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## **REENGINEERING OF PROCESSES OF MANAGEMENT BY STATE FINANCE IN CONDITIONS OF BUDGET REFORM**

**Abstract.** For the successful implementation of any reform program and the creation of opportunities for the transition to a qualitatively new level of governance, not only the implementation of the measures provided for by the program, but also the availability of mechanisms that will ensure the transition process, must be a prerequisite. Improving financial management procedures requires a comprehensive vision and consistent steps to implement the basic principles of the reform of the budget sphere.

The purpose of the article is to develop a scientific approach to a comprehensive assessment of the quality of state finance management under the conditions of budget reform.

The application of a qualitative model based on the theory of fuzzy sets will allow to do a comprehensive assessment of the quality of state finance management. Such an approach is based on taking into account the values of the four groups of indicators — flexibility of state finances, debt burden on state finances, compliance of state finances with the requirements of budget legislation, and the effectiveness of budget expenditures management. As a result, obtaining the objective information on the quality of state finance management will allow to identify possible problems in a timely manner and to effectively implement effective managerial decisions.

The scientific-methodical approach to the complex evaluation of the quality of state finance management is proposed based on the use of a qualimetric model based on the theory of fuzzy sets. Unlike the existing ones, such an approach takes into account the importance of the four groups of indicators — flexibility of state finances, debt burden on state finances, compliance of state finances with the requirements of budget legislation, and the effectiveness of budget expenditures management. The obtaining objective information on the quality of the state finance management will allow to do identification of possible problems and the development of effective managerial decisions in the application of best practices in financial management timely.

**Keywords:** state finances, result-based budgeting, budget management, budget process, process-oriented approach, quality management of state finances.

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## **РЕІНЖІНІРИНГ ПРОЦЕСІВ УПРАВЛІННЯ ДЕРЖАВНИМИ ФІНАНСАМИ В УМОВАХ БЮДЖЕТНОЇ РЕФОРМИ**

**Анотація.** Для успішної реалізації будь-якої програми з реформування і створення можливостей для переходу на якісно новий рівень управління обов'язковою умовою має бути не лише проведення передбачених програмою заходів, а й наявність механізмів, що забезпечать процес переходу. Удосконалення процедур з управління фінансами вимагає комплексного бачення і послідовних кроків з упровадження основних постулатів реформи бюджетної сфери.

Застосування кваліметричної моделі, що базується на теорії нечітких множин, дозволить здійснити комплексне оцінювання якості управління державними фінансами. Такий підхід базується на врахуванні значення чотирьох груп показників — гнучкості державних фінансів, боргового навантаження на державні фінанси, відповідності стану

державних фінансів вимогам бюджетного законодавства, результативності управління видатками бюджету. Як результат, отримання об'єктивної інформації про якість управління державними фінансами дозволить своєчасно виявляти можливі проблеми і оперативно здійснювати ефективні управлінські рішення.

Запропоновано науково-методичний підхід до комплексного оцінювання якості управління державними фінансами на основі застосування кваліметричної моделі, що ґрунтується на теорії нечітких множин. На відміну від наявних, такий підхід ураховує значення чотирьох груп показників — гнучкості державних фінансів, боргового навантаження на державні фінанси, відповідності стану державних фінансів вимогам бюджетного законодавства, результативності управління видатками бюджету. Отримання об'єктивної інформації про якість управління державними фінансами дозволить своєчасно виявляти можливі проблеми і розробляти ефективні управлінські рішення в частині застосування кращої практики управління фінансами.

**Ключові слова:** державні фінанси, бюджетування, орієнтоване на результат, бюджетний менеджмент, стадії бюджетного процесу, процесно-орієнтований підхід, якість управління державними фінансами.

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## **РЕИНЖИНИРИНГ ПРОЦЕССОВ УПРАВЛЕНИЯ ГОСУДАРСТВЕННЫМИ ФИНАНСАМИ В УСЛОВИЯХ БЮДЖЕТНОЙ РЕФОРМЫ**

**Аннотация.** Предложен научно-методический подход к комплексной оценке качества управления государственными финансами на основе применения кваліметрической модели, которая основывается на теории нечетких множеств. В отличие от существующих, такой подход учитывает значение четырех групп показателей — гибкости государственных финансов, долговой нагрузки на государственные финансы, соответствия состояния государственных финансов требованиям бюджетного законодательства, результативности управления расходами бюджета. Получение объективной информации о качестве управления государственными финансами позволит своевременно выявлять возможные проблемы и разрабатывать эффективные управленческие решения в части применения лучшей практики управления финансами.

**Ключевые слова:** государственные финансы, бюджетирование, ориентированное на результат, бюджетный менеджмент, стадии бюджетного процесса, процессно-ориентированный подход, качество управления государственными финансами.

Формул: 4; рис.: 6; табл.: 4; библи.: 10.

**Introduction.** The basis of the approaches to the formation of state finance management policies is the conditions for the functioning of the financial system of the country, and its adjustment is carried out under the influence of various socio-economic factors. The budget reform aims to purposefully improve the processes of state finance management and has a permanent evolutionary character. The scale of budget reform, the pace of its implementation determine the nature of transformations, change the structure of state finance management. For the successful implementation of any reform program and the creation of opportunities for the transition to a qualitatively new level of governance, not only the implementation of the measures provided for by the program, but also the availability of mechanisms that will ensure the transition process, must be a prerequisite. Improving financial management procedures requires a comprehensive vision and consistent steps to implement the basic principles of the reform of the budget sphere.

**Analysis of research and problem statement.** In the modern scientific paradigm, the questions of the evolution of theoretical concepts, the essence and influence of state finances on socio-economic development were worked out in the studies of O. Vasilik [1], O. Dlugopolsky [2], V. Kozyuk [3], T. Davenport [4], I. Jacobson, M. Ericsson, A. Jacobson [5], J. Stiglitz [6], J. Taylor [7], S. Vauban [9], C. Visser and P. Erasmus [10], and other.

**The purpose of the article** is to develop a scientific approach to a comprehensive assessment of the quality of state finance management under the conditions of budget reform.

**Results of the research.** In the context of carrying out activities on reforming the budget sphere, ensuring the new quality of state finance management involves the implementation of a number of key measures:

firstly, a gradual transition to medium-term planning milestones and wider application of budget planning methods based on programmatic targets; legislative regulation of the implementation and implementation of the principles of medium-term planning in developing the draft budget for the next budget year, a clear definition of tasks, types and formats of planning, a list of necessary inputs and result indicators, defining the requirements for the completeness and quality of the basic information, algorithms of interaction between actors medium-term planning process, correlation of forecast indicators of socio-economic development programs with indicators of the medium-term financial plan, sequence of stages and procedures, if necessary, to make changes on the indicated indicators;

secondly, the introduction of results-based budgeting within the framework of medium-term financial planning, which involves reorientation of the spending of budget funds managers to the development of allocated resources to achieve the ultimate socially important and measurable positive results in order to balance the budgets in the medium and long-term; the process of allocating appropriations directly depends on achieving concrete progress in line with the medium-term benchmarks outlined in the socio-economic policy and within the long-term projected budget resources;

thirdly, introducing into the practice of budget management of advanced technologies that create conditions for qualitative and efficient provision of budget services by observing the principle of hierarchy when drawing up a complete list of all direct and service-financed services at the expense of budgetary funds; drawing up the characteristics of all services and their consistent description; distribution of responsibilities of state managers in the areas of development and provision of budget services; the introduction of a system of valuation indicators that illustrates the relationship between the price and quality of the budget service; introduction of procedures for inspection of prices and quality of services by adding to the audits of professional controllers and end-users of services; development and implementation of measures to stimulate the effective activity of state managers; creation of an effective monitoring and control system for providing budget services;

fourthly, the creation of conditions for the expansion of the powers of the main spending units in terms of autonomy in decision-making and responsibility for them through the introduction of procedures for evaluating the quality of state finance management; inventory recipients of budget funds in order to identify possible reserves;

fifthly, to expand the list of services, which are transmitted to outsourcing in accordance with contracts with external performers selected on a competitive basis, which allows the withdrawal of certain types of activities from the sphere of powers of executive bodies, to reduce costs and to more efficiently redistribute resources. As a result, optimization of functions, rationalization of administration and increasing the efficiency of budget expenditures;

sixthly, development of the decision-making system on state borrowing and observance of threshold indicators of debt security (ratio of state debt to GDP, deficit of the state budget to GDP, etc.); minimizing the costs of servicing the state debt, balancing and uniform distribution of payments in time for repayment of the principal amount of interest and interest thereon; prevention of uncontrolled processes of growth of volumes of state and guaranteed by the state debt; improvement of the organization of accounting for direct, contingent liabilities;

seventhly, motivation to take effective measures to improve the quality of budget process management, improve financial indicators of budgets, adhere to the requirements of the Budget Code, and ensure compliance with the principles of openness and publicity in the management of state finances.

Specific features that characterize the budget process are the following:

- legislative regulation - the budget process is carried out with strict observance of the norms of budget legislation, which determine not only the order and stage of actions of the participants of the budget process, but also the time frame of each of the measures implemented within the budget process;

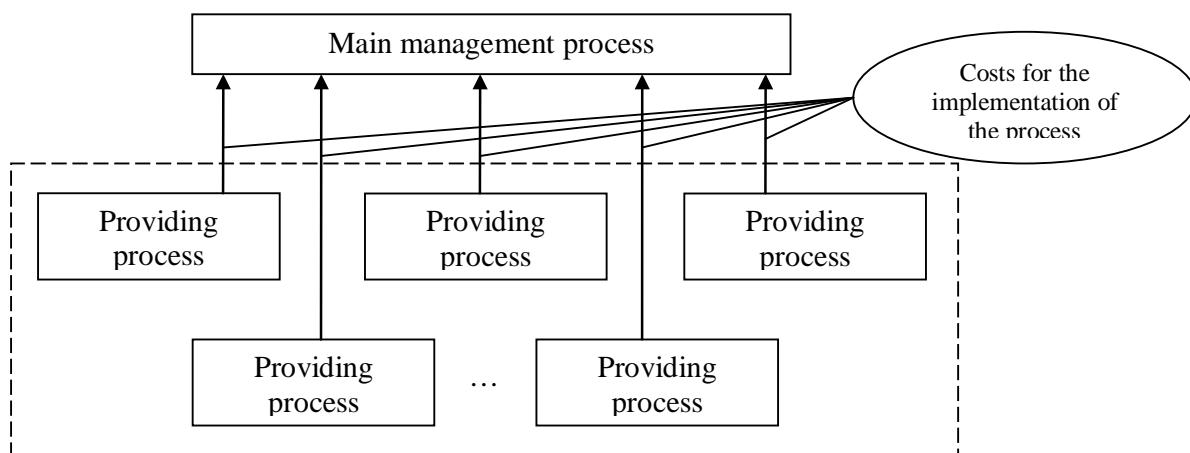
- detailing the rights of participants — the budget process is carried out by a clearly defined group of participants with specific powers that are implemented at one stage or another within a specific stage of the budget process. The legal status, as well as the rights and obligations of the participants in the budget process are clearly outlined by the norms of the budget legislation;

- repeatability (cyclicality) — the budget process has a clear time frame, and after the end of the budget cycle, the budget process begins again. Accordingly, the budget process, which forms the legal limits of future budget legal relations, is being restored. The budget indicators for each subsequent year are in direct proportion to the indicators of the previous reporting year, and each subsequent year is planned for the current budget year.

Traditionally, there are four stages of the budget process: drafting budgets; review and approval of laws (decisions) on the budget; execution of laws (decisions) on the budget; drafting and approval of budget reporting. Control over budget execution is carried out continuously and is carried out in the form of preliminary control (at the stage of drafting and approval of the budget), of the current control (at the stage of execution of the budget) and of further control (in the stage of consideration and approval of the budget performance report).

Legislative regulation of organizational principles of the budget process substantially reduces opportunities, limits incentives for improving the efficiency of state finance management.

The modernization of state finance management in the framework of budget reform involves the application of new rules, processes and procedures for budget execution, reporting, monitoring, evaluation and audit, as well as accounting for the accumulated experience for the planning of future budgets. The introduction of a qualitatively new level of state finance management needs to be managed on the basis of a process approach that is fundamentally different from the existing one and is adequate to the new conditions for the functioning of the state sector of the economy, which necessitates the reengineering of management processes. Reengineering management processes is an uncompromising rethinking and a radical reorganization of management processes to achieve radical improvements in the quality of managerial activity.

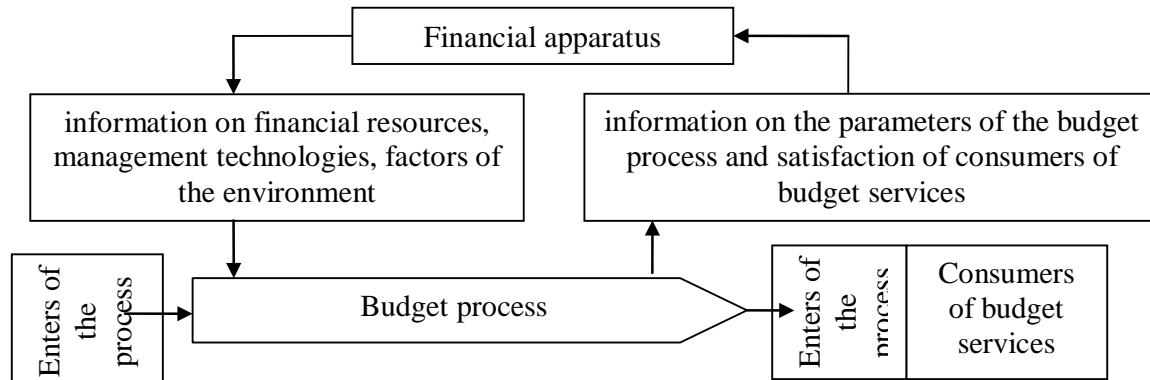


Pic. 1. Interconnections between management processes

Source: [4]

The reengineering of management processes is carried out within the framework of a process-oriented approach to management activity, which involves establishing the relationship between the main management process and the processes that provide it (Pic. 1).

In this case, a separate process represents a set of actions aimed at transforming input streams into results using resources and management measures to achieve strategic goals [5] (Pic 2).



Pic. 2. Management model of the budget process

Source: made by the author

Approach process includes not only the description of business as a set of interrelated processes, but also continuous monitoring and improvement of processes. Innovation in reengineering is the rejection of traditional management approaches, which are often outdated or inappropriate to a particular situation, but are initially laid down in most management processes (Table 1).

Table 1

Comparative characteristics of process management approaches

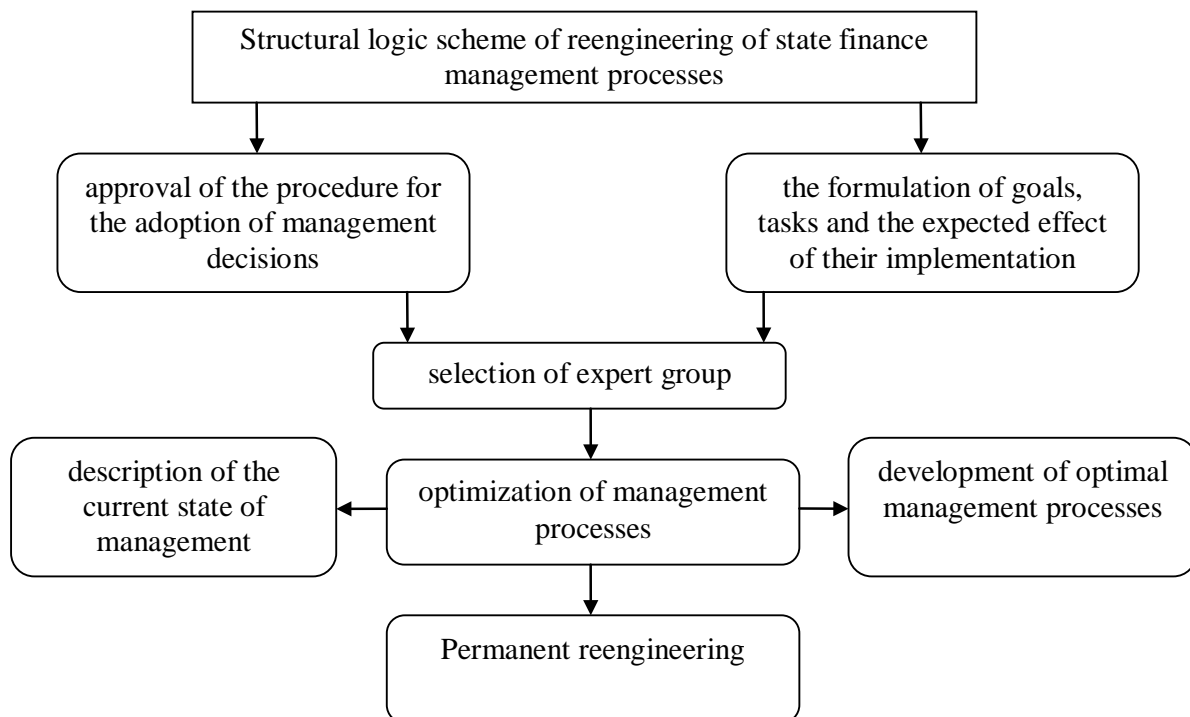
Criteria for comparison	Process improvements	Reengineering processes
The nature of the changes	Gradual	Saltatory
Objective	Improvement at the level of individual functions of existing processes	Creating new processes based on a radical rebuilding of existing ones
Frequency of application	Continuous	Once
The term of realization of events	From a few months to 1-2 years	From 2 to 5 years old
The magnitude of the changes	A set of subprocesses and procedures	The process is in conjunction with other processes
Risk	Moderate	High
Industriousness	Efforts are minimized	It requires the involvement of experts
Efficiency	Partial	High

Source: made by the author

As a part of the result-based budgeting, the budget process stages are being modernized and transformed into: strategic planning (definition of strategic goals and objectives); budget expenditures planning; provision of budget services (achievement of results); monitoring of the quality of state finance management.

In the context of financial instability, the role of reengineering of state finance management processes increases and its importance is further enhanced in the direction of further improvement, modernization of financial management, introduction of crisis management methods, and financial improvement of budgets of all levels in the process of budget reform.

The reengineering of managerial processes becomes possible due to the involvement of a group of experts (Pic. 3).



Pic. 3. Structural-logical scheme of reengineering of processes of management of state finances  
Source: made by the author

A compulsory component of improving the existing system of state finance management is the development of a system for monitoring the quality of state finance management, which is understood as an integrated concept that characterizes the effectiveness of all aspects of the management of state authorities in the financial sector. Monitoring of the quality of state finance management is carried out by analyzing and evaluating a set of processes that ensure the effectiveness of using budget funds and covers all components of the budget process.

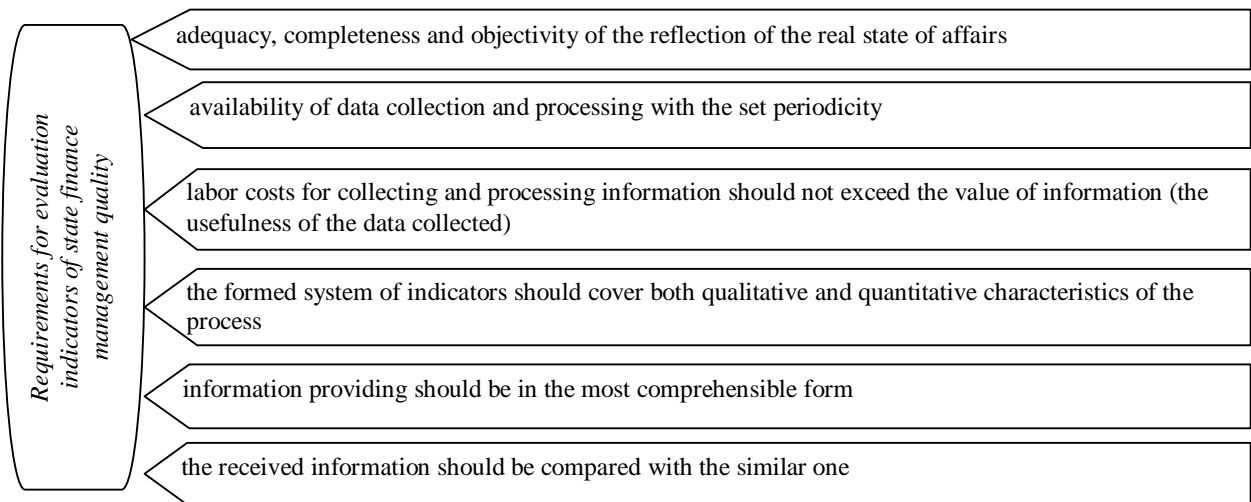
The valuation of the state finance management quality is needed in order to understand how effectively the existing financial management instruments are used, the effect of their implementation, and what can be done to improve the financial performance of state authorities and local government. It analyzes the reasons for achievement or failure to achieve the planned results, identifies existing and possible problems in this area, determines the factors that affect the quality of state finance management, and develops measures to eliminate existing problems.

To assess the state finance management quality, we propose the use of a qualitic model based on the application of the theory of fuzzy sets. Qualimetry (from "quali" — quality, "metry" — measurement and quantitative evaluation of something) combines the methods of quantitative evaluation of the quality of various objects.

The study of problems related to the analysis of state finance management processes revealed many unsolved problems, among which — the identification of the most significant indicators of evaluation of management processes, the problems of information provision evaluation procedures, subjectivity in assessments, etc.

The results of the study showed that the number of indicators of evaluation of managerial processes is determined by the type and complexity of the process itself, with a number of specific characteristics, requirements for the accuracy of the assessment, the purpose of the study and other factors. Quality indicators are rather specific, so each process is individual. In this case, the system of indicators should be flexible to changes in the conditions of functioning of state finances.

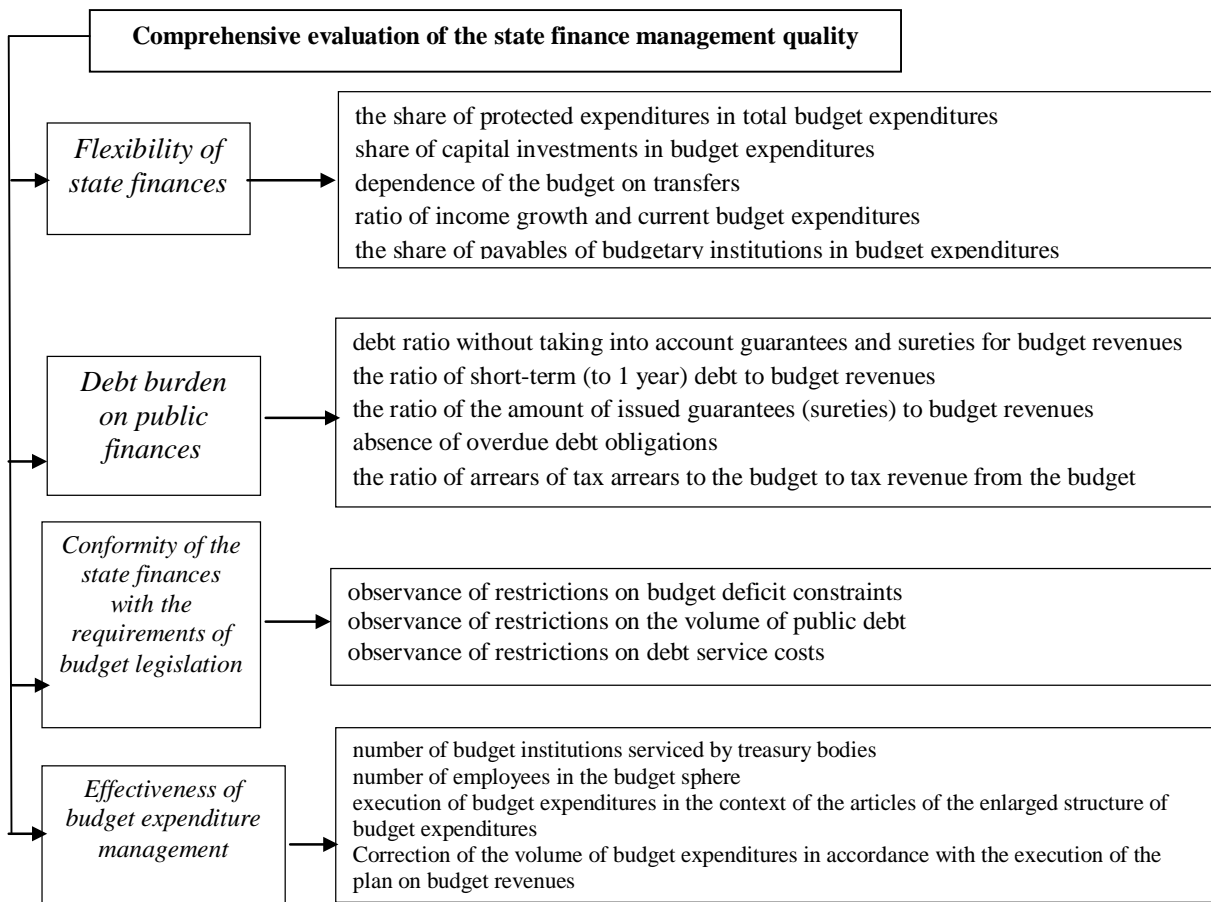
The indicators for assessing the quality of state finance management should be selected in accordance with the requirements presented in Picture 4.



Pic. 4. Requirements for quality indicators of state finance management

Source: made by the author

We propose to present the state finance management quality in the form of a hierarchical structure, at the highest level of quality (complex assessment), and at the lowest level, simple properties (used to calculate individual indicators of qualitative characteristics). At the same time, individual properties can be measured in certain units (number of services, amount of debt, specific weight of budget expenditures in specific areas, volumes of costs, etc.) (Pic. 5).

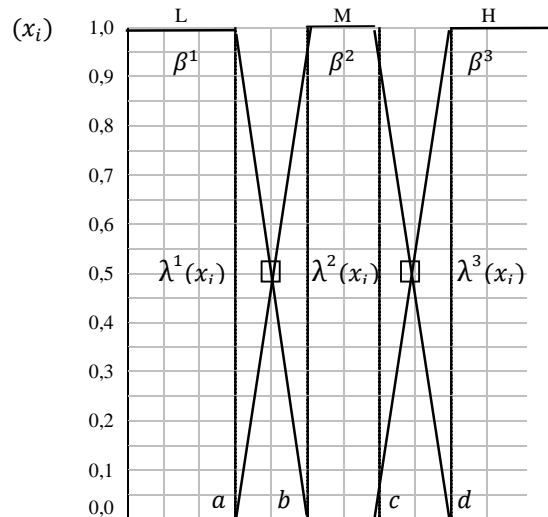


Pic. 5. Set of indicators of quality management of state finances

Source: made by the author

When evaluating the quality of state finance management, we consider the possibilities of the mathematical apparatus of the theory of fuzzy sets to be insufficiently utilized. The peculiarity of the theory of fuzzy sets is the introduction of linguistic variables (term-variables, from the English term — called), which can not be described by mathematical expressions, that is, it is difficult for them to give an exact (objective) quantitative estimate.

Let's introduce the linguistic variable "quality management of state finances" with the term-set of values "low, medium, high". We propose to determine the level of belonging of the indicators of the quality assessment of state finance management to one or another term-set using the three-level system of trapezoidal membership functions (Pic. 6).



Pic. 6. Pentascale of trapezoid fuzzy numbers

Source: made by the author

In picture 6, the following notations are used: L - low, M - middle, H - high quality of state finance management; — neutral points;  $\beta^j, j = \overline{1,3}$  — nodal points (are the means of fuzzy subsets of nuclei);  $a, d$  — abscesses of the bottom of the trapezium;  $b, c$  — abscesses of the upper base of the trapezium.

Standardize (normalize) the numerical values of the indicators by the formula:

$$\tilde{x}_{it} = \frac{x_{it}}{x_{maxi}}, \quad (1)$$

where,  $\tilde{x}_{it}$  — the standardized value of the i-th indicator of quality management of state finances in t-year;  $x_i$  — the absolute value of the i-th indicator of the quality of state finance management in the t-year;  $x_{maxi}$  — the maximum value of the i-th indicator of quality management of state finances.

For each indicator  $x_i, i = \overline{1, n}$  we should define the values of the functions  $\lambda^j(\tilde{x}_i), i = \overline{1, n}, j = \overline{1,3}$ , reflecting the degree of affiliation of the indicator  $x_i$  subset  $B_j$  and take values from 0 to 1. In this case, the sum of all accessories functions for any  $x_i$  is 1. To this end, we will construct a system of membership functions of the indicators for assessing the quality of state finance management with the corresponding fuzzy subsets:

$$\lambda(x_i) = \begin{cases} 0, & x < a; \\ \frac{x-a}{b-a}, & a \leq x \leq b; \\ 1, & b \leq x \leq c; \\ \frac{d-x}{d-c}, & c \leq x \leq d; \\ 0, & d \leq x. \end{cases} \quad (2)$$

where,  $[a, d]$  — is a fuzzy set of media, a pessimistic evaluation of the values of a variable;



[b, c] — is a nucleus of fuzzy set, optimistic estimation of values of a variable.

Consequently, the membership function generates a normal convex fuzzy subset of values with the carrier — the interval (a, d), the boundaries (a, b) (c, d), and the nucleus [b, c].

The results of the recognition of the level of indicators of quality management of state finances are systematized in Table 2.

Table 2

Levels of wearing indicators for fuzzy sets

Indicators	Results of classification by subsets		
	low	middle	high
$X_1$	$\lambda_{11}$	$\lambda_{12}$	$\lambda_{13}$
...	...	...	...
$X_i$	$\lambda_{i1}$	$\lambda_{i2}$	$\lambda_{i3}$
...	...	...	...
$X_n$	$\lambda_{n1}$	$\lambda_{n2}$	$\lambda_{n3}$

$\lambda_{ij}$  - the level of affiliation of the indicator  $X$  and the subset  $j$ ;  $\lambda_{ij}=1$ , if the current level of the indicator corresponds to the specific verbal meaning of the linguistic variable of the level of the indicator  $X_i$ , and is equal to 0 in all other cases.

Source: made by the author

Next, using the expert method, we will determine the rank of the impact of each indicator  $x_i$  on the level of quality of state finance management and, according to the Fishbern's rule, we will determine the weightings of the coefficients  $F_i$  of the impact of each  $x_i$  on the complex assessment:

$$F_i = \frac{2(N-n+1)}{(N+1)N}, \quad (3)$$

where,  $F_i$  is the weight coefficient of Fisher's for the  $x_i$  index;  $N$  — total number of indicators in each group,  $N > 0$ ;  $n$  is the serial number of  $x_i$  in the group,  $n = 1, \dots, N$ .

If, according to experts, all indicators have an equal impact on the quality of state finance management, then the weight will be equal to  $F_i = 1/N$ .

On the basis of the established values of the nodal points  $\beta^j$ , the scales of the impact of the indicators on the quality of state finance management  $F_i$  and the values of the functions of affiliation of indicators to subsets of the levels of quality management of state finances  $\lambda(\tilde{x}_i)$ , we will form a matrix of transformations of assessments of individual indicators into an integral estimation (Table 3).

Table 3

Matrix convolutional form for integral value

Indicators	Weights $F_i$	Quality management of state finances		
		Low	Middle	High
$X_1$	$F_1$	$\lambda_{11}$	$\lambda_{12}$	$\lambda_{13}$
...	...	...	...	...
$X_i$	$F_i$	$\lambda_{i1}$	$\lambda_{i2}$	$\lambda_{i3}$
...	...	...	...	...
$X_n$	$F_n$	$\lambda_{n1}$	$\lambda_{n2}$	$\lambda_{n3}$
Nodal points	$\beta^j$	$\beta^1$	$\beta^2$	$\beta^3$

Source: made by the author

The aggregation of the values of individual indicators in the integral indicator is carried out according to the formula of two-dimensional convolution:

$$K_{int} = \sum_{i=1}^n \sum_{j=1}^m \lambda^j(x_i) F_i \beta^j, \quad (4)$$

where,  $K_{int}$  — integral indicator;  $\lambda^j(x_i)$  — the value of belonging functions;  $F_i$  — Fishbern's weights;  $\beta^j$  — nodal points of belonging functions;  $n$  — the amount of indicators;  $m$  — number of fuzzy subsets of states.

We recommend to recognize the level of indicators using Table 4.

Table 4

Classifier of recognition of the level of  
quality management indicators of state finances

Level of quality management of state finances	Characteristics of quality management of state finances
highest quality assessment of state finance management	proper quality of financial management, funds are provided with encouraging character
the average assessment of the quality of state finance management - in general, satisfactory indicators of the use and management of government financial resources, but there are deviations in individual groups of indicators	the need to develop and take measures to improve the quality of management of the finance themselves in those areas in which the quality of management is assessed at a low level and recommendations for the elimination of these shortcomings
low quality assessment of state finance management - negative values of indicators of distribution, use, monitoring of financial resources	inadequate quality of financial management, the need to take measures to address shortcomings in financial management

Source: made by the author

Thus, the scientific-methodical approach to the integrated evaluation of the state finance management quality has been further developed in the work on the basis of the application of a quality model based on the theory of fuzzy sets. Unlike its predecessors, this approach takes into account the significance of the four groups of indicators — flexibility of state finances, debt burden on state finances, compliance of state finances with the requirements of budget legislation, and the effectiveness of budget expenditure management. Obtaining objective information on the quality of state finance management will allow to identify possible problems and the development of effective managerial decisions in the application of best practices in financial management timely.

**Conclusions.** Summing up, we note that approaches to assessing the quality of state finance management undergo steady changes taking into account the main directions of budget reform, reengineering of the budget process, for effective and responsible management of state finances — providing high-quality budget services while increasing the efficiency and the effectiveness of budget expenditures that determines the need to consistently reform all stages of the budget process through the introduction of modern financial management procedures and technologies in the state sector of economics. All components of the budget reform are interconnected; therefore achievement of the most positive result is possible only with the consistent reformation of the state sector of the economy as a whole. The need for transition to a new level of state finance management leads to the activation of the activities of state and local government bodies in carrying out responsible budget policy, implementation of modern technology of budget process management, results oriented aspiration to the fullest satisfaction of the demand of citizens for budget services.

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