The improvement of theoretical and methodological approaches to the formation of innovativeness of business processes of enterprises has been carried out. A model of innovativeness of business processes has been formed, which takes into account the principles, goals, methods of improving the management of business processes and the factors of influence on them.

The main directions of the formation of an effective business model of an aviation enterprise based on the innovativeness of business processes are investigated and strategic directions of its provision are proposed. At the same time, the following aspects of enhancing the innovative activity of an aviation enterprise are highlighted as: the influence of the external and internal environment, innovative activity, analysis of the innovative potential and innovativeness of business processes.

An integrated approach to assessing the effectiveness of the business model of an aviation enterprise based on the innovativeness of business processes has been formed. This approach allows to provide the necessary level of innovative flexibility of the aviation enterprise and independence in the application of innovative business processes. The author has carried out a practical implementation of the applied approach at aviation enterprises. The study made it possible to identify the most important business processes for aviation enterprises. These include: the level of support (provision) of innovation, the turnover ratio of current assets, the provision of material and technical resources. As a result of the assessment, these business processes have the highest scores (4.55; 4.43 and 4.26, respectively). The assessment of the financial stability of aviation enterprises in the market was carried out and the indicators of the assessment were calculated. An integral indicator of the financial stability of aviation enterprises has been determined, according to which the problems of the effective functioning of Ukrainian aviation enterprises have been identified. At the same time, small aviation enterprises suffer losses and are characterized by a low level of financial stability

Keywords: business model, integrated approach, innovativeness of business processes, aviation enterprise, business model of an aviation enterprise, innovative potential, business processes

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COMPREHENSIVE APPROACH TO THE EFFICIENCY ASSESSMENT OF THE BUSINESS MODEL OF THE AVIATION ENTERPRISE BASED ON BUSINESS PROCESS INNOVATION

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1. Introduction

The issues of enterprise management based on the formation of effective business models that are implemented using a number of balanced and well-grounded business processes are still gaining a separate relevance. The choice of an effective business model requires the use of a wide range of tools for making managerial decisions, because it affects the vital activity and competitiveness of an economic entity in the long term. At the same time, the problem arises of assessing the effectiveness of management decisions when choosing certain variations of the impact on the effective indicator. World experience shows that the modern dynamically developing market of goods and services, increased competition, low volume of innovations at enterprises lead to a decrease in the competitiveness of products. There is an emergence of barriers in international trade, the raw material orientation of exports necessitates the search for new tools and methods for managing the innovation of business processes. One of the progressive methods of managing the manufacturability of existing business processes, which can optimize the economic and innovative activities of enterprises, will improve the competitiveness and quality of products. The business process in the field of technological innovation is of particular importance in building an effective business model of an enterprise, has its limits and is characterized by inputs to the process, which can be the results of research and development. The process ends with results – the emergence of a new technology for the production of traditional, improved or fundamentally new products, the introduction of information systems, new energy sources, and the like.

The efficiency of business process management in the field of technological innovation at an enterprise directly depends on the quality and completeness of information used in the process of implementing a business process management system. The more factors the management system selected (developed) by the enterprise takes into account, the faster, more accurately and more adequately the management respond to changes in the external and internal environment of the enterprise.

One of the most important conditions for the activities of aviation enterprises in modern economic conditions is to provide management with effective tools for analysis and forecasting. Aviation enterprises need to be guided by the trends of the global air transportation market with the subsequent adoption of management decisions based on analytical information. Aviation enterprises must constantly use the latest innovative technologies, introduce new business processes and analyze all current activities.

That is why, the development of an integrated approach to assessing the effectiveness of the business model of an aviation enterprise based on the innovativeness of business

processes is gaining relevance. After all, it is the application of this approach that allows to determine which business processes affect the activities of the aviation enterprise and which it is better to abandon, or reorient your activities.

2. Literature review and problem statement

A great contribution to the creation of a scientific basis for the formation and functioning of business processes of business entities has been made in many works by both Ukrainian and foreign authors. So, in work [1] it is determined that business processes at an enterprise are capable of increasing the efficiency and effectiveness of an enterprise by improving and introducing innovations. However, there is no direction for an integrated approach to solving this issue. It is also advisable to consider the features of the formation of individual components of the innovative potential in accordance with the conditions of the enterprise and the relationship between them in the implementation process.

In [2], it is proposed to consider business processes as activities aimed at creating a product. Businesses can benefit from providing new services or improving existing business processes. But there are still unresolved issues related to the achievement of the efficiency and effectiveness of the enterprise, it becomes possible only on the basis of coordinated preventive actions of the management and development strategy. The option to overcome this is the flexibility of the enterprise depending on changes in the external environment, the formation of rational business plans and the presentation of effective business models.

The work [3] defines the business model as a way of doing business, functions in conjunction with innovation. This is why businesses that commercialize new ideas and technologies through business models see them as a place for innovation. However, there is no definition of the volume of investments in the development and implementation of innovations and the effectiveness of the results obtained. Therefore, it is important to monitor the dynamics of performance indicators of an enterprise under the influence of changes in the business model and parameters of innovation.

The authors of the work [4] determined that the business model acts as a mediator in the process of value creation. It operates between the technical and social spheres, selects and filters technologies, transforms them into specific configurations that will be offered on the market. This article focuses on developing value propositions and seizing opportunities for sustainable development in the long term, based on the innovativeness of the business model. However, the work does not highlight the further mechanism and limiting capabilities of enterprises to finance innovation.

In modern conditions of doing business, it is business processes that correspond to the technology of production activities, the opportunities to form an innovative enterprise. In work [5], the concept of an innovative business model is proposed, which consists in designing new or transforming existing business models. A way to overcome this can be a combination of individual business processes, which depend on their efficiency and the formation of effective business models on their basis.

The study of business models for doing business by air enterprises requires an understanding of the essence of organizing the air transportation itself, because it is not only aviation equipment, but also methods and methods of transportation, personnel, logistics, etc.

It should be understood that the relevant components of the business model have a great influence on the level of aviation enterprise operation. That is why, in [6], four main components are identified that affect the business model of an aviation enterprise: value proposition; market segmentation; value chain; profit structure. However, the work does not take into account methodological approaches to determining and predicting the results of an aviation enterprise's activities, depending on the proposed components of the business model.

In the scientific work [7] it is noted that the current level of international competition determines rather stringent requirements for aviation enterprises to create a successful business. All this allows us to assert that it is advisable to be involved in innovation and the creation of flexible organizational structures. This leads aviation enterprise executives to increasingly consider reorganizing financial and economic relations as a means to create competitive business models based on innovation. The implementation of innovations in business models allows for the provision of better customer service and the provision of new forms of activity.

In general, scientists pay special attention to the formation, assessment, management of business processes and its components, as well as the essence of the main types of business models of enterprises, which will improve the resulting indicators and ensure the competitiveness of the enterprise in a strategic perspective. All this allows to assert that it is advisable to use an integrated approach to assessing the effectiveness of the business model of an aviation enterprise based on the innovativeness of business processes. At the same time, it is important to take into account the possibilities of the financial stability of the aviation enterprise and establish the level of margin for achieving the desired goal.

3. The aim and objectives of research

The aim of research is to develop an integrated approach to assessing the effectiveness of the business model of an aviation enterprise based on the innovativeness of business processes. This will make it possible to promote the stimulation of economic activity, the growth of the competitiveness of the enterprise and its adaptation to the conditions of the external environment.

To achieve the aim, the following objectives were set:

– to consider and improve the theoretical and methodological approaches to the study of the innovativeness of the business processes of the enterprise;

– to improve the directions of forming an effective business model of an aviation enterprise based on the innovativeness of business processes;

– apply mathematical tools to determine the stages of the approach to assessing the effectiveness of the business model of an aviation enterprise;

– assess the level of financial stability of aviation enterprises in competitive markets and determine their competitive position.

4. Materials and methods of research

The research was carried out using the methods of systems analysis and theoretical generalization, observation and comparison. These methods were used to form the concept of an effective business model of an enterprise, it is achieved in

assessing the sources of the available resources of the enterprise and the innovativeness of its development, as well as analyzing the existing business processes at the enterprise.

On the basis of theoretical concepts, an analysis was made of the possibility of their application in practice for aviation enterprise. In particular, an integrated approach was used to assess the business processes of an aviation enterprise and their combination to determine which business processes have the greatest impact on the efficiency of the business model of an aviation enterprise.

This approach allows ensuring the competitiveness of the aviation enterprise and determining the level of financial stability in a changing external environment.

5. Results of the study on the formation of the effectiveness of the business model of an aviation enterprise based on the innovativeness of business processes

5. 1. Formation of a theoretical and methodological approach to the study of innovativeness of business processes of an enterprise

An enterprise as an open economic system has many interrelated processes that, by their functioning, determine its state and development prospects in the future. The processes occurring within the enterprise are interconnected and the general condition of the entire enterprise directly depends on them. In today's changing external environment, enterprises should use an innovative way of development, because it is the principle of innovative management based on the effective application and implementation of business processes that allows them to adapt to changes. Achieving the desired synergistic interaction between the strategy and the financial goals of the enterprise is one of the areas of innovativeness of business processes as a component of enterprise management as a whole. That is why it is optimal to ensure the efficiency of business processes of an enterprise and to attract modern information technologies, which will allow rational use of time when describing the relationship between the results of business processes and the costs of achieving them. Thus, to ensure the innovativeness of the business processes of an enterprise, it is necessary to take into account the principles, goals, methods of improving the management of business processes and factors influencing the innovativeness of business processes. It should be noted that the issues of business process management arise sharply at the enterprise, when at a certain stage of its development there are disruptions in the work of departments and production. If they are of a regular nature and significantly affect the efficiency of the enterprise itself, it is necessary to quickly respond to them. With this in mind, Fig. 1 shows a model of the formation of innovativeness of business processes of an enterprise.

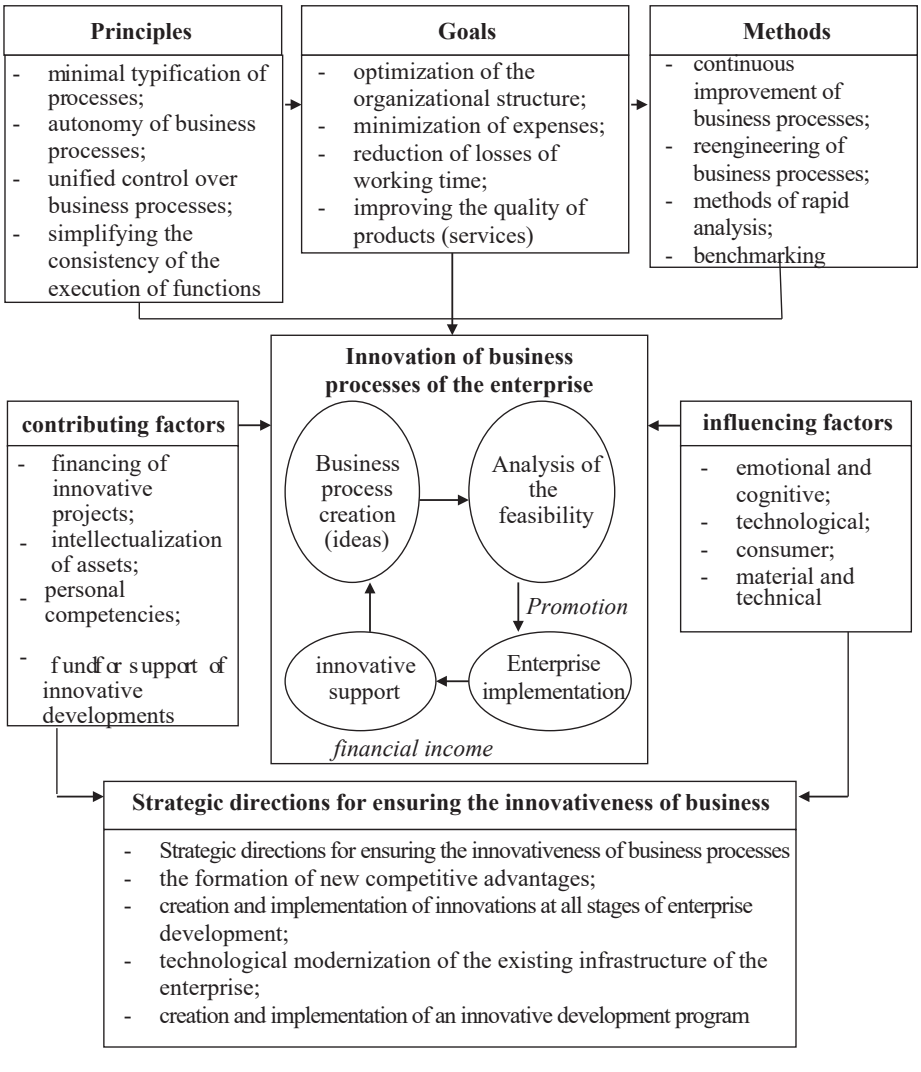

Fig. 1. The model of the innovativeness formation of enterprise business processes

In order to ensure the innovativeness of business processes at the enterprise, it is proposed to apply a theoretical and methodological approach to improve and implement business processes. This approach allows to diagnose the existing business processes of the enterprise and establish qualitative and quantitative characteristics that determine the degree of management and functioning efficiency. It also allows continuous improvement and optimization, therefore it is very important to form a system for improving the business processes shown in Fig. 2.

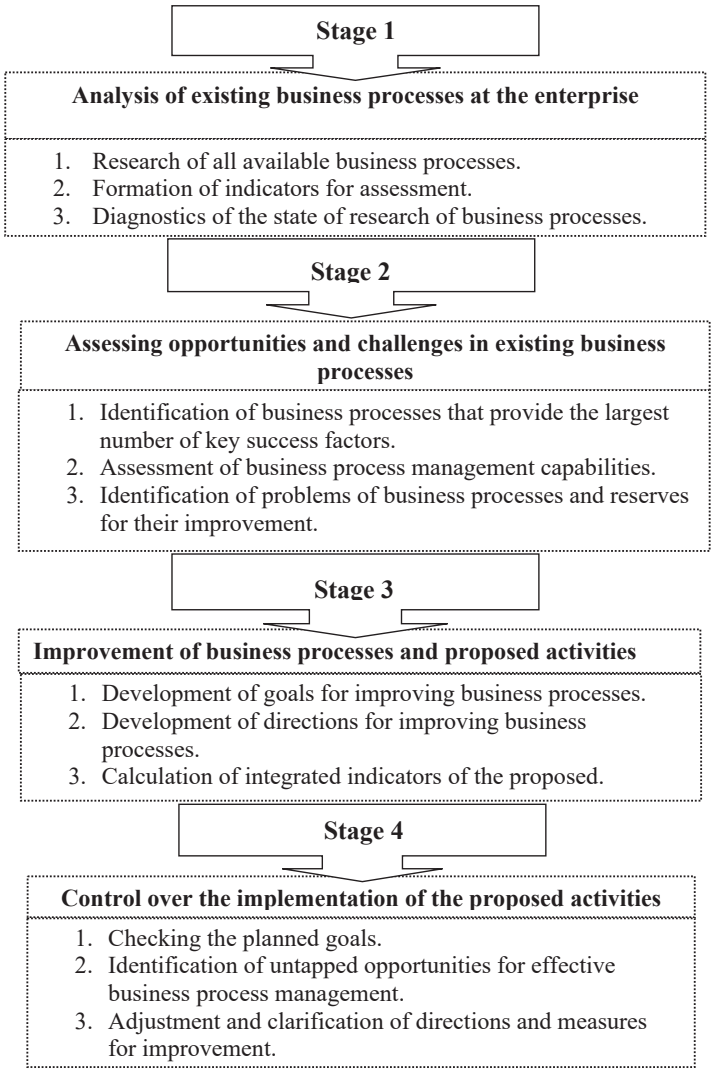

Fig. 2. Theoretical and methodological approach to improving the innovativeness of business processes of an enterprise

The first stage consists in analyzing the existing business processes in the enterprise, at the second stage, an assessment of opportunities and problems in existing business processes is carried out. At the third stage, there is a process of improving business processes and the implementation of the proposed activities, at the fourth stage – control over the implementation of the proposed activities to improve business processes.

The effective formation of the innovativeness of business processes at the enterprise is proposed to be carried out in the following ways:

– selection of the most promising innovative business projects;

– differentiation of criteria for the selection of investment business projects;

– ensuring the compliance of the proposed investment business processes with the production and financial potential of the enterprise;

– ensuring the consistency of investment business processes for the most important indicators of the enterprise.

5. 2. Directions of the formation of an effective business model of an aviation enterprise based on the innovativeness of business processes

One of the key points in shaping the business model of an enterprise is identifying sources of sustainable competitive advantage that will create maximum value for consumers. The successful commercialization of new technologies also depends on the business model in which they are brought to market. The dynamic development and trends of business intellectualization, the increasing role of innovation in increasing the competitiveness of the enterprise should have a comprehensive impact on the development of the enterprise, therefore, building an effective business model covers all aspects of enterprise management. As a key component of an effective business model are business processes, which should be based on an innovative aspect. Innovative business practices involve the use of radical and open innovation. Aviation enterprises that enter the market with innovative business processes and appropriate competitive strategies have significant market advantages and can set their own rules with a strong competitive edge over competitors. The business model of the aviation enterprise must ensure a systemic combination of goals and business processes with the realities of the external environment, which is changing insidiously and rapidly.

The business processes of the aviation enterprise are very diverse and rather complicated, thanks to which the aviation enterprise can operate successfully and meet the needs of customers. In today's environment, the overall business model must change in line with the rapid changes in the market environment. This requires managers to analyze, check, improve, and sometimes reorganize business processes in order to achieve even greater efficiency. At the same time, you need to focus on what is the specificity of a given aviation enterprise, on which customers it focuses, in what geographic areas it operates. This is what will allow you to achieve the best effect, that is, focusing on those basic elements of business processes that can bring maximum results. An important issue remains the correct distribution of business processes into elements and the definition of their individual components from the point of view of the possible process of their modeling and presentation in the form of an interconnected structure.

Modern directions for the development of effective enterprise activity require a rational choice of ways to manage business processes. Monitoring the economic sustainability of business processes of an enterprise consists in tracking indicators of economic activity aimed at timely identification and early prevention of problems, as well as deviations from their criteria [8].

To implement an effective business model of an aviation enterprise, it is necessary to:

1. Determination of new key factors of success, which are determined when assessing the internal environment of the enterprise, its internal potential.

2. Development and provision of innovativeness of business processes.

3. Increasing the innovative activity of the enterprise, which manifests itself in the main activities of the aviation enterprise: the purchase of air tickets is carried out via the Internet, the technological update of aircraft, the provision of additional services for passengers, etc.

4. Assessment of the strategic analysis of the innovative potential of an aviation enterprise necessitates an analysis of the strengths and weaknesses of its activities, an analysis of the innovation climate and goals and trends in the development of the air transport industry.

Sustainable development of an enterprise is characterized by the ability to carry out continuous economic activities at any time in conditions of uncertainty of environmental impact. The implementation of measures for the sustainable development of the enterprise has a number of economic, social and environmental directions. So these areas include:

– increasing the level of enterprise management;

– opening up new market opportunities;

– growth of the investment attractiveness of the enterprise;

– innovative approach to the development of goods and services;

– minimization of risks;

– improving the efficiency of resource allocation and reducing costs.

However, to ensure sustainable development of the enterprise, there are a number of problems that need to be addressed through monitoring, reengineering and redesign of existing business processes [9–11].

Fig. 3 shows the system of forming an effective business model of an aviation enterprise based on the innovativeness of business processes.

Thus, the successful implementation of the business model of an aviation enterprise makes it necessary to harmonize the use of innovative business processes, analysis of the external and internal environment of the enterprise and strategic analysis of innovative potential.

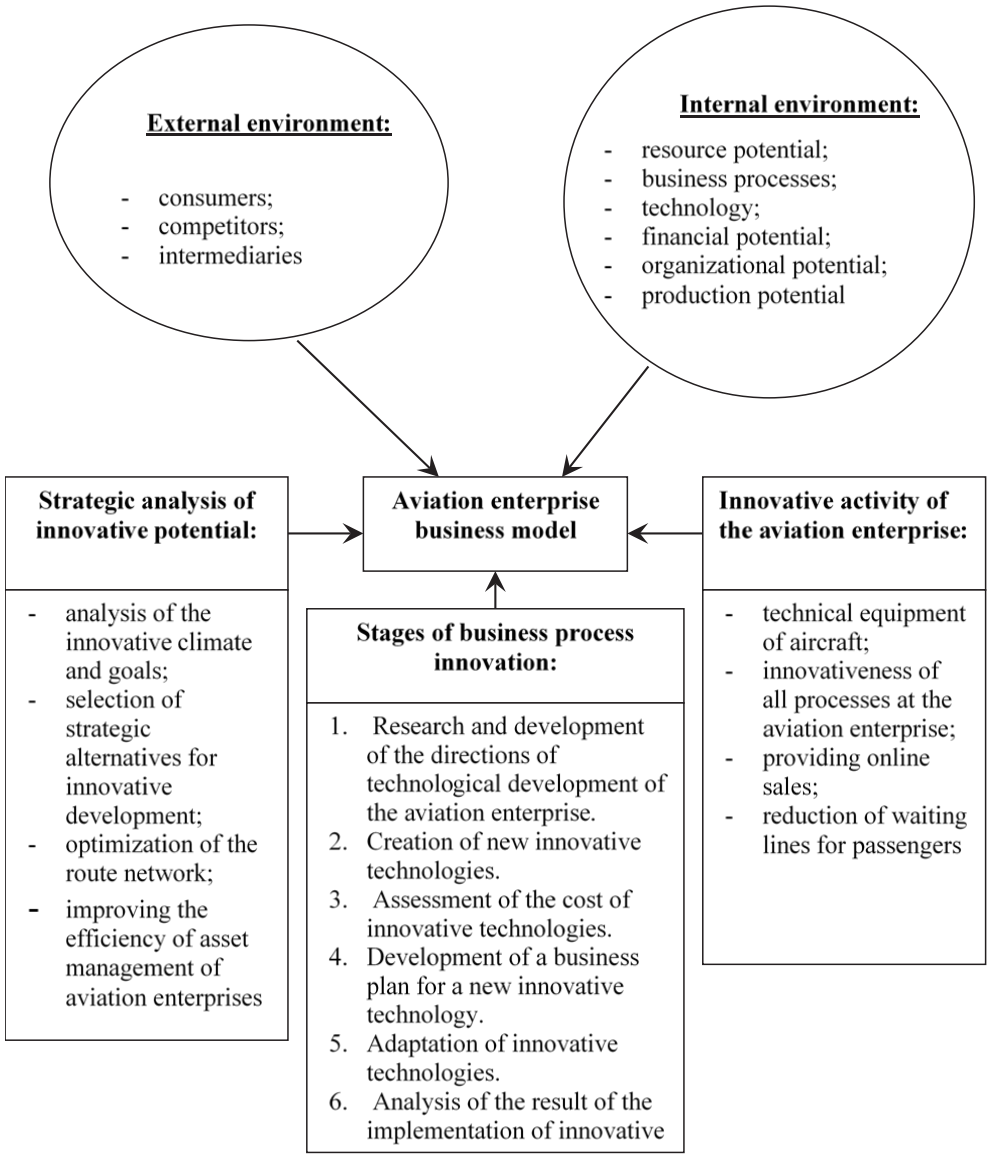

Fig. 3. The system of forming an effective business model of an aviation enterprise based on the innovativeness of business processes

Thus, any enterprise that plans to develop or survive in a dynamic environment has to face constant change as its ability to continue to operate is under threat. In such cases, the modern economic environment for most enterprises is forced to become flexible, constantly react to changes in the external environment. To develop and implement various local and global projects of changes in their business activities should be developed without loss of control [12].

It should also not be forgotten that investments play a critical role in ensuring the innovative potential of an enterprise. There are several factors that characterize the investment attractiveness of an enterprise. Among them, one can single out the stability of the financial condition and the level of financial indicators, the competitiveness of products, the degree of riskiness of investments, as well as the existing potential for expanding innovations. Investments play an important role in the development of the enterprise, which means that they will contribute to its development and improvement, as well as the overall improvement of the innovation climate in the country [13].

5. 3. Mathematical tools for applying the stages of the approach to assessing the effectiveness of the business model of an aviation enterprise

Choosing an effective business model for an aviation enterprise in the face of uncertainty requires the use of a wide range of decision-making tools, among which methods of data mining or data mining stand out. These methods are based on the provisions of the theory of fuzzy sets, including using the fuzzy inference algorithm, which consists of the following stages [14]:

1. Stage 1. Formation of a set of input linguistic variables:

$$X^* = \left(x_1^*, x_2^*, ..., x_n^*\right), \quad (1)$$

where x_1, x_2, ..., x_n – the name of the incoming linguistic variables 1, 2 ... n – the ordinal number of the incoming variable.

2. Stage 2 is fuzzification, that is, the formulation of membership functions for the terms of all input variables, the compilation of logical rules for fuzzy inference and determination of the weight of each rule.

According to [15], if to denote the membership function of the i-th input fuzzy variable x_i) from the interval $\left[\underline{x_i}, \overline{x_i}\right]$ to j-th fuzzy term as $\tilde{t}_{ij}$ for the input variable or $\tilde{d}_{ij}$ for the output variable. Then the fuzzy term-set can be specified as a definite integral bounded by the function x to some fuzzy membership set $\mu_j(xi)$ on the segment $\left[\underline{x_i}, \overline{x_i}\right]$, where $\underline{x_i}$ – the left boundary of the interval, $\overline{x_i}$ – the right boundary of the interval.

In this study, let's use membership functions of the Gaussian type, corresponding to the normal distribution density of the data [16]:

$$\mu(x) = e^{-\frac{1}{2}\left(\frac{x-b}{c}\right)^2}, \quad (2)$$

where b – coordinate of the maximum of the membership function, c – concentration coefficient of the membership function, which is determined based on the distribution of the attribute in the general population.

The fuzzy knowledge base also contains a set of rules that are specified by fuzzy term sets [15]:

$$\begin{pmatrix} x_1 = \tilde{t}_{1j} \Theta_j x_2 = \\ = \tilde{t}_{2j} \Theta_j ... \Theta_j x_n = \tilde{t}_{nj} \text{ with weight } \alpha_j \end{pmatrix} \Rightarrow y = \tilde{d}_j,$$

$$j = \overline{1,m}, \quad (3)$$

where $\tilde{t}_{1j}, \tilde{t}_{2j}, ..., \tilde{t}_{nj}$ – value of the input linguistic variable, j – ordinal number of the linguistic term, y – name of the output linguistic variable; $\tilde{d}_j$ – value of the output linguistic variable; θ_j – one of two possible logical AND or OR operations.

The measure of fulfilling the premise of each rule for a set of input variables:

$$\mu_j(X^*) = \\ = w_j\left(\mu_j\left(x_1^*\right) \Theta_j w_j\left(x_2^*\right) \Theta_j ... \Theta_j w_j\left(x_n^*\right)\right), \quad j = \overline{1,m}, \quad (4)$$

where wj denotes the significance of the j-th rule in the fuzzy knowledge base.

3. Stage 3 "Logical inference" [15]: the measure of the truth of the conclusion of each of the rules of the created knowledge base is determined by prod-activation. It occurs by identifying the membership function of the j-th term of the output variable ($\mu_{dj}(\omega)$), taking into account the degree of truth of the premise of each rule for the vector of input variables ($\mu_j(X^*)$).

4. Stage 4 "Composition" –fuzzy terms of the output variables are combined by aggregation (agg) according to the maximum operation [15]:

$$\tilde{\omega} = \text{agg}\left(\tilde{d}_1^*, \tilde{d}_2^*, ..., \tilde{d}_m^*\right) = \max\left(\tilde{d}_1^*, \tilde{d}_2^*, ..., \tilde{d}_m^*\right), \quad (5)$$

5. "Defuzzification" stage, as a result of which a set of fuzzy inferences turns into a crisp number based on the Sugeno algorithm, which involves the use of one of two types of fuzzy inference rules:

a) the original variable is calculated as the linear dependence of the output variable on combinations of input variables [17]:

$$\omega = \varepsilon_1 \times x_1 + x_2 \times u_2 + ... + \varepsilon_n \times x_n, \quad (6)$$

where x_1, $x_2 ... x_n$ – the quantitative values of the linguistic variables; ε_1, $\varepsilon_2 ... \varepsilon_n$ – weight coefficients of the corresponding equations;

b) the original variable is defined as a constant [17]:

$$\omega = \gamma_n, \quad (7)$$

where y_n – the constant value of the output variable.

The given algorithm of fuzzy inference may be appropriate for determining the stages of an integrated approach in solving various problems in the field of economics and enterprise management, since it shows the influence of each parameter of the business model of an enterprise in various sectors of the economy [18].

According to the approach: financial result, profitability and performance indicators are indicators that accumulate the results of various types of activities of enterprises for the previous period. And in accordance with this, they can serve as indicators that signal a successful or unsuccessful choice of a business model by an enterprise.

The software implementation of fuzzy inference was carried out using Matlab (USA) using the Sugeno fuzzy inference algorithm.

The resulting indicator is proposed to determine the coefficient of operational efficiency (y). This indicator is defined as the ratio of net income from the sale of products, goods, works, services (NI) to the cost of sales of products, goods,

works, services (Cost). This indicator has less variability than the profitability indicators, but at the same time it accurately reflects the effectiveness of the business model chosen by the aviation enterprise.

Stage 1. It is assumed that the effectiveness of the chosen business model of the aviation enterprise "γ" is formed as a result of the following factors:

– x_1 – motivational and managerial component or the level of material incentives to motivate personnels. It is a generalizing value of the ability of an enterprise to retain and develop its own workers, to provide them with working conditions. Can be described by the terms "low" and "high" level of material incentives for motivation;

– x_2 – provision with material and technical resources. It has a double meaning, firstly, it shows how much material and technical resources are optimally used in the process of activity. Secondly, it shows how well the company is forming assets, since if there are idle or surplus assets on the balance sheet, the indicator will be below the optimal value. Can also be described using the terms "high" and "low" logistics level;

– x_3 – level of support (provision) of innovation activity. Shows the company's ability to switch to an innovative development model, but, as rightly noted in [19], "a high level of development of intangible assets may be accompanied by low innovation activity, and vice versa." The indicator can be given a linguistic assessment using the terms "low" and "high" level of innovation provision;

– x_4 – current assets turnover ratio. Estimated by the terms "fast" and "slow" speed of one revolution;

– x_5 – balance of the enterprise's debt is measured as the ratio of the amount of accounts receivable to accounts payable. Based on the considerations that a significant excess of accounts receivable over accounts payable, as well as its too low level, negatively affect the efficiency of the current activities of the enterprise. This indicator can be indicators of imbalance in cash flows and future destruction of progressive production activities. The level of this indicator is described using the following three terms: "insufficient", "balanced", "super-high" level of receivables;

– x_6 – coefficient of autonomy (the ratio of equity capital to the company's liabilities). It shows the structure of the company's funding sources. In the analyzed sample, the majority of enterprises have a rather low value of the indicator, which in some cases is less than zero. The reason for this is the losses incurred in previous periods, which exceeded the cost of equity capital, which indicates the extremely low financial stability of the enterprise and the high risk of loss of financial stability. To facilitate calculations, the equity capital of such enterprises in the calculations was equated to zero, as recommended in a number of similar calculations [20]. The capital structure is assessed using the terms "equity-oriented" and "debt-oriented".

It is proposed to determine the influence of the above factors on the efficiency of an enterprise using a six-factor hierarchical model (Fig. 4).

In order to design a system of fuzzy inference, an in-depth study of a sample of 15 observations of operating aviation enterprises for 2017–2019 was carried out, which provided a sufficient array of information.

Stage 2. A fuzzy inference system has been created by means of the Matlab Fuzzy Logic Toolbox (USA) using a fuzzy inference system of the Sugeno type, which is the result of designing and training a neuro-fuzzy hybrid model.

For training a hybrid network, the hybrid method was selected with an error level of 0 and the number of cycles as a result of training the network, an error of 0.1626 percentage points, which is sufficient to diagnose the effectiveness of enterprise business models.

For the input factors x_1–x_6 and the initial y, the model "six inputs one output" is obtained. So, the input variables x_1–x_4, x_6 each have two terms with the corresponding graphs of the membership functions, and the variable x_5 has three.

Using the membership functions of the input variables, fuzzification is carried out, that is, the transition from the numerical parameters of the input variables to the fuzzy values of linguistic variables. The fuzzification stage includes the choice of fuzzy terms for linguistic assessment of influencing factors, given on the corresponding universal sets [21]. That is, membership functions are selected for the terms of the variables x_1–x_6, which allow for any value for a number of input data to determine its degree of membership in a fuzzy set. In this case, all six input variables are assigned membership functions of the gausmf type (Gaussian function).

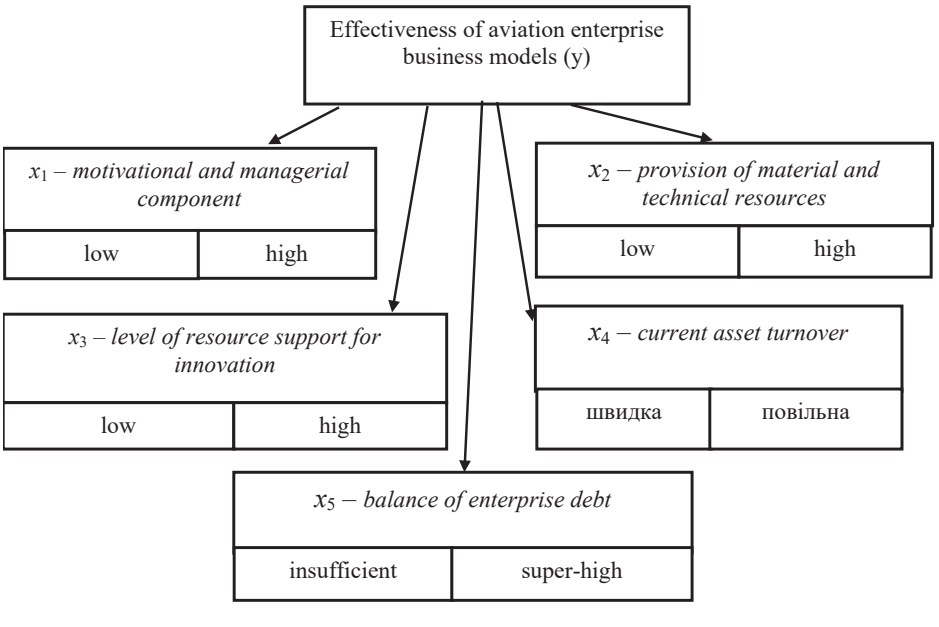

Fig. 4. Estimated terms for linguistic variables x_1–x_6

Next, membership functions are formed to build a fuzzy inference algorithm, Table 1.

Table 1

Membership functions used to build a fuzzy inference algorithm

Term	Analytic expression
Variable x_1 "level of material support for personnel motivation"	
Low	$\mu_{low}(x_1)=\begin{cases} e^{-\frac{1}{2}\left(\frac{x_1-0.007272}{1.622}\right)^2}, \text{ if } x_1>1.62 \\ 1, \text{ if } x_1 \le 1.62 \end{cases}$
High	$\mu_{high}(x_1)=\begin{cases} e^{-\frac{1}{2}\left(\frac{x_1-4.1452}{1.585}\right)^2}, \text{ if } x_1<2.56 \\ 1, \text{if } x_1 \ge 2.56 \end{cases}$
Variable x_2 "provision of material and technical resources"	
Low	$\mu_{low}(x_2)=\begin{cases} e^{-\frac{1}{2}\left(\frac{x_2-0.0341}{3.62}\right)^2}, \text{ if } x_2>3.963 \\ 1, \text{ if } x_2 \le 3.963 \end{cases}$
High	$\mu_{high}(x_2)=\begin{cases} e^{-\frac{1}{2}\left(\frac{x_2-8.48}{3.67}\right)^2}, \text{ if } x_2<4.81 \\ 1, \text{if } x_2 \ge 4.81 \end{cases}$,
Variable x_3 "level of support for innovative activities"	
Low	$\mu_{low}(x_3)=\begin{cases} e^{-\frac{1}{2}\left(\frac{x_3-0.00576}{3.863}\right)^2}, \text{ if } x_3>3.92 \\ 1, \text{if } x_3 \le 3.92 \end{cases}$
High	$\mu_{high}(x_3)=\begin{cases} e^{-\frac{1}{2}\left(\frac{x_3-9.087}{3.88}\right)^2}, \text{if } x_2<5.2 \\ 1, \text{if } x_3 \ge 5.2 \end{cases}$
Variable x_4 "current assets turnover ratio"	
Low	$\mu_{low}(x_4)=\begin{cases} e^{-\frac{1}{2}\left(\frac{x_4-0.01799}{3.71}\right)^2}, \text{ if } x_4>3.72 \\ 1, \text{if } x_4 \le 3.72 \end{cases}$
High	$\mu_{high}(x_4)=\begin{cases} e^{-\frac{1}{2}\left(\frac{x_4-8.849}{3.685}\right)^2}, \text{ if } x_1<5.16 \\ 1, \text{if } x_4 \ge 5.16 \end{cases}$
Variable x_5 "debt management level"	
Low	$\mu_{low}(x_5)=\begin{cases} e^{-\frac{1}{2}\left(\frac{x_5-0.03313}{1.303}\right)^2}, \text{ if } x_5>1.34 \\ 1, \text{if } x_5 \le 1.34 \end{cases}$
Average	$\mu_{average}(x_5)=\begin{cases} e^{-\frac{1}{2}\left(\frac{x_5-3.058}{1.397}\right)^2}, \text{ if } x_5\langle 1.57 \text{ or } x_5\rangle 4.46 \\ 1, \text{if } 1.67 \le x_5 \le 4.46 \end{cases}$
High	$\mu_{high}(x_5)=\begin{cases} e^{-\frac{1}{2}\left(\frac{x_5-6.217}{1.356}\right)^2}, \text{ if } x_5<4.86 \\ 1, \text{if } x_5 \ge 4.86 \end{cases}$
Variable x_6 "capital structure"	
Focused on equity	$\mu_{high}(x_6)=\begin{cases} e^{-\frac{1}{2}\left(\frac{x_6-0.05259}{0.4581}\right)^2}, \text{ if } x_6<0.56 \\ 1, \text{if } x_6 \ge 0.56 \end{cases}$
Focused on equity	$\mu_{low}(x_6)=\begin{cases} e^{-\frac{1}{2}\left(\frac{x_6-0.8947}{0.4745}\right)^2}, \text{ if } x_6>0.42 \\ 1, \text{if } x_6 \le 0.42 \end{cases}$

By default, the Anfis-editor add-in of the MatLab environment develops and tests fuzzy inference algorithms with rules, in which a combination of terms of input variables. It is a complete set of all possible combinations of the membership functions of the input variable in the designed Sugeno system – constants. Their justification is given in combination with a description of the base of rules for fuzzy inference. Since there are six input variables in the system, five of which have two terms, and one of them has three terms, the maximum number of rules in the knowledge base for formulating all possible deposits between factors and consequences should be $3 \cdot 2^5 = 96$. However, not all rules are needed to adequately reflect the relationship between inputs and outputs.

Stage 3 – inference. In the process of fuzzy logic, all calcua lations can be illustrated in the form of a set of graphs (Fig. 5).

In the designed algorithm, for each of the 96 rules, seven graphs are built, six of which correspond to the input variables x_1–x_6, and one output to *y*. The results of activation of the rules for each of the studied indicators, having a measure of truth above zero, are displayed in yellow, and for the output variable – in blue. If the membership function has zero truth, then there is no color on the graph. The resulting graph, which determines the clear value of the resulting indicator, calculated as a result of comparing all membership functions, is placed at the end, after all the graphs of the output variable (Fig. 5).

The system of rules for displaying fuzzy dependencies between the level of enterprise efficiency and factors x_1–x_6 is shown in Table 2.

Table 2

A system of rules for displaying fuzzy dependencies between the level of enterprise efficiency and factors x_1–x_6

No.	Rule	Const
1	If (x_1 is high) and (x_2 is low) and (x_3 is low) and (x_4 is low) and (x_5 is high) and (x_6 is borrowed) then (output is out1mf5);	1.631
2	If (x_1 is low) and (x_2 is low) and (x_3 is low) and (x_4 is high) and (x_5 is high) and (x_6 is equity) then (output is out1mf12);	0.7571
3	If (x_1 is low) and (x_2 is low) and (x_3 is high) and (x_4 is low) and (x_5 is low) and (x_6 is borrowed) then (output is out1mf13);	0.8179
4	If (x_1 is low) and (x_2 is low) and (x_3 is high) and (x_4 is high) and (x_5 is low) and (x_6 is equity) then (output is out1mf20);	0
5	If (x_1 is low) and (x_2 is high) and (x_3 is low) and (x_4 is high) and (x_5 is high) and (x_6 is equity) then (output is out1mf36);	1.393
6	If (x_1 is high) and (x_2 is high) and (x_3 is high) and (x_4 is high) and (x_5 is balanced) and (x_6 is equity) then (output is out1mf46);	1.248
7	If (x_1 is high) and (x_2 is low) and (x_3 is low) and (x_4 is high) and (x_5 is balanced) and (x_6 is equity) then (output is out1mf59);	1.825
8	If (x_1 is high) and (x_2 is low) and (x_3 is high) and (x_4 is low) and (x_5 is high) and and (x_6 is equity) then (output is out1mf66);	1.059
9	If (x_1 is high) and (x_2 is high) and (x_3 is high) and (x_4 is low) and (x_5 is balanced) and (x_6 is equity) then (output is out1mf88);	1.156
10	If (x_1 is high and (x_2 is high) and (x_3 is high) and (x_4 is high) and (x_5 is low) and (x_6 is borrowed) then (output is out1mf91);	0.7174
11	If (x_1 is high) and (x_2 is low) and (x_3 is high) and (x_4 is high) and (x_5 is balanced) and (x_6 is borrowed) then (output is out1mf69);	0.3969
12	If (x_1 is high) and (x_2 is low) and (x_3 is low) and (x_4 is high) and (x_5 is high) and (x_6 is equity) then (output is out1mf60)	0.5699

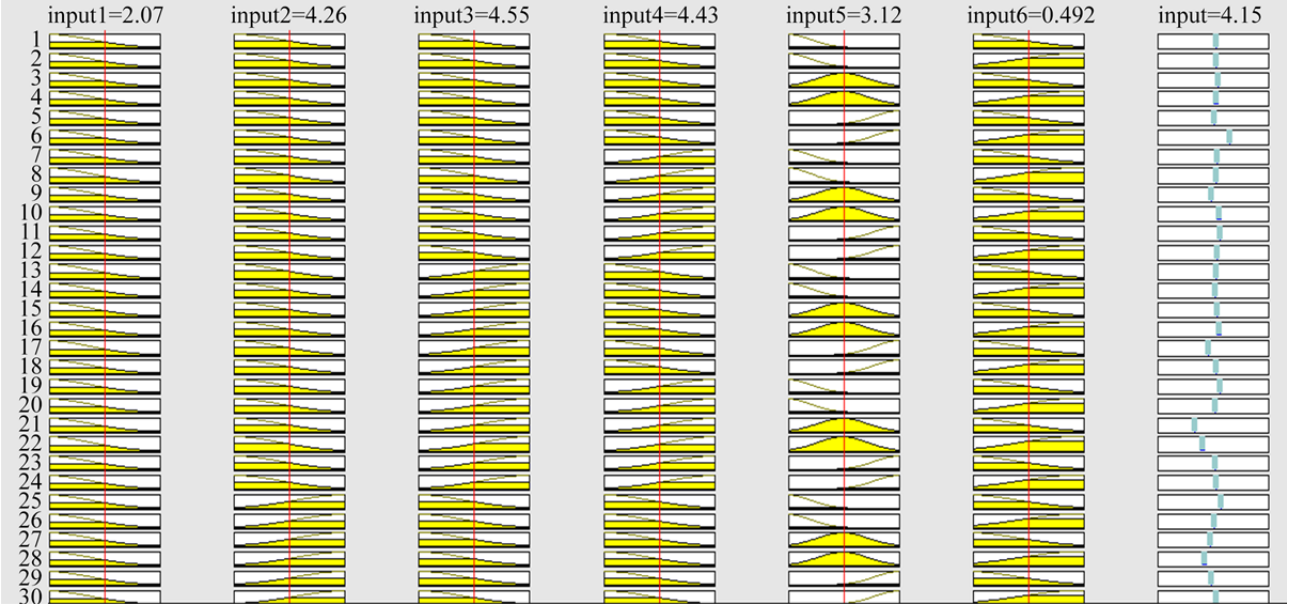

Fig. 5. Visualization of the process of fuzzy inference (fragment)

Achievements of effective activity are possible only if all six conditions are met, but they are not equal to each other. The significance of individual conditions is taken into account with the help of their concentration, it is achieved by raising the membership functions of a degree equal to the weight of the condition-rule (w_j). That is, the minimum value of all membership functions determines to what extent the current state of the enterprise will ensure the efficiency of operating activities:

$$\mu_{eff} = \left(\mu_1(x_1)\right)^{\omega_1} \Lambda \left(\mu_2(x_2)\right)^{\omega_2} \Lambda \left(\mu_3(x_3)\right)^{\omega_3} \times$$
$$\times \Lambda \left(\mu_4(x_4)\right)^{\omega_4} \Lambda \left(\mu_5(x_5)\right)^{\omega_5} \Lambda \left(\mu_6((x_6))\right)^{\omega_6},$$

$$\Updownarrow \mu_{\text{econ.safety}} = \min\left(\mu_1(x_1)\right)^{\omega_1}; \Lambda\left(\mu_2(x_2)\right)^{\omega_2};$$
$$\Lambda\left(\mu_3(x_3)\right)^{\omega_3}; \Lambda\left(\mu_4(x_4)\right)^{\omega_4}; \Lambda\left(\mu_5(x_5)\right)^{\omega_5}; \Lambda\left(\mu_6(x_6)\right)^{\omega_6}. \quad (8)$$

At the stage "Logical inference", the measure of the truth of the conclusion of each of the rules of the knowledge base formed on the basis of fuzzy logic means is determined. To do this, we use the data of LLC Aviation Company WIND ROSE for 2019, which was not included in the sample, and therefore its indicators can be used as control values to check the accuracy of the generated algorithm.

The surveyed enterprise in 2019 had the following indicators.

Efficiency of the main activity (x_3)=4.16; x_1 (motivational and managerial component or the level of material incentives for motivating personnels)=2.07; x_2 (provision with material and technical resources)=4.26; x_3 (level of support (provision) for innovation activity)=4.55; x_4 (current assets turnover ratio)=4.43; x_5 (balance of the enterprise's debt)=3.12; x_6 (autonomy coefficient)=0.492.

Based on the determination of the degree of membership of the value of the linguistic variable to its fuzzy terms, for each of the output variables, the measure of truth of each of the logical rules is established, which ranges from 0 to 1. Zero truth means that the value of the input vector cannot belong to this term.

Stage 4. Composition. At this stage, the fuzzy terms of all initial variables are combined to the maximum. As a result of the accumulation of sub-conclusions and rules of fuzzy sets, an accumulated membership function is obtained for each of the initial variables x-1x6. The resulting membership function for each source variable is formed by combining the functions of the original variable in accordance with the conclusions of each rule. The composition is performed for each of the factors x-1x6.

Stage 5. Defuzzification. According to the system of rules formulated in Table 2 as follows:

1. Low level of material and technical support (x_2), turnover of current assets (x_4) and innovative activity (x_3). Due to the balanced management of accounts receivable and payable (x_5), a high level of personnel motivation (x_1) and the use of primarily attracted capital as sources of financing assets (x_6). This will ensure the efficiency of operating activities at a level close to mf12=1.631.

2. Low level of personnel motivation (x_1) combined with a low level of innovative activity (x_3) and material and technical support (x_2). When pursuing a flexible policy for managing accounts receivable (x_5) and using primarily attracted capital as sources of financing assets (x_6). Even with a high level of current assets turnover (x_4), it cannot provide sufficient operational efficiency mf12=0.7571.

3. Low level of personnel motivation (x_1), material and technical support (x_2), turnover of current assets (x_4). And a high level of innovative activity (x_3) while pursuing a flexible policy for managing accounts receivable (x_5) and using mainly attracted capital as sources of financing assets (x_6). This will ensure the efficiency of operating activities at the level of mf12=0.8179.

4. Low level of personnel motivation (x_1) and material and technical support (x_2), a strict policy for managing accounts receivable (x_5), a high level of innovative activity (x_3). Enterprise is provided mainly at the expense of equity capital (x_6), even a high level of turnover of current assets (x_4) cannot ensure efficient operation. In this case, the efficiency of operating activities will approach mf20=0.

5. Low level of personnel motivation (x_1) and innovative activity (x_3) in combination with a high level of material and technical support (x_2), turnover of current assets (x_4), accounts receivable (x_5). And the use of predominantly equity capital (x_6) as sources of financing assets will ensure the efficiency of operating activities at a level close to mf12=1.393.

6. High level of personnel motivation (x_1), material and technical support (x_2), current assets turnover (x_4) and innovation activity (x_3). In combination with a balanced policy of management of accounts receivable and payable (x_5) and the use of primarily attracted capital as sources of financing assets (x_6). This will ensure the efficiency of operating activities at a level close to mf12=1.248.

7. High level of personnel motivation (x_1), current assets turnover (x_4) in combination with a low level of material and technical support (x_2) and innovative activity (x_3). Due to the balanced management of accounts receivable and payable (x_5) and the use of primarily attracted capital as sources of financing assets (x_6). This will ensure the efficiency of operating activities at a level close to mf12=1.825.

8. High level of personnel motivation (x_1) and innovative activity (x_3), combined with a strict policy for managing accounts receivable and payable (x_5). And a low level of material and technical support (x_2) and turnover of current assets (x_4) and the use of primarily attracted capital as sources of financing assets (x_6). This will ensure operational efficiency at the level of mf12=1.059.

9. High level of personnel motivation (x_1), material and technical support (x_2) and innovative activity (x_3). In combination with a balanced policy for managing accounts receivable and payable (x_5), a low level of turnover of current assets (x_4) and the use of primarily attracted capital as sources of financing assets (x_6). This will ensure the efficiency of operating activities at a level close to mf12=1.156.

10. With unbalanced management of accounts receivable and payable (x_5) and the use of primarily attracted capital as sources of financing assets (x_6). High level of personnel motivation (x_1), turnover of current assets (x_4), innovative activity (x_3) and material and technical support (x_2). This makes it possible to achieve an indicator of operational efficiency only in the amount of about mf91=0.7174.

11. High level of personnel motivation (x_1), turnover of current assets (x_4) and innovative activity (x_3), a balanced policy for managing accounts receivable and payable (x_5). With a low level of equity capital in the structure of funding sources (x_6), a low level of material and technical support (x_2) impedes the effective operating activities of the enterprise – mf69=0.3969.

12. If the level of personnel motivation (x_1), turnover of current assets (x_4) are high, the company pursues a loyal policy of managing accounts receivable and payable (x_5). It has a low level of attracted funds in the structure of funding sources (x_6), and is also characterized by a low level of innovation activity (x_3) and material and technical support (x_2). This makes it possible to achieve an indicator of operational efficiency at the level of mf60=0.5699.

The given set of rules reflects the basic requirements for ensuring a high level of efficiency of the enterprise's operating activities.

Thus, the design and training of a hybrid neural fuzzy network based on an algorithm of fuzzy inference made it possible to substantiate a set of indicators that are priority for ensuring the efficiency of an enterprise. Of the six indicators selected for analysis, such as:

– motivational and managerial component or the level of material incentives to motivate personnel;
– provision with material and technical resources;
– level of support (provision) of innovative activities;
– current assets turnover ratio;
– balance of the enterprise's debt.

Only the capital structure ratio does not have a sufficiently strong effect on the efficiency of the enterprise, and therefore it was advisable to exclude it from further research, Table 3.

Table 3

Generalized data of the analysis of the assessment of the influence of factors on the effective indicator

Factor	Relation character
Motivational and managerial component or the level of material incentives for personnel motivation	Strong relation (2.07)
Provision with material and technical resources	Strong relation (4.26)
The level of support (provision) of innovation activity	Strong relation (4.55)
Current assets turnover ratio	Strong relation (4.43)
Balance of the enterprise's debt	Strong relation (3.12)
Capital structure ratio (autonomy)	Weak relation (0.42)

These studies were fully confirmed by the analysis of LLC Aviation Company WIND ROSE, which means that regulating the values of indicators in the process of operating activities of companies and choosing business models by them will allow enterprise managers to ensure the desired level of efficiency.

5. 4. Assessment of the level of financial stability of aviation enterprises in competitive markets and determination of their competitive position

In the context of the study of the current state of the activities of aviation enterprises in competitive markets, we consider it necessary to use the Harrington function to assess the financial stability of aviation enterprises in the market. The Harrington function is the result of the transformation of any natural values of indicators into a dimensionless scale of desirability, reflecting the correspondence between the psychological (subjective analytical assessment) and physical (indicator values) characteristics of the object under study.

The assessments will be carried out on the basis of those indicators that best characterize the financial condition of the studied aviation enterprises (Table 4).

Let's believe that the presented system of indicators is the most representative and comprehensive way to determine the financial condition of the studied aviation enterprises. Since they were included in their composition as the most important indicators of financial stability (determined by the general coverage ratio, the autonomy ratio, the concentration ratio of attracted capital). So are important indicators of the efficiency of economic activity (determined by the indicator of return on assets and gross profitability of production costs).

The results of the calculations of indicators for assessing the financial condition of aviation enterprises in Ukraine are presented in Table 5.

Table 4

Indicators for assessing the financial condition of aviation enterprises in Ukraine (developed by the author)

Indicator name	Designation	Calculation mechanism
Overall coverage ratio	y_1	Amount of current assets/ Amount of current liabilities
autonomy ratio	y_2	Equity/Balance
Raised capital concentration ratio	y_3	(Raised funds+Borrowed funds)/Balance
Return on assets (the level of return on net income of average annual assets as a whole)	y_4	Net Income/Total Assets
Gross profitability of production costs	y_5	Gross profit/Cost of production

Table 5

The results of the calculations of indicators for assessing the financial condition of aviation enterprises of Ukraine in 2019

Enterprise	y_1	y_2	y_3	y_4	y_5
1	0.1	–8.88	9.88	–2.46	0.04
2	0.14	–6.12	7.12	–1.94	0.17
3	0.12	–6.96	7.96	–0.20	0
4	0.24	–0.12	0.85	1.30	0
5	1.57	0.56	0.44	0.14	0.28
6	1.87	0.88	0.12	–0.03	0.01
7	0.51	–0.15	1.15	0.09	0.15
8	0.19	–1.72	2.72	0.30	–0.08
9	0.69	0.39	1.39	0.13	–0.06
10	1.42	0.49	0.51	0.03	0.20
11	0.18	–3.52	4.52	–0.81	–0.44
12	1.42	0.77	0.23	0.01	0
13	0.07	0.98	0.02	0	–0.99
14	0.98	–0.02	1.02	0.01	0.02
15	0.03	–30.09	31.09	6.96	0.09

It is possible to level the linear relationship between the selected indicators using correlation analysis based on the use of the pair correlation coefficient:

$$r_{y_1y_2}=\frac{\Sigma_i^N=_1\left(y_{1i}-\overline{y_1}\right)\times\left(y_{2i}-\overline{y_2}\right)}{\sqrt[2]{\Sigma_i^N=_1\left(y_{1i}-y_1\right)^2\times\left(y_{2i}-y_2\right)^2}}, \quad (9)$$

where y_1, y_2 – research indicators; N – the number of studies in which changes in indicators will be determined; i – current study number.

The correlation matrix of the relationship between the five indicators is as follows (Table 6):

Table 6

Paired correlation indicators

Indicators	y_1	y_2	y_3	y_4	y_5
y_1	1.00	0.471807	–0.4707	–0.10642	0.376876
y_2	0.471807	1.00	–0.99963	–0.68727	–0.15421
y_3	–0.4707	–0.99963	1.00	0.687072	0.153772
y_4	–0.10642	–0.68727	0.687072	1.00	0.080918
y_5	0.376876	–0.15421	0.153772	0.080918	1.00

According to the results of the analysis (Table 6), the use of selected indicators is acceptable.

To construct an integral indicator of the financial stability of aviation enterprises, the generalized Harrington desirability function was used:

$$D=\sqrt[n]{\Pi_{i=1}^n d_i}, \quad (10)$$

where D – generalized desirability;

d_i – quotient of desirability;

n – the number of indicators for assessing the state of the research object.

$$d_i=\exp\left(-\exp\left(-x_i\right)\right), \quad (11)$$

where x_i – indicator in dimensionless form:

$$x_i=\frac{2y_i-\left(y_i^{\min}+y_i^{\max}\right)}{y_i^{\min}-y_i^{\max}}, \quad (12)$$

where $y_i^{\min}$ and $y_i^{\max}$ – the limits of the area are "satisfactory" on the Harrington scale.

The ranges of the desirability function values on the Harrington scale are presented in Table 7.

Table 7

The intervals of the desirability function values on the Harrington scale

Linguistic assessment	The ranges of desirability function values
Very good	1.00–0.80
Good	0.80–0.63
Satisfactorily	0.63–0.37
Bad	0.37–0.20
Very bad	0.20–0.00

Harrington function is the result of converting natural (numerical) values of indicators into a dimensionless scale of desirability, which establishes a correspondence between the psychological (subjective assessment of the analyst) and physical (values of indicators) characteristics of the object under study.

Carrying out a linguistic assessment of the financial stability of aviation enterprises, according to the proposed model, provides for the determination of dimensionless values of the indicators we have chosen.

To do this, it is necessary to determine the limits of the baseline indicators $y_i^{\min}$ and $y_i^{\max}$ in the middle of which the level of financial stability of the aviation enterprises can be considered "satisfactory". Despite the fact that aviation enterprises must constantly comply with a number of regulatory indicators, we proposed to take a value $y_i^{\max}$ equal to the structural average – the median; $y_i^{\min}$ – the difference between the median and the standard deviation (Table 8).

Using formula (12), let's standardize the indicators, which will have the following form (Table 9).

The results of calculating the integral indicator of the financial stability of aviation enterprises are summarized, according to (10), in Table 10.

Graphical representation of the results of calculating the integral indicator of the financial stability of aviation enterprises by the Harrington desirability function in 2019 is shown in Fig. 6.

Table 8

Values y_i^{min} and y_i^{max} for indicators of financial stability of aviation enterprises

Indicators	y_1	y_2	y_3	y_4	y_5
Average value of the indicator	0.6353	–3.5673	4.6013	0.2353	–0.0407
Median	0.24	0.12	1.15	0.01	0.01
Mean deviation	0.5517	5.0374	5.0193	1.0472	0.1876
The maximum value of the indicators y_i^{max}	0.24	–0.12	1.15	0.01	0.01
The minimum value of the indicator y_i^{min}	–0.3119	–5.1574	–3.8693	–1.0372	–0.1776

Table 9

Dimensionless view of indicators of financial sustainability of aviation enterprises

Enterprise	x_1	x_2	x_3	x_4	x_5
1	0.49	–2.48	4.48	–3.72	1.32
2	0.35	–1.38	3.38	–2.72	2.71
3	1.0	–1.72	3.71	–0.59	0.89
4	0.14	1.0	0.88	–1.50	0.89
5	0.64	1.26	0.72	0.71	3.88
6	6.91	1.40	0.58	0.92	1.0
7	1.98	0.99	1.0	0.81	2.49
8	0.82	0.36	1.63	0.41	0.04
9	2.37	1.20	1.10	1.23	0.25
10	5.02	1.24	0.74	1.04	3.03
11	0.78	–0.35	2.34	–0.57	–3.79
12	5.28	1.35	0.63	1.0	0.89
13	0.38	1.44	0.55	0.98	–9.66
14	3.68	1.04	0.95	1.0	1.11
15	0.24	–10.89	12.93	14.27	1.85

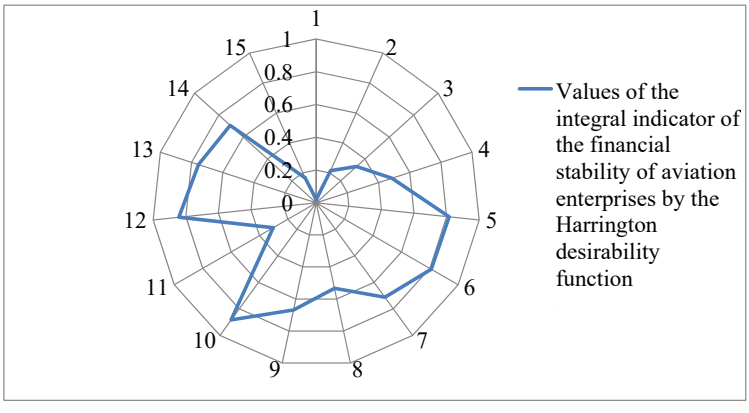

Fig. 6. Graphical representation of the results of calculating the integral indicator of the financial stability of aviation enterprises by the Harrington desirability function in 2019

Table 10

The value of the integral indicator of the financial stability of aviation enterprises by the Harrington desirability function

Enterprise	D	Assessment
1	0.022	Very bad
2	0.214	Very bad
3	0.331	bad
4	0.485	satisfactorily
5	0.815	Very good
6	0.810	Very good
7	0.713	Good
8	0.533	satisfactorily
9	0.669	Good
10	0.883	Very good
11	0.303	bad
12	0.843	Very good
13	0.755	Good
14	0.707	Good
15	0.167	Very bad

The results of the assessment, reflected in Table 10 first of all indicate the problems of the effective functioning of Ukrainian aviation enterprises in 2019, which corresponds to the deepening of the crisis in the air transportation industry. At this point, attention should be paid to the fact that out of 15 studied aviation enterprises for 7, the financial condition was assessed as "very bad"; for 2 – "bad"; for 2 – "satisfactory". And only 8 aviation enterprises were rated as having "good" and "very good" financial condition.

6. Discussion of the results of applying an integrated approach to assessing the effectiveness of the business model of an aviation enterprise

There are a large number of methods for improving and forming the efficiency of the business model of an enterprise, proposed by modern researchers [1–7]. All of them are integral and complex: some contain a significant number of components for calculation, others – on the contrary, few. Unlike existing approaches, this paper proposes a theoretical and methodological approach (Fig. 2), which allows diagnosing the existing business processes of an enterprise and establishing qualitative and quantitative characteristics that determine the degree of management and functioning efficiency.

In order to ensure an effective business model of the aviation enterprise, a system for the formation of an effective business model has been formed, which allows harmonizing the use of innovativeness of business processes, when analyzing the external and internal environment of the enterprise and assessing the existing innovative potential (Fig. 3).

The author's approach to the formation of an effective business model allows us to identify unknown, and sometimes at first glance insignificant characteristics or elements of existing business processes. In the course of the study, using mathematical tools, it was possible to assess the effectiveness and appropriateness of the results obtained in determining the effectiveness of the business model. Based on decisions about the possibility of using business processes, make a decision on restructuring or restructuring of already existing business processes.

The study of the effectiveness of the business model of the aviation enterprise made it possible to identify the most important business processes for aviation enterprises, the whole procedure for calculating an integrated approach is presented by formulas (1)–(7), and the calculation was made.

The system of rules for displaying fuzzy dependencies between the level of enterprise efficiency and existing business processes (factors x_1–x_6) are given in (Table 2). As a result of the assessment of the business processes of the aviation enterprise, it was determined that the most influential are: the level of support (provision) of innovative activities, the turnover ratio of current assets, the provision of material and technical resources (4.55; 4.43 and 4.26, respectively).

Detailed analysis of the data presented in Table 3, allows us to draw a number of important conclusions regarding the effectiveness of the innovativeness of business processes in the activities of an aviation enterprise and their orientation towards the appropriate sources of investment resources.

In the context of the study of the current state of the activities of aviation enterprises, it is proposed to calculate the financial condition and determine the indicators of assessment (Table 4), which will help form further ways to improve financial stability in the market. The integral indicator of the financial stability of aviation enterprises is proposed to be calculated using the formula (10), and are presented in table. 10, which makes it possible to establish that there are problems with the efficient operation of aviation enterprises in 2019. There is a deepening of the crisis in the air transportation industry, because out of 15 studied aviation enterprises for 7, the financial condition was assessed as "very bad". For 2 enterprises – "bad" and for 2 enterprises – "satisfactory". And only 8 aviation enterprises were rated as having "good" and "very good" financial condition.

Therefore, it can be argued that the current state of the largest aviation enterprises in competitive markets using the presented integrated approach makes it possible to draw a general conclusion about the unstable and unstable competitive position of most business entities. The current state of development of the air transportation market can be characterized as monopolized, highly concentrated with a low level of competition intensity. Under such conditions, the market is dominated by the tendency to conduct a non-competitive struggle among the largest aviation alliances. At the same time, small aviation enterprises suffer losses and are characterized by a low level of financial stability.

In the future, it is advisable to study the mutual influence of all components of the innovative potential of an aviation enterprise to improve the performance of functional areas, develop appropriate strategies and implement innovative and investment opportunities to ensure sustainable competitive advantages.

7. Conclusions

1. Theoretical and methodological approaches to the formation of innovativeness of business processes of enterprises are formed, which will identify problematic and ineffective business processes, as well as ways to improve them. A model of innovativeness of business processes is proposed, which takes into account the principles, goals, methods of improving the management of business processes and the factors of influence on them. This approach differs from others, as it allows you to rationally use time when describing the relationship between the results of business processes and the cost of achieving them.

2. The main directions of the formation of an effective business model of an aviation enterprise based on the innovativeness of business processes have been investigated and strategic directions for its provision are proposed. At the same time, the following aspects of enhancing the innovative activity of an aviation enterprise are highlighted as: the influence of the external and internal environment, innovative activity, analysis of the innovative potential and innovativeness of business processes.

3. Mathematical tools are proposed to ensure the formation of an integrated approach to assessing the effectiveness of the business model of an aviation enterprise, which allows to ensure the required level of innovative flexibility of the aviation enterprise and independence in the application of innovative business processes. The main stages of this approach are identified and substantiated, which include: the formation of a set of input variables, fuzzification, "logical inference", "composition", "defuzzification" and the practical implementation of this approach is applied at air receptions. According to the results of which, it was found that the most influential are: the level of support (provision) of innovative activity, the turnover ratio of current assets, the provision of material and technical resources (4.55; 4.43 and 4.26, respectively).

4. An assessment of the financial stability of aviation enterprises in the market and the calculation indicators of the assessment are carried out. The integral indicator of the financial stability of aviation enterprises is calculated, which makes it possible to form further ways to increase the financial stability in the market. And also to identify the problems of the effective functioning of Ukrainian aviation enterprises.

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