

ORGANIZATIONAL AND ECONOMIC MECHANISM OF IMPROVING ENERGY COSTS IN THE TECHNOLOGICAL AND PROCESS CONSTANT OF THE PRINTING INDUSTRY

*Dmytro Makatora*¹, *Alona Makatora*², *Mykola Zenkin*³, *Anastasiia Mykhalko*⁴, *Oleksandr Shostachuk*⁵

¹ Prof. National Technical University of Ukraine, 37 Prospect Beresteiskyi, Kyiv, Ukraine, E-mail address: makatora_d@ukr.net

² PhD Student, National Technical University of Ukraine, 37 Prospect Beresteiskyi, Kyiv, Ukraine, E-mail address: alona.makatora@gmail.com

³ Dr. Prof., National Technical University of Ukraine, 37 Prospect Beresteiskyi, Kyiv, Ukraine, E-mail address: nikolay_zenkin@ukr.net

⁴ Prof. Kyiv National University of Technology and Design, 2 Mala Shyianovska Str., Kyiv, Ukraine, E-mail address: nastyia_franchuk16@yahoo.com

⁵ Prof. National Technical University of Ukraine, 37, Prospect Beresteiskyi, Kyiv, Ukraine, E-mail address: o.shostachuk@gmail.com

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Abstract

The printing sphere of economic activity refers to energy-consuming industries, which determines the implementation of an organizational and economic mechanism for improving the use of energy costs in technological processes. The purpose of the study is to justify the organizational and economic mechanism of improving energy costs in the technological and process constant of the functioning of business structures in the printing industry based on the identification of the key features and structural components of the development, taking into account specific features. The feasibility of developing an organizational and economic mechanism for improving energy costs in the technological and process constant was proven by the analysis of the global investment trends in the projects on energy-efficient technologies. The problems of ensuring the improvement of energy costs at production enterprises are highlighted in the research. The key aspects of the functional focus of the organizational and economic mechanism for improving energy costs in the direction of optimizing the energy potential of enterprises in the printing industry have been studied. The principles of the functioning of the organizational and economic mechanism for improving energy costs in the technological and process constant of the functioning of entrepreneurial structures in the printing industry are substantiated. The managerial components of the organizational and economic mechanism for improving energy costs of enterprises in the printing industry are singled out. The organizational and economic mechanism for improving energy costs in the technological and process constant of the functioning of entrepreneurial structures in the printing industry is proposed.

Keywords: *organizational and economic mechanism, energy costs, technological and process constant, printing industry, energy resources, globalization.*

JEL Codes: *Q49.*

Introduction

Current processes of socio-economic development are distinguished by the noticeable dynamism of intersystem transformations in the functioning of economic structures of various levels and forms of organization, which manifests itself in regular development and modification of the basic drivers of economic

growth and stimulating factors for ensuring expanded reproduction. One of these main trends of development is the process of systematic implementation of the basic provisions of the sustainable development concept embodied in ensuring the harmonious triune functioning of economic, social and ecological components of economic systems. It is worth noting that an important element in ensuring economic

sustainability of business structures was the introduction of resource optimization technologies and their integration within current technological and process constant of the functioning of enterprises. The mentioned processes on the resource optimization are aimed at eliminating non-productive costs, ensuring frugality and economy of use of resource components of the production process of industrial enterprises, in particular in part of energy costs. This approach appropriately correlates with the current progressive trends of economic development in terms of “green transition” and energy efficiency. It is worth noting that in the conditions of intensification of global recessionary processes, intensification of uncertainty factors, price volatility, the outlined problems are also reflected in the security dimension of the analysis. After all, on the one hand, ensuring improvement of the cost structure of the use of energy resources by the enterprise allows mobilizing additional financial resources in the conditions of objective limitation of its involvement, and on the other hand, corresponding processes allow reducing quantitative consumption of energy resources. Based on this, to date, the issue of developing an effective organizational and economic mechanism for improving energy costs in the technological and process constant of the printing industry, which should ensure a systematic and planned transition of the relevant business structures to energy-efficient and energy-saving functioning, is actualized.

The purpose of this article is to analyze the key features and structural components of the construction of the organizational and economic mechanism of energy costs in the technological and process constant of the functioning of entrepreneurial structures in the printing industry.

Literature review

The problems of researching organizational and technical aspects of ensuring effective cost management and improving energy costs of business entities have found their wide distribution in the academic space. In particular, among a significant number of scientific works in the field of management, accounting, cost

optimization and appropriate instrumental support, the scientific work of the following scientists should be noted (Ahmad F. et al., 2024; Marhasova V. et al., 2024; Yang Shiyu et al., 2024; Popelo O. et al., 2022; Tao Zhang et al., 2024;).

At the same time, the issues of ensuring the economical use of energy resources, achieving the energy efficiency of the enterprise and, in general, the study of stimulating factors for implementing the green transition, which are thoroughly explained in the works of such economists as (Hamid Ghobadi Lamouki et al., 2024; Jingjie Li et al., 2024; Tan L. et al., 2024; Yu Weihua et al., 2024), are gaining wide theoretical and methodological consideration.

However, despite the presence of a powerful theoretical basis in the form of scientific works in the field of cost management of business structures and organization of the processes for achieving energy efficiency of their functioning, the issue of complex generalization of relevant theoretical and methodological developments directed to the formation of a holistic organizational and economic mechanism for improving energy costs in technological and process constant of the functioning of entrepreneurial entities.

Methodical approach

To substantiate the organizational and economic mechanism of improving energy costs in the technological and process constant of the functioning of entrepreneurial structures of the printing industry, the methodology of the system approach was used, which made it possible to comprehensively investigate all the elements of the mechanism, taking into account their interrelationships and the influence of the external and internal environment, and to reveal its integrated property. The systematic approach provided an opportunity to substantiate the synthesis of the key features and structural components of the organizational and economic mechanism for improving energy costs in the technological and process constant of the functioning of entrepreneurial structures in the printing industry, which will contribute to the achievement of the goal of the mechanism's functioning directed to the reduction of reducing

energy costs at enterprises in the printing industry.

Results

The problem of building effective mechanisms of organizational and economic support for improvement of energy costs, today, forms a global track of the development of economic systems, which is accordingly reflected in global indicators of the economic activity in various functional areas. For example, according to data from the International Energy Agency, in 2023, the total amount of invested monetary resources in the development of business energy efficiency amounted to more than 600 billion dollars, ensuring global progress in achieving energy efficiency at the level of 2.2 %, at the same time, expert forecasts indicate a potential increase in relevant financial allocations up to 1.8 trillion dollars by 2030 (International Energy Agency, 2023). A study of the processes of economic development on the example of the US economy since 1970 shows that the key driver of its growth was investments in energy efficiency, which in general made it possible to increase the total energy productivity by 170%. At the same time, lack of the above-mentioned investments in the development of energy efficiency, the level of emissions of harmful gases would be 60% higher than the current level (Business Council for Sustainable Energy, 2023).

Additional confirmation of the relevance of the above-mentioned trends to the improvement of internal processes related to the consumption of energy resources by the business sector is provided by the data of the European Investment Bank. During 2022, this Institution financed projects related to the improvement of energy processes for a total amount of about 19 billion euros, among them 7 billion euros for ensuring energy efficiency, 7.2 billion euros for the use of renewable energy sources and about 5.1 billion euros for projects in the green energy sector. In general, during 2017-2022, 29.8 billion euros were invested in projects using renewable energy sources, which made it possible to reach

an indicator of 31.333 GW of annual energy generation of the corresponding type (European Investment Bank, 2023). Also notable is the trend towards active disinvestment, namely the sale of assets of the companies which main activity is directly related to the use of traditional energy sources, which in 2022 reached the level of 40.5 billion dollars (Ren21, 2023).

The outlined issues become especially relevant in the context of research into the specifics of the energy expenditure management, which are mostly characterized by the dominance of traditional energy sources in terms of the relevant structural indicators, in parallel with the high level of wear and tear of the corresponding equipment, which serves as an additional source of energy losses and negative environmental impacts. In general, it is possible to identify the following problems of ensuring the improvement of energy consumption by domestic enterprises (Fig.1):

- objective limitations of the existing methodological base for the implementation of complex energy audit procedures of business structures, in particular in terms of the forms of their implementation and the means of practical implementation;

- shortage of human resources with appropriate professional and competence characteristics for the qualified energy audit;

- low level of development of the energy supply infrastructure, which results in high rates of losses during transportation of energy carriers to the end consumer;

- problems of financial support for the full implementation of modern measures in the field of energy saving and attraction of appropriate investment resources;

- limited opportunities for effective diversification in the supply system of energy resources of enterprises;

- lack of system processes of controlling the use of energy resources at the level of business structures, which is mainly limited to the accounting of the received resource, while avoiding the procedures of technological and process control of

consumption according to different functional directions and forms of regularity of the operation of the main equipment;

— inadequacy of the knowledge base and the information and communication component in the process of implementation by enterprises of initiatives in the sphere of cost optimization of the consumption of energy resources;

— methodical complexity of forming an internal base of normative indicators that serve as a reference point for energy audits and

research on the productivity of the current composition and volume of energy consumption;

— weak motivation of the business sector to implement modern solutions in the field of optimization of resource use of energy and implementation of the energy efficiency policy;

— technical and technological limitations of effective energy modernization of the equipment, which is explained by high level of its wear and tear and the difficulties of the production integration of the relevant innovative products.

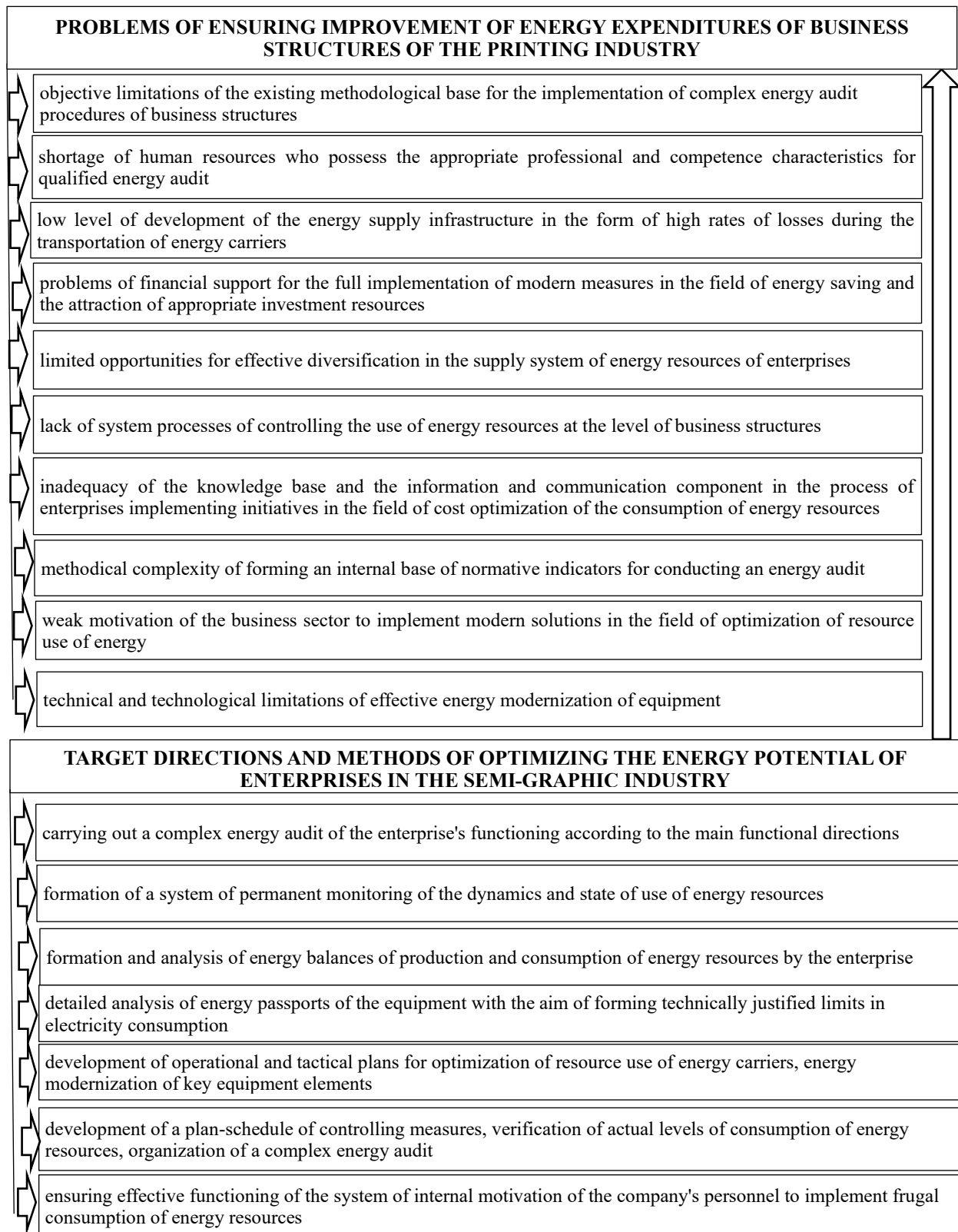


Figure 1. Tasks specifying target areas and methods of optimizing energy potential of the enterprise

**Source: systematized by the authors.*

Based on the results of the above analysis, it can be stated that the existing trends in ensuring sustainable development of economic entities, in particular in terms of improving energy costs and achieving a high level of energy efficiency, directly manifest themselves in the corresponding indicators of capital movement and performance indicators.

It should be noted that the organization of effective management practices in terms of improving energy costs of the enterprises in the technological and process constant requires development of a complex organizational infrastructure at the level of the business structure, which covers all the main business processes and properly takes into account both the needs of individual functional areas and specific features of their implementation. That is why the primary aspect of development of business entities in this area is the construction of the sustainable organizational and economic mechanism that will allow establishing the processes of improving energy costs at the systemic and planned level of implementation in accordance with current strategic provisions of development and technological and process aspects of the functioning.

The organizational and economic mechanism for ensuring the improvement of energy costs in the technological and process constant of business entities is a complex of production-technological, organizational-management and economic means designed for systematic monitoring and identification of promising directions for optimizing energy potential of the enterprise to mobilize additional resources to save costs and elimination of the destructive impact of the business structure on the natural and ecological environment.

The key aspects of the functional orientation of the operation of the organizational and economic mechanism for improving energy costs in the technological and process constant are a set of tasks that specify the target directions and methods of optimizing energy potential of the enterprise (Fig. 1).

We should note that ensuring effective functioning of the organizational and economic mechanism for improving energy costs in the technological and process constant of the

printing industry is based on a system of principles that form a general vector of controllability of the management system and represent universal guidelines for the operation of the mechanism itself.

These systemic principles of the functioning of the organizational and economic mechanism of improving energy costs in the technological and process constant of the functioning of entrepreneurial structures in the printing industry include the following:

1. The principle of comprehensiveness provides for ensuring the analytical and managerial completeness of the implementation of the optimizing process of energy costs of the enterprise, which must properly take into account stable relationships formed between various functional directions, business processes, while at the same time observing the integrity of the procedure for implementing management initiatives in the energy saving sector.

2. The principle of effective rationing provides for the mandatory formation of an internal information base of existing regulatory limits for the use of energy resources by the enterprise's equipment, their application in the course of developing optimization measures; periodic updating of this type of indicators.

3. The principle of responsibility provides for the presence of a clear horizontal and vertical division of responsibility, avoiding duplication of managerial and executive functions.

4. The principle of technical and technological relevance provides that the use of management tools within the organizational and economic mechanism of improving energy costs must correspond to the objective technical and technological characteristics of the production and management base of the enterprise's functioning, as well as take into account the constants characteristic of this managerial direction (the specifics of climatic and weather conditions, availability of certain types of energy resource, their cost, current legal restrictions, etc.).

5. The principle of permanent monitoring provides for the implementation on a permanent basis of a set of necessary measures for the operational and tactical monitoring of current indicators and the general dynamics of energy

consumption in the main directions, as well as adjustment of formed plans in accordance with possible changes in the composition of fixed assets or other factors that affect energy consumption levels.

6. The principle of motivation involves maintaining the appropriate level of personnel motivation of the business structure to achieve the planned indicators of consumption of energy resources, their frugal use, as well as the initiation of relevant production and organizational improvements within the limits of one's own area of responsibility.

Next, we'd like to propose considering the content of the main management components of the organizational and economic mechanism of improving energy costs in the technological and process constant of the functioning of entrepreneurial structures in the printing industry (Fig. 2).

The planning component includes a complex of managerial activities related to the compilation of energy balances, accounting and analysis of equipment passports, formation of forecasts of the use of energy resources, taking

into account the actions of internal (planned repairs of equipment, installation/modernization of fixed assets, etc.) and external (changes in the volume of output under the influence of seasonality, market demand fluctuations) influencing factors.

The control component involves organization of a periodic energy audit of the enterprise at the system level; establishment of technical means of accounting for energy consumption by the enterprise's equipment; analysis of effective indicators of the use of energy carriers, which form the basis of further development of optimization measures; monitoring of the compliance with established norms and limits; identification of the causes of energy losses at the enterprise, as well as sources of overtime use of energy resources (both in terms of the functioning of production equipment and in relation to the work of management apparatus and service services); substantiation of the overall potential of the business structure for the implementation of energy saving measures.

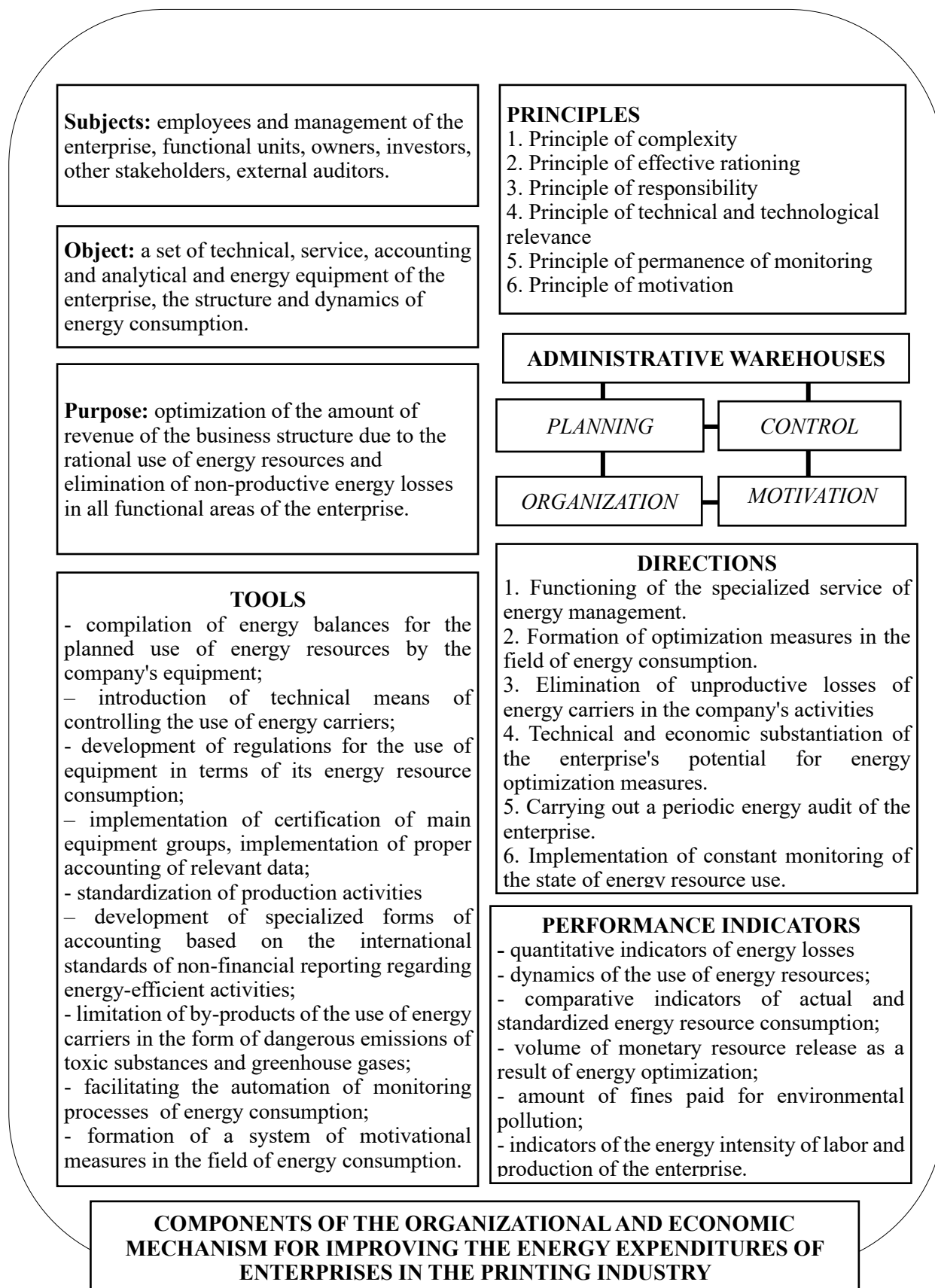


Figure 2. Logical and structural scheme of the key components of the organizational and economic mechanism for improving energy costs of enterprises in the printing industry

**Source: developed by the authors.*

The organizational component of the activity involves the creation of a specialized functional unit of the enterprise (energy management service) aimed at performing control and monitoring functions and developing improvement measures within the framework of the energy management policy; development of specific regulations for energy-efficient use of equipment.

We would like to note that the implementation of the organizational function of management within the framework of the studied mechanism requires construction of an integrated energy policy, which allows systematizing and normalizing the phasing of the implementation of optimization measures, control and monitoring procedures.

The motivation component covers the issue of developing a separate system of motivational measures aimed at stimulating conscious, from the point of view of energy saving, behavior of the staff, as well as supporting the corresponding initiative activity of the company's employees. A system of bonuses, extra payments, and gifts can be used as motivational tools; as part of the non-material component of motivation, practices of reducing working hours, awarding certificates of appreciation/thanks, bonuses for providing additional leave, etc. can be applied.

It should be added that implementation of the motivational component of management of the organizational and economic mechanism for improving energy costs requires establishment of a clear correlation between the achieved results in saving energy resources and the amount of material incentives.

In summary, the logical-structural diagram presented above of the key components of the organizational-economic mechanism for improving energy costs in the technological-process constant of the functioning of entrepreneurial structures in the printing industry demonstrates the elemental composition of this mechanism, which includes as system-forming components (objects, subjects, principles, management components), as well as a range of

applied management tools for improving energy costs and quantitative indicators of the effectiveness of the mechanism functioning at the level of a specific enterprise.

Conclusions

As a result of the research, a detailed analysis of global trends in the field of improving energy consumption and energy saving of enterprises was given. The main problems of effective improvement of energy costs in the technological and process constant of the functioning of business structures are characterized.

A scientific novelty is the construction of the organizational and economic mechanism for improving energy costs in the technological and process constant of the functioning of business structures, which is based on the analysis of the key features and structural components of the construction and includes the key structural components of the organizational and economic mechanism for improving energy costs of the functioning of enterprises in the printing industry, namely: tasks, principles, management components (planning, control, organization and motivation), directions and tools for improving energy costs with corresponding quantitative indicators for evaluating the effectiveness of their practical implementation.

The implementation of the organizational and economic mechanism will ensure the establishment of the process of improving energy costs at the systemic and planned level of implementation in accordance with the current strategic provisions of development and technological and process aspects of the functioning of the printing industry.

Prospective areas of further scientific research in this theoretical and methodological field are the analysis of applied aspects of the implementation of the proposed mechanism, specification of the elements of methodical and instrumental support for the improvement of energy consumption by the enterprises of the printing industry.

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