unstable factors of the internal and external environment. As a result, a more accurate resulting indicator is obtained.

Prospects. *It is advisable to conduct further scientific research in the direction of the formation of an improved system of indicators of the economic entity's activity, which take into account not only quantitative, but also qualitative indicators. This will make it possible to adequately assess the level of management and develop anti-crisis programs to minimize risks in the company's activity.*

Keywords: *management, forms of management, business entity, analysis, evaluation, influencing factors, computerization, instability factors, internal environment, external environment.*

Formulas: 1, fig.: 1, table: 3, bibl.: 23.

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Relevance of the topic and setting of the problem. Enterprise management is a complex economic process that requires constant monitoring, analysis and assessment of influencing factors. Thanks to such information, it is possible to develop adequate management decisions regarding the introduction of innovations and improvements in financial and economic activity. In the conditions of instability and the ongoing war in Ukraine, the life of business entities is directly dependent on the speed and quality of management decision-making. Objectively, enterprises must quickly respond to changes in the internal and external environment and effectively use their potential in order to function with maximum benefit and efficiency in the long term. Thus, the functioning of a business

entity in such conditions actualizes the need to study the level of its management, as the main element of development.

Analysis of recent research and publications. Such Ukrainian and foreign scientists as O. Haydenko, N. Shevchuk [1], G. Kaletnik, V. Tsikhanovska [2], E. Mnykh [3], M. Lototskyi [4], Yu. Shcheglova, O. Sudakova, M. Lazhe [5], M. Bozhenova [6], Z. Shershnyova [7], N. Yakymenko-Tereshchenko, L. Kozhurina [8], T. Velichko [9], T. Pablo, R. Vicinte, R. Ramiro [10], Cao and D. Tian [11] and others.

However, despite the large number of studies on the effectiveness of management of business entities, we state that the outlined problems are insufficiently researched. Therefore, the study of the methodology of assessing the level of management with the aim of forming a qualitative system of indicators has caused special scientific interest. The latter should take into account factors of instability of the external and internal environment, which directly affect the dynamics of development in a competitive environment.

The purpose of the article is to evaluate the level of management of the business entity and to substantiate the factors of instability that have the greatest impact on the effectiveness of its activities and development in the long term.

Presentation of the main research material. Management of business entities is a complex and long-term process that requires management to constantly monitor the state and results of activities. In the future, these processed data will be used by the management of the enterprise to make management decisions. The main function of management is analysis, which involves assessing the level of influence of internal and external factors on the activity of a business entity. However, it is difficult to predict the magnitude of the influence of factors, since their number is large, and the effect of each of them is different in relation to the activity of the business entity. Therefore, there is a need for the formation of an effective analytical apparatus for assessing factors and economic processes that occur in the internal and external environment of the enterprise. An important issue in this area is the study of the quality of the management level of the enterprise. Such a study identifies the capabilities and potential of the enterprise in the competitive environment, as well as its place in the market. Taking into account all the management components of a business entity, we offer an economic-mathematical model for evaluating the management system, which will allow you to assess its level and identify management weaknesses [12].

In a formalized form, this model can be presented as follows:

$$\Sigma zag = (\varphi_1 U_1 + \varphi_2 U_2 + \varphi_3 U_3 + \varphi_4 U_4 + \varphi_5 U_5 + \varphi_6 U_6 + \varphi_7 U_7) \lambda i \quad (1)$$

where, Σzag - level of management (estimates of management level), U_i - forms of enterprise management (U_1 - general management, U_2 - functional management, U_3 - strategic management, U_4 - financial management, U_5 - production management, U_6 - operational management, U_7 - innovative management), φ_i - weighting factors that characterize the degree of influence on the resulting indicator, and λi - weighting factor that characterizes the degree of influence of other factors on enterprise management.

In our studies [12], the methodology for identifying indicators related to forms of management and their corresponding correction coefficients ($U_1 - U_7$; $\varphi_1 - \varphi_7$) is described in sufficient detail. On the other hand, the approach to determining the weighting factor, which characterizes the degree of influence of other factors on enterprise management (λi), is not specified.

Critically evaluating the different impact on the activity of business entities, it is possible to ascertain its dependence on many characteristics. In particular, the larger the enterprise and the greater its profit, the less dependent it will be on external and internal negative influences. The speed of response to various negative phenomena plays an equally important role in ensuring effective activity. In this context, it is a well-known fact that modern computer technologies are used, which allow you to quickly obtain data for management and take appropriate corrective actions. Also, in our opinion, the industry to which the business entity belongs, as well as the purpose of the activity, are of significant importance. There are industries less dependent and more dependent on various influences. As for the goal, in addition to making a profit (there are subjects that do not have such a goal at all, for example, non-profit institutions and organizations), modern organizational units set completely new goals related to sustainable development, environmental protection, etc. Without delving into the greater detail of such hypotheses, we note that, despite some debate, they definitely take place and are completely objective.

Accordingly, we propose to determine the weighting factor (λ_i) in the following 4 directions, which will allow to determine the degree of influence of other factors on the activity of the economic entity: based on the income level of the economic entity (1); by the amount of computerization of business entities (2); by branch of the national economy (3); according to the purpose of the business entity's activity (4).

Therefore, according to the first (1) direction, it will be advisable to use the following values of the weighting factor λ_i . For example, a possible variant of using the income level indicator is the division of the enterprise into micro, small, medium and large, carried out in the Tax Code of Ukraine [13] (tabl.1).

Table 1

Classification of enterprises of Ukraine in accordance with Law of Ukraine No. 2164-VIII and the recommended values of the weighting coefficient of influence λ_i

Classification of enterprises	Net income from the sale of products (goods, works, services)	λ_i
micro enterprises	up to 700 thousand euros	1
small enterprises	up to 8 million euros	0,75
medium enterprises	up to 40 million euros	0,50
large enterprises	more than 40 million euros more than 40 million euros	0,25

Note: author's generalization.

An important element of the business entity's activity is computerization (including management decision-making processes), or in other words, the level of IT application in certain structural divisions and services. To a greater extent, usually IT is represented in relation to analytical processes (tabl. 2).

Table 2

Software products with automated business processes at the enterprise

№	System name	Main information elements of the system	Purpose of the system
1	ERP (Enterprise Resource Planning)	<ul style="list-style-type: none"> - inventory management; - sales and supply; - design; - production management; - project management; - quality management; - financial management; - warranty service; - transport management 	provides planning and control of enterprise resources
2	MRP (Material Requirements Planning)	<ul style="list-style-type: none"> - description of the condition of the materials; - plan-schedule of production volumes; - product specification; - order plan; - report on planning bottlenecks; - performance report; - report on forecasts 	carries out planning of production needs in material resources
3	SCM – Supply Chain Management	<ul style="list-style-type: none"> - planning, formulation of calendar schedules, design of supply networks, modeling of various situations, analysis of operations; - tracking of logical operations and control of their execution 	logistics management system (supply chain management)
4	PDM – Product Development Management	<ul style="list-style-type: none"> - management of engineering data; - management of selection information; - management of technical data; - management of technical information; - management of images and documents, manipulation of information related to the product 	system for managing production data at industrial enterprises (managing the assembly of products)
5	(CAD/CAM – Computer-Aided Design/ Manufacturing	<ul style="list-style-type: none"> - computer design support; - computer support for production 	system of automated design and technological preparation of production (automated production design)
6	BPM (business process management)	<ul style="list-style-type: none"> - repository of business processes; - means of modeling business processes; - means of adjusting business processes; - a tool for integrating the information systems used at the enterprise at the level of business processes performed in the BPM system; - work portal; - means of analysis and reporting 	the concept of process management of enterprises, which considers business processes as special resources of the enterprise, which continuously adapts to constant changes

7	AIS – Accounting Information System	- carries out assessment, analysis and forecasting of income and profit; - evaluates, analyzes and forecasts other economic events in the enterprise and its divisions	information automated accounting system (registers business processes and makes management decisions)
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Note: author’s generalization based on [14; 15; 16; 17; 18].

The need for them is caused by the need to quickly receive adequate information, which will be the basis for making management decisions. The use of such information allows you to avoid crisis situations at the enterprise. Computerization is especially relevant in large enterprises, since the processing of a large mass of information is a very time-consuming and lengthy economic process, where time does not work in favor of the stability and development of the business entity in a competitive environment.

Therefore, determining the level of computerization is important in the process of analyzing and making management decisions of a business entity. So, the next possible option for determining the weighting factor λ_i (2) can be its identification based on the volume (level) of computerization of processes at the enterprise. If up to 25% of operations and processes are computerized, it is advisable to set the coefficient at 0.25; if from 25 to 50%, the coefficient is equal to 0.5; from 50 to 75% – the coefficient will be 0.75; more than 75% - the coefficient will be equal to 1.

Regarding the determination of the weighting coefficient λ_i by economic sector (3), its establishment can be based on the ratio of the GDP growth index to the inflation index (GDP/li). That is, it is worth paying attention to the fact whether the level of GDP of a particular industry changes significantly under the influence of existing conditions. This issue is relevant for further research. After that, you can identify the corresponding coefficients. At the same time, for less dependent industries, the weighting factor with the smallest value should be used, and for more dependent industries, on the contrary, with the largest one. And the second method with a similar algorithm is to set the coefficient λ_i by economic sector (3) based on indicators of the volume of activity (% to the base year, converted into a coefficient) by 3 sectors: industry, construction, agriculture, correlated with the inflation index (li) (tabl. 3).

Table 3

Classification of branches of the national economy and recommended values of the weighting coefficient of influence λ_i

Indicator	industry			construction			agriculture		
	2020	2021	2022*	2020	2021	2022*	2020	2021	2022*
Volumes of activity, % until 2020 (OB)	1,00	1,10	0,90	1,00	5,10	5,00	1,00	14,40	12,10
inflation index (li), %	1,05	1,10	1,27	1,05	1,10	1,27	1,05	1,10	1,27
ratio OB/li	0,95	1,00	0,71	0,95	4,64	3,94	0,95	13,09	9,53
the recommended weighting factor, λ_i **	x	x	0,99	x	x	0,66	x	x	0,33

Note: * – unofficial data, summarized on the basis of the author’s research of available sources; ** - is assigned based on the value of the obtained OB/li ratio in the reverse order: the higher the indicator, the lower the λ_i coefficient will be; author’s generalization; data sources [19; 20; 21; 22; 23].

In the process of activity of a business entity, it is important to define its purpose. This is important for several reasons. First, for the formation of plans, including strategic ones. Secondly, in accordance with the goal, the management develops and carries out the distribution of tasks between different levels of management and structural units. In both cases, the identification of the goal serves as the basis for the rational and effective functioning of the business entity. In fig. 1. schematically shows the main elements of the relationship “the purpose of the business entity - management”, the key position among which is system analysis and its results for decision-making.

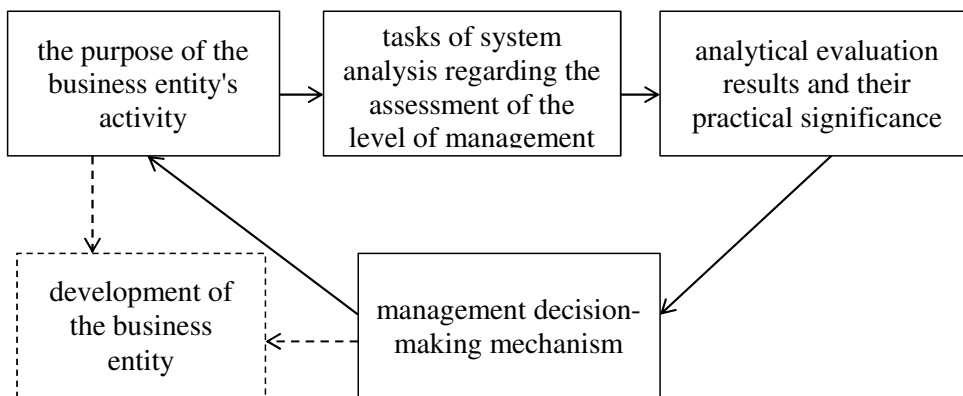


Fig. 1. The relationship between the purpose of the business entity and management decision-making.

Note: author's generalization.

The sequence of conducting a system analysis in accordance with the purpose of the business entity leads to the formation of results that will be of practical importance in the process of making management decisions [21; 22; 23]. This mechanism is a continuous process because the goal of the enterprise is its sustainable development in a competitive environment.

So, the last option for determining the weighting factor λ_i (4) is its identification depending on the purpose of the business entity's activity. We propose to consider the following goals of the enterprise and establish the corresponding volumes of the weighting factor:

1) obtaining profit from the economic activity of the business entity (we can conditionally suggest the value of the weight indicator λ_i equate it to 0.25);

2) profit + use of funds for the purposes of enterprise development (for example, purchase of fixed assets, development of new types of activities, etc.), while the value of the weighting indicator is equal to 0.50;

3) making a profit + using funds for the purposes of enterprise development + development of social issues of enterprise employees: the value of the weighting indicator λ_i is equal to 0.75;

4) making a profit + using funds for the purposes of enterprise development + solving social and environmental issues: in this case, we can set the weighting index λ_i to 1.

Also, taking into account all the proposed methods, we can comprehensively combine and determine a single weight factor λ_i and maximally take into account the effects of unstable factors on the activity of the business entity.

Conclusions and prospects for further research. So, we can consider the system of evaluating the level of management of economic entities as a complex economic and mathematical process, which, with the use of an adequate analytical base, will provide adequate evaluation data. Evaluation of the management system according to the proposed approach, using appropriate weighting factors, will provide an opportunity to establish directions for its improvement and improve the principles of making effective management decisions. For the effective management of the enterprise, synchronicity is required when conducting analytical studies. This synchronicity is most in demand when analyzing the influence of external and external factors. Because as a result, we will receive objective data for further planning of the system of actions to eliminate risk processes. The evaluation of the level of management developed by us is appropriate, which takes into account the forms of management and the factors that influence them. The model proposed by the author will adequately evaluate the management and adjust the directions of decision-making to eliminate crisis situations. In the future, it is important to implement the task of optimizing the list of influencing factors, their classification, substantiation, and attracting new indicators. In addition, further research in the direction of developing a simulation model of adaptive management of business entities is promising.

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**СИНХРОНІЗАЦІЯ ФОРМАЛІЗОВАНОЇ ОЦІНКИ ВПЛИВУ СУЧАСНИХ
ФАКТОРІВ НА ДІЯЛЬНІСТЬ І СИСТЕМУ УПРАВЛІННЯ ПІДПРИЄМСТВОМ:
АЛЬТЕРНАТИВНА АНАЛІТИЧНА МОДЕЛЬ**

Анотація

Вступ. У процесі управлінських рішень важливим елементом є не тільки інформаційно-аналітичні дані про результати діяльності, а й обсяг впливу внутрішніх та зовнішніх факторів на них. Для вирішення цього завдання необхідно уточнити показники впливу, тенденції їхніх змін, результативність. Дослідження

впливу різних факторів поширене в науковій думці. Проте цей предмет наукових пошуків все ще актуальний. Поясненням цього є той факт, що зовнішні та внутрішні фактори суттєво впливають на розвиток суб'єкта господарювання в конкурентному середовищі.

Мета дослідження полягає в обґрунтуванні та формалізації факторів, які відображають міру впливу на якість управління суб'єктом господарювання, їх результативність та визначають стратегію його діяльності у довгостроковій перспективі.

Методи. У процесі проведеного дослідження використовувались методи індукції та дедукції, що дали змогу оцінити окремі та загальні економічні закономірності. Емпіричні методи та ідентифікація з метою визначення факторів впливу на управління діяльністю суб'єкта господарювання. Латентно-семантичний та структурно-логічний метод – для оброблення інформації й уточнення факторів, які пов'язані з визначенням показників ефективного управління діяльності підприємства, та усунення негативних факторів впливу в процесі ухвалення управлінських рішень. За допомогою методів узагальнення та абстрагування визначено форми управління та систему факторів нестабільності, які впливають на систему розвитку суб'єкта господарювання в невизначених умовах.

Інформаційну базу дослідження становлять наукові праці українських і зарубіжних учених з питань оцінювання рівня системи управління суб'єктом господарювання, матеріали міжнародних науково-практичних конференцій, результати особистого досвіду та спостережень.

Результати. Запропоновано економіко-математичну модель оцінювання системи управління із врахуванням необхідних компонентів. Це дасть змогу оцінити потенціал суб'єкта господарювання в конкурентному середовищі. Проведено ідентифікацію форми управління підприємствам, яка дасть змогу визначити позитивні та негативні показники впливу на ухвалення управлінських рішень. У процесі проведеного дослідження запропоновано фактори нестабільності поділити на основні та специфічні, які показують їх структурно-логічний зв'язок із внутрішнім та зовнішнім середовищем.

Проаналізовано ваговий коефіцієнт, який характеризує міру впливу інших чинників на управління підприємством та запропоновано альтернативні напрямки його визначення. Основу підходів становлять: рівень доходу суб'єкта господарювання; обсяг комп'ютеризації суб'єктів господарювання; галузь національної економіки; мета діяльності суб'єкта господарювання. Запропоновано алгоритм розрахунку вагового коефіцієнта впливу, що дозволяє враховувати нестабільні фактори внутрішнього і зовнішнього середовища. В результаті отримуємо більш точний результуючий показник.

Перспективи. Подальші наукові дослідження доцільно проводити у напрямку формування удосконаленої системи показників діяльності суб'єкта господарювання, які враховують не лише кількісні, а й якісні показники. Це дасть змогу адекватно оцінити рівень управління та розробити антикризові програми щодо мінімізації ризиків у процесі діяльності підприємства.

Ключові слова. управління, форми управління, суб'єкт господарювання, аналіз, оцінка, фактори впливу, комп'ютеризація, фактори нестабільності, внутрішнє середовище, зовнішнє середовище.

Формули: 1, рис.: 1, табл.: 3, бібл.: 23.

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