

# Innovative Paradigm of Management Accounting and Development of Controlling in the Entrepreneurship

Alina Zh. Sakun<sup>1</sup>, Iryna V. Perevozova<sup>2</sup>, Olha H. Kartashova<sup>3</sup>, Oleksandr S. Prystemskyi<sup>1,\*</sup>,  
Andrii S. Mokhnenko<sup>4</sup>

<sup>1</sup>Department of Accounting and Taxation, Kherson State Agrarian and Economic University, Kherson, 73006, Ukraine

<sup>2</sup>Department of Entrepreneurship and Marketing, Ivano-Frankivsk National Technical University of Oil and Gas, Ivano-Frankivsk, 76000, Ukraine

<sup>3</sup>Department of Public Management and Administration, Kherson State Agrarian and Economic University, Kherson, 73006, Ukraine

<sup>4</sup>Department of Finance, Accounting and Entrepreneurship, Kherson State University, Kherson, 73000, Ukraine

*Received April 16, 2021; Revised June 15, 2021; Accepted June 24, 2021*

## **Cite This Paper in the following Citation Styles**

**(a):** [1] Alina Zh. Sakun, Iryna V. Perevozova, Olha H. Kartashova, Oleksandr S. Prystemskyi, Andrii S. Mokhnenko, "Innovative Paradigm of Management Accounting and Development of Controlling in the Entrepreneurship" *Universal Journal of Accounting and Finance*, Vol. 9, No. 4, pp. 548-564, 2021. DOI: 10.13189/ujaf.2021.090403.

**(b):** Alina Zh. Sakun, Iryna V. Perevozova, Olha H. Kartashova, Oleksandr S. Prystemskyi, Andrii S. Mokhnenko (2021). *Innovative Paradigm of Management Accounting and Development of Controlling in the Entrepreneurship*. *Universal Journal of Accounting and Finance*, 9(4), 548-564. DOI: 10.13189/ujaf.2021.090403.

Copyright©2021 by authors, all rights reserved. Authors agree that this article remains permanently open access under the terms of the Creative Commons Attribution License 4.0 International License

**Abstract** The article considers a comprehensive methodology of innovative paradigm of management accounting, which takes into account the functional design of information and analytical support of the innovation process that is the foundation for expanding tools and determinants of controlling in the socio-ecological and economic space of entrepreneurship. The maximum possible amount of organized information data is substantiated. It considers the individual features of the management accounting model for decision-making to form the determinants of controlling development with the probability of turning it into a strategic resource aimed at ensuring a stable business, taking into account socio-environmental and economic factors. The model of development of the innovative theory of the administrative account from a position of meaningful enrichment is presented. It is proved that the subject of management accounting with an innovative aspect is the process of managing transaction and innovation costs, which strengthen the development strategy of business entities. Indicators of management accounting, which is formed into a three-component part of business development – social, environmental, economic – as a basis for an integrated assessment of the level of activity of entities in a particular area or industry. A detailed veil of monetary and natural innovative components of management accounting

with a focus on the past and future is presented. The intellectual resource and its derivative benefit - intellectual rent is proposed to study in the plane of the philosophy of human-centeredness and with an emphasis on professional knowledge in time, which is obtained by a person. The method of controlling effectiveness is substantiated, which forms a synergistic effect of interaction of functional components of controlling and coherence of their goals.

**Keywords** Management Accounting, Controlling, Entrepreneurship, Innovations, Innovation Costs, Functional Subsystems of Controlling

---

## 1. Introduction

Business success is achieved through the optimal ordering of the set of components of business entities (organizational, economic, technological, etc.). The adequacy of institutional management mechanisms for the preservation and increase of national wealth, the formation of a stable financial condition of individual owners of private capital, subordinated to management, which ensure the effective implementation of its functions, must be consistent with business algorithms, as well as

requirements and needs. At the same time, short-term and permanent competitiveness of economic entities allows adapting accounting tools to the environment of the agricultural market, focused on the managerial aspects of analytical support of entrepreneurship, forming a system of stable development of economic entities.

Inhibition of the development of management accounting in the activities of Ukrainian enterprises, and even more so – the introduction of its effective methods in practice is attributed to the vague delineation of its conceptual boundaries. Moreover, lack of clear scientific recommendations for the implementation of effective management accounting tools in various forms and types of entities leads to the deterioration of internal accounting systems and the quality of information flows.

At the same time, the trend of artificially created concept of management accounting is limited by the norms of international standards formed on the basis of the global economy. However, the economy needs a different account – a scientifically sound innovative paradigm of management accounting in the socio-ecological and economic space. That is, there is a need for a balanced theoretical and methodological accounting, in which the management component is its basis. Building management accounting on the principles of synergy of methodology, tools and methods should reveal the ability to identify and record transactional and intellectual costs generated by the new theory of innovation.

Problems of the theory and practice of management accounting in the specified information space of internal accounting were discussed by I. Belebeha [1], S. Bulgakova [2], O. Hrytsai [3; 4], O. Kaverina [5], T. Kaminska [6], G. Lambertson [7; 8], S. Levytska and I. Stovpovets [9], M. Prodanchuk [10], S. Schaltegger and R. Burritt [11], M. Vahrushina [12], Z. Zadorozhnyi [13]. The following scholars have paid attention to the issue of dialectical institutional connection between the officially recognized postulates of the accounting system and approaches to determining the limits of the competence of the influence of management accounting on the accounting paradigm: R. Brukhanskyi [14], F. Butynets [15], R. Gray [16], O. Kantsurov [17], A. Kolot [18], J. Nilsson and S. Bergstorm [19], M. Pushkar [20], A. Pylypenko, I. Dzobko, O. Pysarchuk [21], I. Sadovska, O. Machulka [22], S. Schaltegger and R. Burritt [23], E. Voronova [24], V. Zhuk [25].

Problems of rational management accounting and its place in the management system were discussed by O.

Karpenko [26], H. Kireitsev, O. Hudzynskyi, T. Pakhomova [27], S. Kuznietsova [28], E. Muhomedzyanova [29], I. Sadovskaya [30], S. Schaltegger and R. Burritt [31], V. Zhuk [32]. However, the identification of management accounting in the institutional structure, which would correlate the relationship between its theoretical concept in the general theory of accounting and in terms of its analytical support, is rarely discussed.

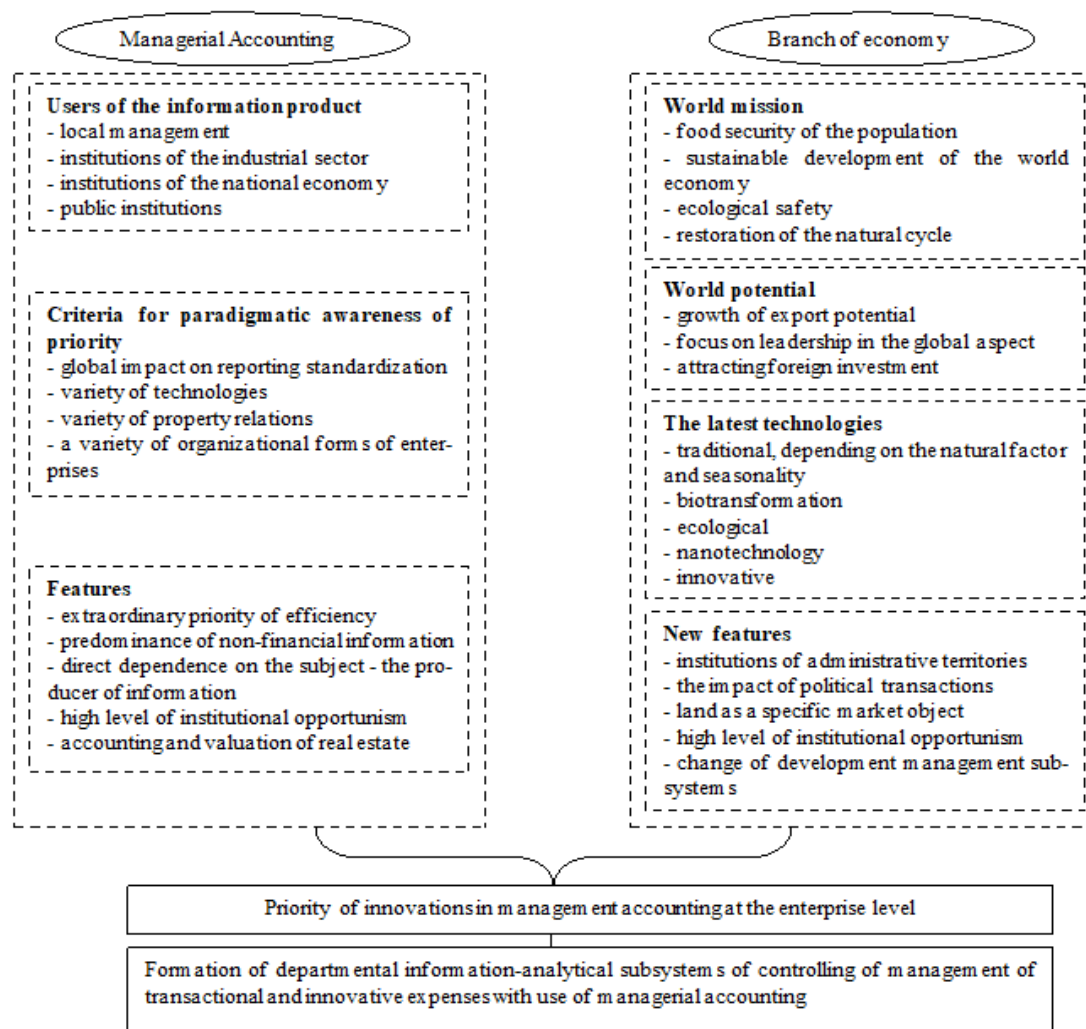
The priority of our study is to substantiate the methodology of innovative paradigm of management accounting, which takes into account the functional design of information and analytical support of the innovation process. It is the foundation for expanding tools and determinants of controlling in the socio-ecological and economic space of entrepreneurship.

## 2. Materials and Methods

The development of the institutional environment on a global scale requires from management accounting increasing adaptability, versatility and quality of forming the information [33; 34]. The latter requires the development of a methodological platform. It should have an expanded purpose for the sectors of the national economy that are implemented by the concept of sustainable development [35]. Changing socio-economic formation and the introduction of market relations in the world have necessitated the transformation of the institutional environment in the process of agrarian reform [36].

While ensuring the stability of the world, the development of the national economy could be predicted as a linear function. However, financial crises, military action, deteriorating living standards, along with the intention to change the economic policy of the world create significant uncertainty about the future development of institutional change [37; 38].

The maximum possible amount of organized information data, which takes into account the individual features of the model of management accounting for decision-making, allows choosing the necessary approach to form the determinants of controlling with the possibility of turning it into a strategic resource [39]. Moreover, with the spread of information-analytical subsystems of controlling, innovations in management accounting are realized, the paradigmatic awareness of which is presented in Fig. 1.



**Figure 1.** Priority of innovations in management accounting and information and analytical subsystems of controlling the economy

Thus, the main criteria for the priority of management accounting are: global impact on the standardization of reporting; variety of technologies; multivariate property relations; and diversity of organizational formations. In our opinion, the accounting praxeological doctrine in the intellectual socio-ecological and economic environment reveals the patterns and ways to achieve effective management accounting. It should be noted that the action is effective only when it leads to the result [40; 41]. That is, praxeological assessments that are subject to gradation relate either to actions or to the results of those actions.

First, restraint may be uneconomical or counter-economic, or only occasionally economic [42; 43]. Therefore, the result of the production process and its activity depends on the action of the subjects of departmental information and analytical controlling systems. It plans the processes of managing business costs, transaction and innovation costs using management accounting data and has the necessary freedom of action [44]. Second, the principle of minimal intervention is mandatory, which encourages interference with the

natural course of events. According to it, such a selection of management accounting tools is provided, which encourage active impulses to minimize the cost process of production and innovative designs of controlling in the socio-ecological and economic space of entrepreneurship [45].

Taking into account the growing priority of the innovative paradigm of management accounting in the information-analytical subsystems of controlling industries, we consider it appropriate to use the philosophy of individualism [3]. It leads to the development of a new scientific theory of social responsibility of professional accountants in economic calculation of the results of the productive process which is followed by the formation of analytical reports of entrepreneurial activity of enterprises [46; 47].

In this case, the subjects of management accounting in the practical activities of the information-analytical subsystem of controlling are: cost, costs of production and marketing, costs of aggregate economic activity [48]. From the standpoint of innovation theory, the subject of

management accounting is the process of managing transaction and innovation costs, which strengthen the development strategy of business entities. The generalized model of development of the subject component of management accounting is presented in Fig. 2.

Given that the methodology of innovative paradigm of management accounting using production process models is formed with the help of methods for the development of information-analytical subsystems of controlling, we believe that the subject of management accounting for visual perception is appropriate to present using the function (historical approach) [3] (1):

$$P_{uo} = \int f(AS) \quad (1)$$

where  $P_{uo}$  is the subject of management accounting,  $\int$  is indefinite boundaries of the subject of management accounting and  $f(AS)$  is accounting system.

Accordingly, from the standpoint of innovation theory,

the subject of management accounting follows from the general understanding of detailed subsystems of controlling, which embodies the reflection of the species structure of the costs of the business entity using a mathematical algorithm (innovative approach) [3] (2):

$$P_{uo} = \int_{KF}^{AF} f(SK) \times f(PF) \times f(CIF) \times \dots \times f(Inf) \quad (2)$$

where,  $AF$  is professional accounting judgment based on constructivism,  $KF$  is controlling principles and  $\int_{KF}^{AF}$  is the boundaries of a new innovative subject of management accounting, which is based on accounting and information-analytical data, as well as on the constructivism of professional judgment of the accountant;  $f(SK)$  is controlling subsystem;  $f(PF)$  is prognostic system;  $f(CIF)$  is cloud technology system;  $f(Inf)$  is a system of innovative management accounting functions.

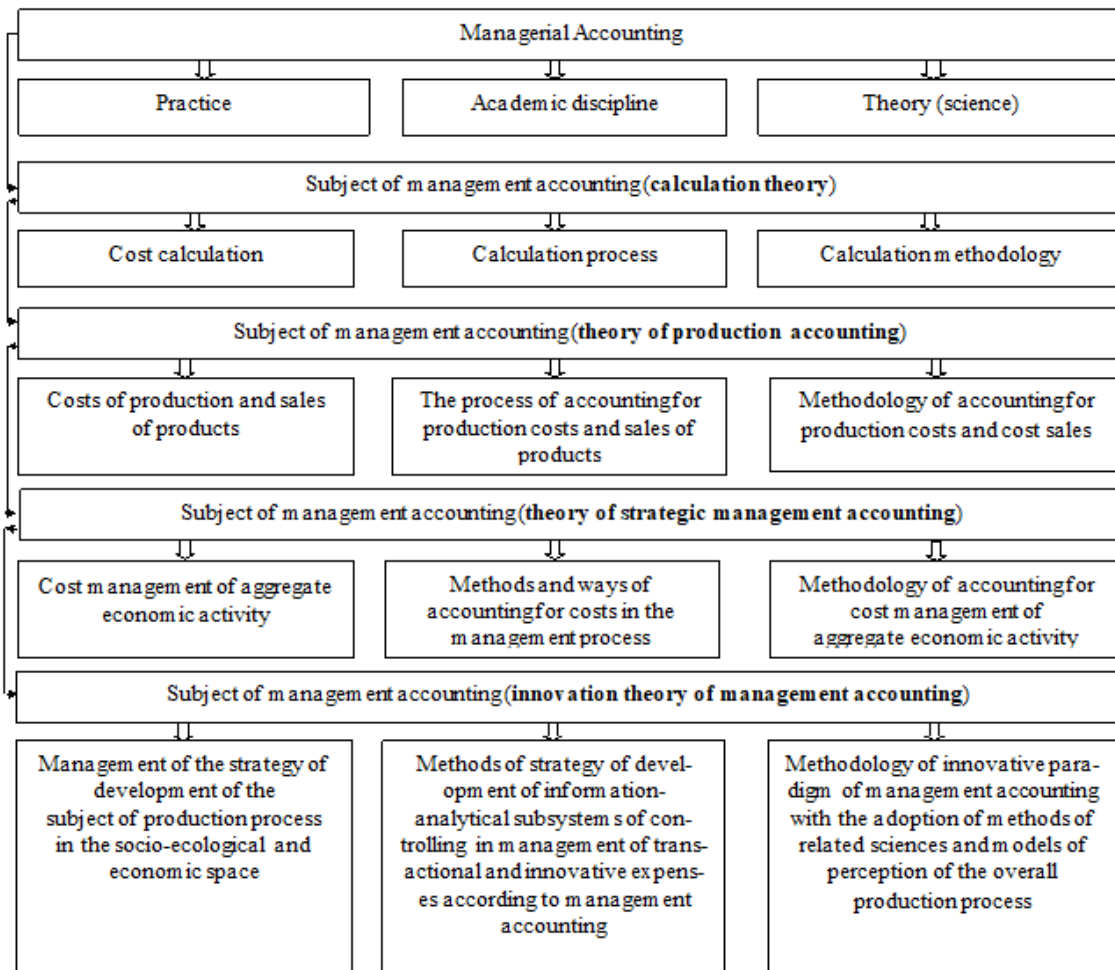


Figure 2. Model of development of innovative theory of management accounting from the standpoint of meaningful enrichment

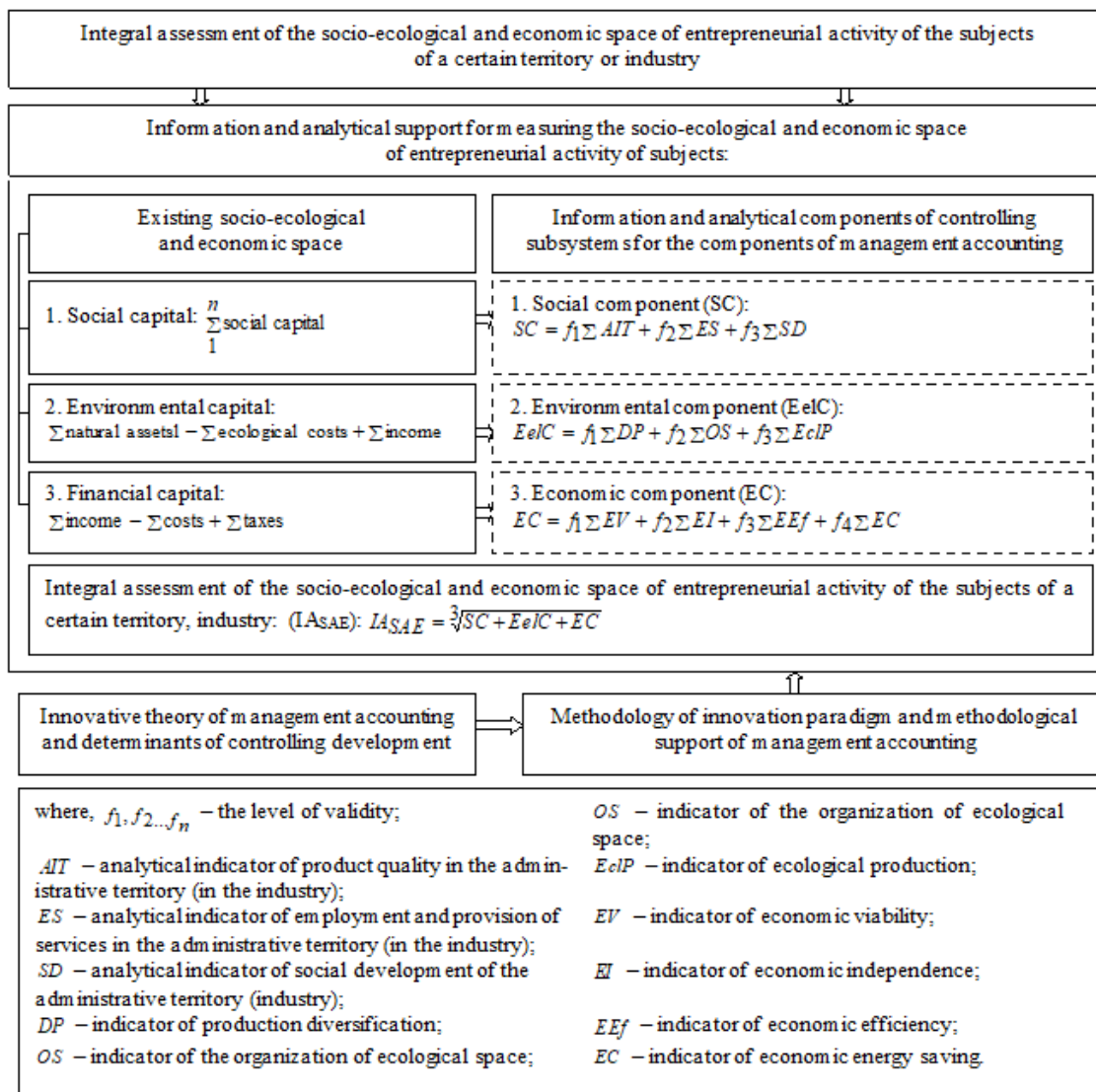
We should note that components of the new subject of management accounting are formed on the basis of the accounting system within the historical approach and constructively determine the relationship with the function of the innovative approach, respectively. The general system functions (equations) will look like this [3] (3):

$$\begin{cases} P_{uo} = \int fOF \\ P_{uo} = \int_{OF}^{BF} f(OF) \times f(PF) \times f(CIF) \times \dots \times f(Inf) \end{cases} \quad (3)$$

This visual image of the general system function clearly shows the relationship with related sciences and introduces its rules into the subject essence of innovative management accounting theory. They are focusing on its

new components in the socio-ecological and economic environment of entrepreneurial activity [49; 50].

It should be noted that the development of information and analytical subsystems of controlling in the management of transaction and innovation costs according to the management accounting of the micro level is a strategy for the development of the macro- and meso-level of the state [51]. Therefore, there is a need to substantiate management accounting indicators, which are proposed to form a three-component part of business development – social, environmental, economic, which is the basis for an integrated assessment of the level of activity of entities in a given territory or industry (Fig. 3)



**Figure 3.** Methodology of innovative paradigm of management accounting and information-analytical subsystems of controlling for the balanced estimation of social-ecological and economic space of entrepreneurial activity of subjects

Thus, innovations in management accounting provide a toolkit of information-analytical subsystems of controlling, which allow to comprehensively assess the activities of business entities and through methodological support to implement strategic goals of managing their development in a particular area or industry (innovation processes in general, innovation, innovative projects, costs) [52]. The delimitation of information and analytical subsystems of controlling for financial and management accounting simultaneously finishes two tasks: 1) determining the results of enterprises of previous periods (the task of financial accounting); 2) providing relevant information for the management system at all its levels for management decisions in the implementation of current activities and activities related to future periods of enterprises (management accounting tasks) [29].

The formation of information-analytical subsystems of innovation controlling covers a significant number of processes and tools: development of management tools for strategic and operational controlling; information and analytical support for controlling innovation and transaction costs; methods of calculating costs by type, place of origin and products; methods of analysis of discrepancies between planned and actual indicators of

costs and results. Existing or established planning and budgeting systems and internal management reporting are also used as tools [53; 54]. The effectiveness of controlling provides the formation of a synergistic effect due to the interaction of the functional components of controlling and the consistency of their goals [29] (4-5):

$$P_p + P_{ac} + P_c + P_{an} \leq P_{sc} \tag{4}$$

$$SE = P_{sc} - (P_p + P_{ac} + P_c + P_{an}) \tag{5}$$

where  $P_{sc}$  is the effectiveness of the control system,  $SE$  is synergistic effect from the integration of functional controlling systems and  $P_p, P_{ac}, P_c, P_{an}$  is the effectiveness of the planning, accounting, control and analysis systems. This characteristic of the synergetic effect of the formation of controlling in the management system of entrepreneurial activity of economic entities is its qualitative interpretation, which indicates the dependence of the overall result on the interaction of the functional components of controlling. Indicators of the synergy effect are recommended to be used as a system criterion for the selection of the scenario of controlling formation after the completion of the methodological basis for the selection of the scenario.

**Table 1.** Matrix of veiling of innovative components of management accounting in the socio-ecological and economic space of industrial enterprises

		Innovations in management accounting in the socio-ecological and economic space of agricultural entrepreneurship (IMASEE)			
		Monetary innovation of management accounting (MIMA)		Natural innovation of management accounting (NIMA)	
		Current period	Long-term period	Current period	Long-term period
Focus on the past	Regular information-analytical subsystem of controlling	Cost accounting for social and ecological measures (calculation of variable costs, pricing, ABC method)	Accounting for costs and revenues from the use of social, human and ecological capital	Accounting of inventory and material values moving	Accounting for the impact on ecological and social capital
	Special information-analytical subsystem of controlling	Real assessment of ecological costs	Efficient calculation of production costs cycle, calculation of target ecological and social costs	Post-assessment of short-term influences on surrounding and social environment	Inventory of life cycle production. Evaluation of investments in the ecological and social environment
Focus on the future	Regular information-analytical subsystem of controlling	Ecological and social operational budgeting and budgeting of ecological and social capital in monetary terms	Long-term cost planning on social and ecological activities in cost means	Budgeting of physical component of surrounding environment (budget formation based on the ABC method)	Long-term planning of social costs and Ecological activity in natural presentation
	Special information-analytical subsystem of controlling	Ecological and social costs of the future periods	Investment evaluation in ecological and social projects. Budgeting of life cycle production and target pricing	Appropriate ecological impacts (considering restrictions in short-term run on the activity of enterprises)	Assessment of ecological and social investment. Analysis of life cycle of specific project
	Special information-analytical subsystem of controlling	Ecological and social costs of the future periods	Investment evaluation in ecological and social projects. Budgeting of life cycle production and target pricing	Appropriate ecological impacts (considering restrictions in short-term run on the activity of enterprises)	Assessment of ecological and Social investment. Analysis of life cycle of specific project



### 3. Results of Discussion

Innovative approaches to the development of management accounting in the socio-ecological and economic space of entrepreneurship allows forming a common understanding and lobbying for its implementation in the information and analytical subsystems of controlling among managers and other stakeholders. We conducted a detailed visualization of monetary (MIMA) and natural (NIMA) innovative components of management accounting with a focus on the past and future in the socio-ecological and economic space of the micro level with different types of management decisions (Table 1). Thus, the monetary innovation component of management accounting (MIMA) includes standardized interdependent cost instruments of environmental and social environment, which are related to strategic and operational planning, provide conditions for decision-making, means to achieve goals, control and reporting.

The functionality of the natural innovative component of management accounting (NIMA) is manifested through analytical tools that identify the strengths and weaknesses of the impact of business entities on the ecological and social environment for management decisions, as well as means of measuring environmental efficiency, direct and indirect control of environmental impacts, and catalysts of ensuring an active position for internal and external communications. Internal management decisions, regardless of duration (current or long-term) are accompanied by the accumulation of both regular (information and analytical subsystems of controlling, which form calculations for management) and special levers of influence (specific methods of controlling

subsystems that create information for specific decisions) on the socio-ecological and economic environment of business entities [19; 55].

The dynamics of indicators of innovation activity of industrial entities in Ukraine for the period 2010-2019 indicates the inability to achieve the planned results in full. Thus, in 2019, the number of industrial enterprises that introduced innovations in the production process amounted to 60.2%. Only 21.6% industrial entities have introduced financial resources for new types of technological process and 22.8% industrial entities have introduced financial resources for new types of technological process.

In 2019, 1088 industrial enterprises spent 0.294 billion USD on technological innovations. At the same time, the priority share of cost allocation in management accounting fell on the purchase of machinery, equipment and accounting engineering – 1846 billion USD, for the purchase of domestic research work – 30.2 billion USD, foreign research work – 6.6 billion USD, for the acquisition of other external knowledge – 5.2 billion USD, for the training of professional specialists in management accounting and information-analytical departments of the controlling subsystem for the development and implementation of new innovative products and processes, as well as other works related to the creation and implementation of innovations – 68.3 billion USD.

More than 70% of the innovation-active enterprises in the industrial sector have introduced innovations at the expense of their own resources (175.8 billion USD), at the expense of state – 3.4 billion USD, received funds from investors – 89.9 billion USD (foreign investors deposits 88.8 billion USD, domestic – 1.1 billion USD), at the expense of credit resources – 23.0 billion USD (Fig. 4).

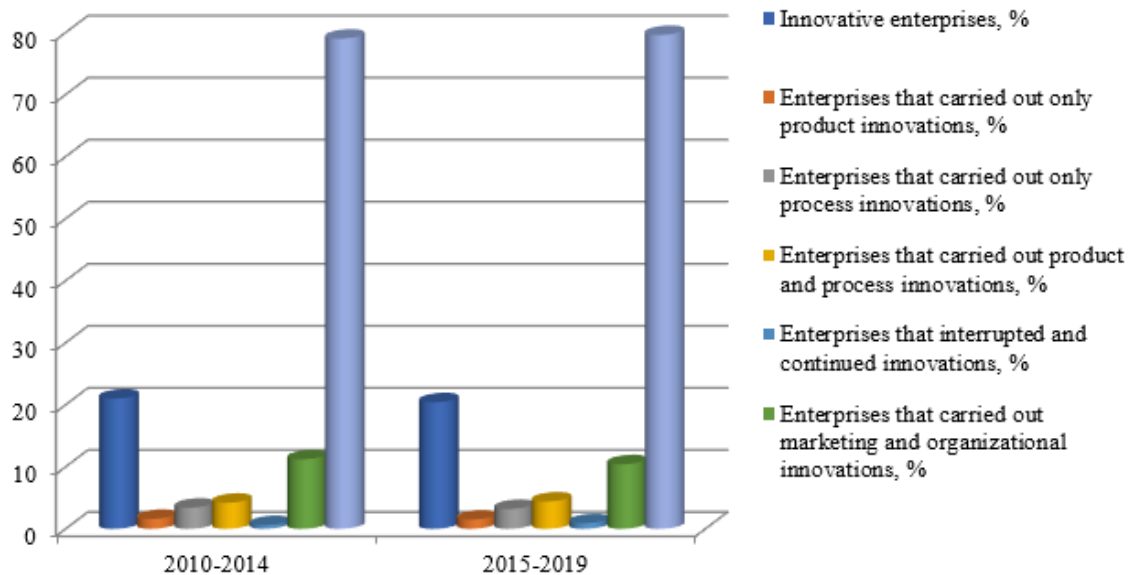


Figure 4. Innovative activity of subjects of industrial branch of Ukraine for the period of 2010-2019, %

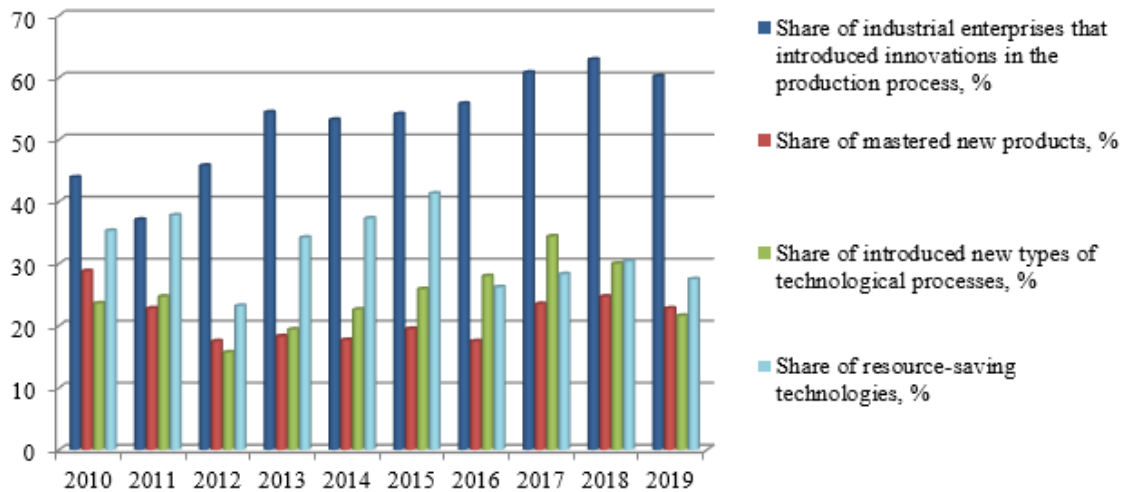


Figure 5. Distribution of industrial entities of Ukraine by components of management accounting and types of innovations, %

We have identified the areas of entrepreneurial activity of industrial entities that affect the formation of controlling goals in the future, provided the use of innovative components of management accounting. Thus, according to the survey, the level of innovation activity of industrial enterprises for the last five years (2015-2019) is 20.4-21.0% of their total number. At the same time, the multidirectional implementation of innovative components of management accounting prevails, in particular in process and production technologies, as well as the interruption and resumption of costs in innovation activities (Fig. 5).

The tendency of different types of innovation shows that innovations for the introduction of new products are carried out by half as many enterprises than with the introduction of new technologies in the production process: 1.5-1.6% against 3.2-3.4% innovation-active enterprises in the industry. The distribution of enterprises by the size of technological innovations in the production process shows that the stable priority costs for large, small and medium-sized industrial enterprises are the expanding of the range of products that form the natural and monetary components of management accounting innovations. Thus, with this innovation goal in the period 2015-2019, the share of small businesses that ensure the development of the industrial sector was – 41.5%, medium – 41.4%, large – 47.7%; in the period 2010-2014 – 42.3%, 40.6%, 48.5% respectively. In addition, the share of

business entities that have mastered new foreign markets in the period 2015-2019 averaged 45.6%.

The species structure of entrepreneurial activity of industrial enterprises with an emphasis on the innovative transformation of management accounting components showed that for large businesses the less priority is to change the quality of goods and services (the importance of targeted implementation has decreased significantly from 3 51.2% in 2010-2014 to 45.7% in 2015-2019); medium-sized enterprises have a similar trend – a drop in level 17.-1.6%; for small enterprises - on the contrary, its importance has increased from 36.9% to 40.7%. The least important innovation costs of management accounting for industrial entities are the reduction of time required for innovations to enter the market. In 2014-2019, the share of innovative components of management accounting for small enterprises was 11.6%, medium – 12.2%, large – 16.3%, against 10.2%, 14.1% and 18.4% in 2010-2014. At the same time, the reduction of the cost of the socio-ecological environment in the structure of innovation costs is typical for small enterprises (reduction of costs from 14.4% to 13.8%).

Differences in the innovative components of management accounting and sources of information and analytical subsystems of controlling of industrial entities for the introduction of new technological processes are presented in Figs. 6-8.



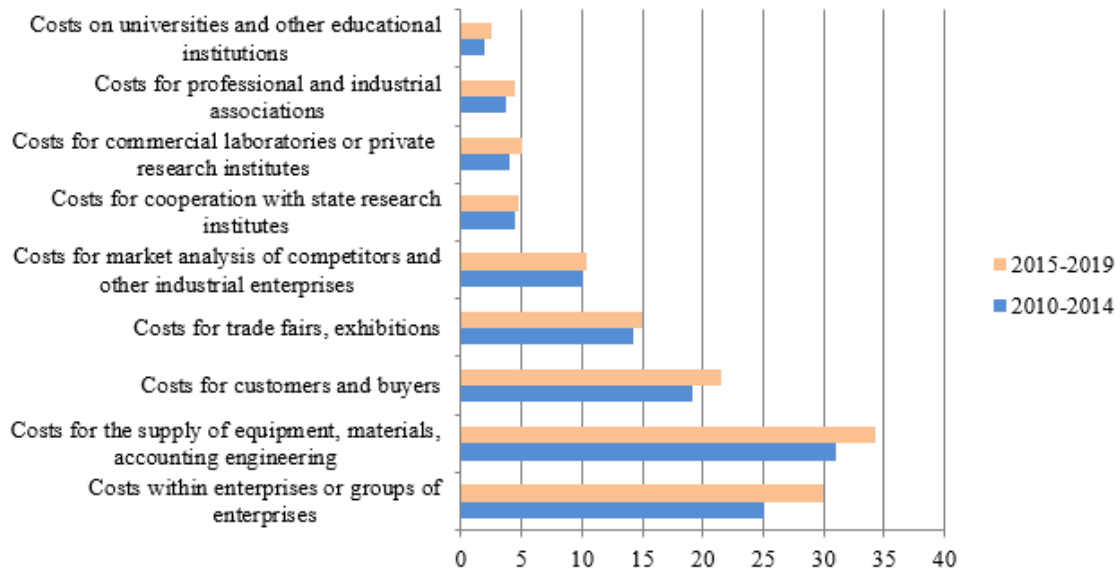


Figure 6. Distribution of subjects of the industrial branch of Ukraine on innovative components of the administrative accounting and sources of information and analytical subsystems of controlling at change of technological process, %

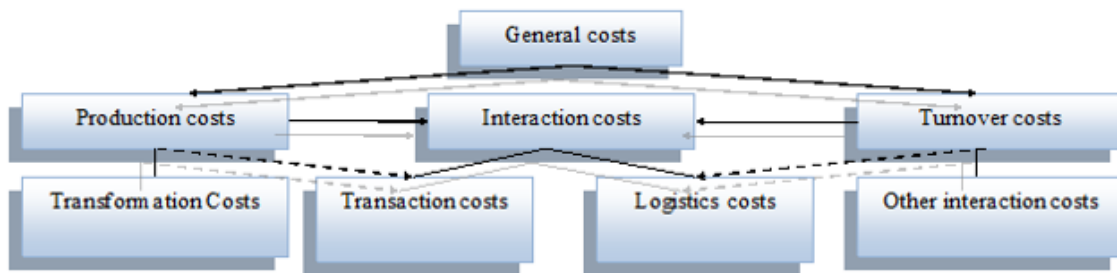


Figure 7. Transaction costs in the overall cost structure of industrial enterprises



Figure 8. Distribution of subjects of the industrial branch of Ukraine on innovative components of the administrative accounting and sources of information-analytical subsystems of controlling at introduction of new production (processes), %

It should be noted that by combining the innovative costs of management accounting in groups for the formation of transaction costs and costs for socio-ecological needs, the range of use of sources of information and analytical subsystems of controlling is

reduced. It is important to understand that transaction costs arise only as a result of the relationship between business entities, which are not related to the process of physical change of material. They are part of the total costs of the enterprise, part of the costs of interaction and

are closely related to the costs of exchange and production (Fig. 7).

These are the specific costs of establishing exchange agreements and relationships, both within the company and in the course of external interactions related to the search for information and negotiations. At the same time, their dominance in the monetary component of management accounting innovations is determined by informational and legal aspects of their origin; the concept of economic costs, which provides for the distribution of losses and the necessary costs to prevent and overcome these losses; institutional nature of the phenomena, i.e., the conditionality of the existence of transaction costs by factors of national nature.

We should note that the transaction sector of the economy in the industrial sector is from 50% to 70%, and its share is constantly growing. At the same time, the share of transaction costs in the total costs of industrial enterprises is from 1,5% to 15%. Therefore, the management of any costs and transactions, in particular, is possible only if there is information about their distribution by type. The main factors hindering the entrepreneurial activity of the subjects of the industrial branch of Ukraine and their innovation are: lack of own funds (80.1% of the studied subjects), high costs for innovations (55.5%), insufficient financial support of the state (53.7%), high economic risk (41%), long payback period of innovations (38.7%), lack of qualified personnel (20%) and the possibility of cooperation with other enterprises and scientific organizations (19.7%), lack of information about markets (17.4%), about new technologies (17.3%), lack of demand for products (16%).

There is a direct dependence of the financial and economic condition of enterprises on the purposeful change of numerical factors of their entrepreneurial activity, which have a direct or indirect impact on the transformation of innovative components of management accounting and controlling determinants, depending on socio-ecological and economic environment and macroeconomic trends of economic development. We should note that management accounting in the innovation-intellectual plane, expands the scope of its operation in the subsystems of controlling. One of the main activities in the new plane is to create added value, both own and acquired. In its own aspect, it is manifested through intellectual rent. Intellectual rent is a benefit that is created when a professional specialist of a business entity has constructive knowledge in the production process.

Asymmetry, i.e., unequal conditions for the functioning of large, medium and small businesses is manifested not only through unequal access to information and analytical subsystems of controlling, but also through unequal provision of intellectual resources (capital, assets, etc.). It

is not known which factor influences the effectiveness of functioning more – informatization or intellectualization. In our opinion, information is an invaluable resource, but there is no clear explanation of the benefits of owning an information resource, for example, the benefit of owning physical capital – profit, financial capital - interest, the benefit of owning labor – wages.

We propose studying the intellectual resource and its derivative benefit – intellectual rent, which is associated with knowledge and time. That is, our hypothesis works in the plane of the philosophy of human-centeredness. It is proposed to create a controlling department for the management of accounting and analytical knowledge. This is especially important for large industrial enterprises. For example, industrial holdings have a real opportunity to create such organizational structures that would deal with tracking, identification and generalization of implicit knowledge, conducting appropriate procedures for its transformation into formalized knowledge. As a final step – creating constructive knowledge, translating it into the legal field (acquisition of property rights) and ensuring confidentiality if necessary, the introduction of new corporate “cognitive” positions, such as director of knowledge management, knowledge engineer, knowledge technologist, will directly generate new ideas with their subsequent formalization and construction into new knowledge.

For small and medium-sized industrial enterprises, we recommend the creation of service cooperatives, the functional responsibilities of which may be as follows: systematization and generalization of implicit knowledge, its formalization and translation into constructive knowledge, as well as dissemination among members of such cooperative. Thus, we consider intellectual resources in the innovative component of management accounting, as intellectualized knowledge is an ontological source of innovation, which provides: 1) “three-level” model of intellectualization of knowledge (tracking implicit knowledge, creating formalized knowledge, generalization and crystallization of formalized knowledge); 2) the possibility of expanding the reproduction of implicit knowledge (study of ways to develop internal creative and labor intentions (aspirations) of employees of enterprises and managers - direct users of accounting information); 3) reducing the time of “stay” of knowledge in a formalized form and creating a stage of transfer of innovative knowledge; 4) mental and value awareness that the main producers of new knowledge are professional organizations that create institutional conditions for their effective dissemination; 5) the actualization of a new type of production (a critical factor of knowledge in the modern economy is intellectual capital). Given the above, the innovative guideline for the development of management accounting can be presented in Fig. 9.

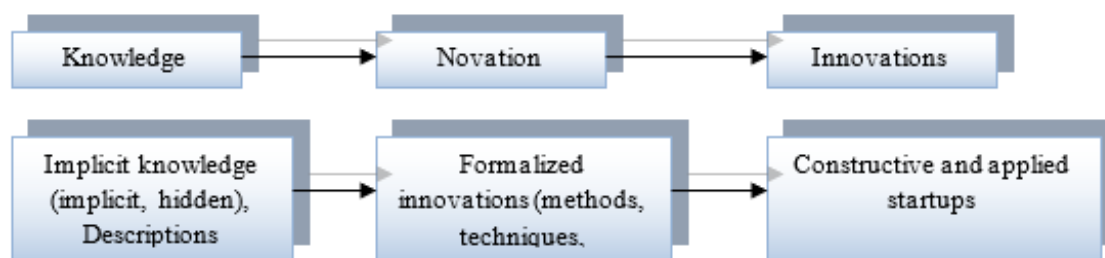


Figure 9. Innovative guideline for the development of management accounting

Thus, the targets of innovative development of management accounting and a set of interrelated components that determine the implementation of the mechanism of innovative transformations in the industry by changing the actual resource provision, existing constraints and available methods and tools of controlling, allowed proposing a conceptual model of innovation control of socio-ecological and economic space of industrial entrepreneurship. The model is presented both in the static semantic sense, and in the expanded form, considering not only semantic, but also process character of controlling management (Fig. 10)

The choice of the concept of controlling innovations for active industrial enterprises is based on the conclusions of the feasibility of implementation, provided:

- the presence of inconspicuous negative trends of economic and managerial nature, which is confirmed by internal and external weak signals (indicators);
- the sufficiency of resources and methods for the implementation of innovation controlling: the method of “small steps”, which involves partial gradual and slow changes in the existing management structure; the method of “bombing” – a rapid change in the management system at the enterprise; the method of “planned evolution” – the planned implementation of controlling innovations based on the construction of tactical and operational plans with their own purpose, timing, management measures.

The functional content of controlling the innovation of an industrial enterprise depends on the stages of the innovation process. This is attributed to the output of innovative products and the introduction of technological innovations, which lead to an increase in transaction costs associated with the promotion of innovations to expand new markets. At the product level, the innovation process is embodied in the life cycle stage of the industrial enterprise and affects the functional content of controlling the innovations (Fig. 11).

Criteria for choosing the scenario of controlling the innovation reflect the change of stages of its operation and the target desire of the company to significantly expand the range of products, find access to new markets or increase the share of captured markets (it is characterized for the stage of growth, which increases controlling in all areas).

It includes improving product quality, reducing the time for market innovations, increasing the flexibility of production, replacing obsolete products or processes, increasing capacity for production (the introduction of controlling the production process), reducing costs for labor, materials and energy per unit of production (controlling innovation and transaction costs), reducing the impact on the environment for small businesses, and improving the social environment (improving the quality of health and safety). It is recommended that industrial enterprises consider the following limitations of innovation controlling management scenarios:

1. time space is unique for enterprises of all sizes;
2. controlling space: operational controlling covers a period of one year, which is analogous to operational planning for enterprises of all sizes; controlling innovations depends on the period of strategic planning, which for enterprises of different sizes is: for small and medium enterprises 4-5 years, for large – up to 10 years;
3. the number of enterprise group: large enterprises – 60-100 participants, medium – 30-40, small – not less than 20; involvement of external specialists to manage and coordinate effective work on groups of enterprises of the innovation controlling department, which have a high level of abstract thinking and professional judgments, competence to increase the variability of scenarios.

It is proposed to evaluate the following characteristics of the activity of industrial enterprises: structure and quality of innovations; volume, quality and price of innovative products, costs of its operation, rates of renewal and payback; number of innovative processes and technologies; innovative level of production; volume, dynamics, structure and composition of innovation and transaction costs; volume, dynamics and composition of sources of innovative development (activity); resource provision (logistical, personnel, financial, organizational), efficiency and dynamics of innovation.

Controlling innovation and transaction costs can be built alternatively according to the innovative goals of the enterprise, the components of innovation, the stages of innovation projects and cost centers. We offer one of the emphasized options for components of innovative activity of the enterprise (Table 2).

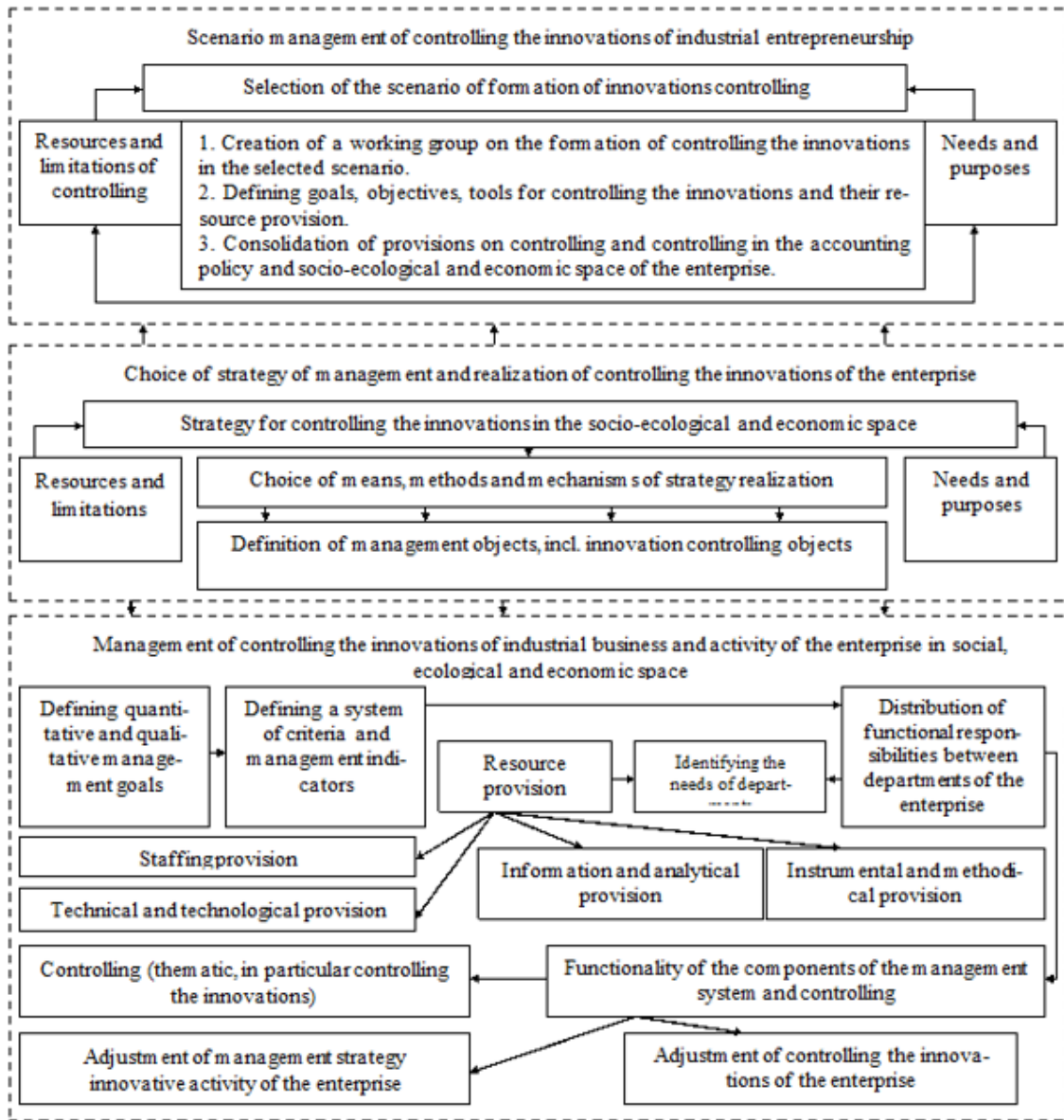


Figure 10. Dynamic conceptual model of controlling the innovations in the socio-ecological and economic space of industrial entrepreneurship

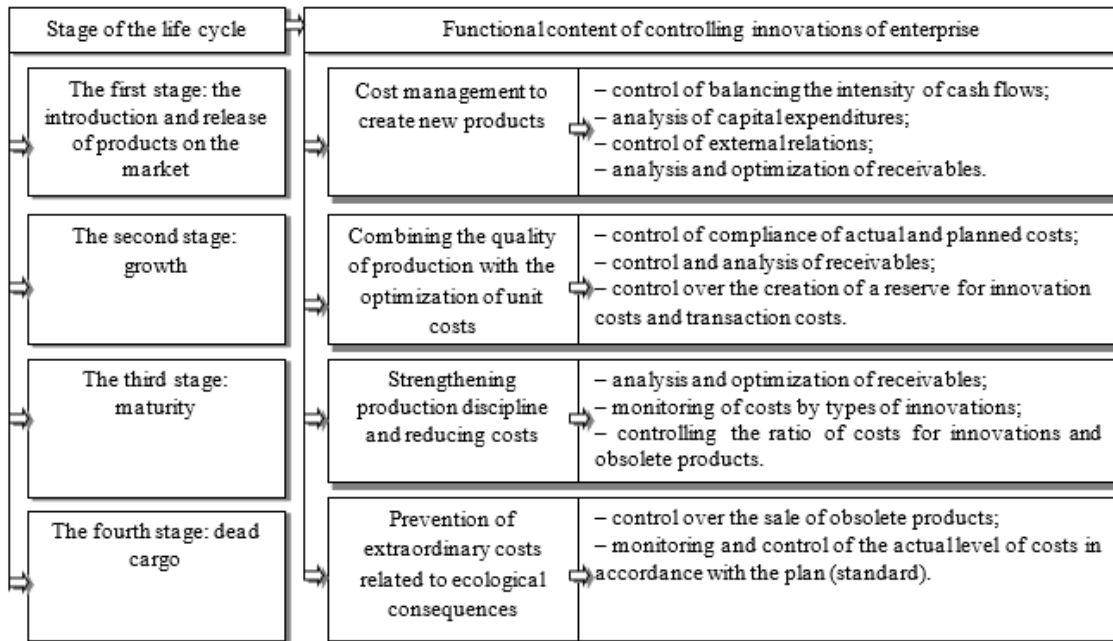


Figure 11. Functional stages of controlling the innovations by stages of the life cycle of innovative products of an industrial enterprise

Table 2. Recommended indicators of industrial activity of enterprises for controlling innovation and transaction costs by stages of the life cycle of innovative products

Controlling the innovative costs of the enterprise	Grouping of indicators by enterprise size		
	large	medium	small
Generation of knowledge and ideas	X <sub>5</sub>		
Innovative potential	X <sub>5</sub> , X <sub>9</sub> -X <sub>12</sub> , X <sub>14</sub>	X <sub>5</sub> , X <sub>9</sub> -X <sub>12</sub>	
Resource provision of innovation activity	X <sub>9</sub> -X <sub>12</sub> , X <sub>14</sub>	X <sub>9</sub> -X <sub>12</sub>	
Innovation management	X <sub>22</sub> -X <sub>32</sub>		
The effectiveness of innovation	X <sub>37</sub> , X <sub>77</sub> , X <sub>78</sub>		
Reliability of costs	Qualitative information-analytical support and methods of calculation of indicators X <sub>14</sub> , X <sub>22</sub> -X <sub>32</sub> , X <sub>37</sub> , X <sub>77</sub> -X <sub>78</sub>		

X<sub>5</sub> – the cost of patents and licenses for intellectual property rights, USD; X<sub>9</sub> – total amount of innovation costs (research work, production and sales), USD; X<sub>10</sub> – the amount of costs for research work, USD; X<sub>11</sub> – the share of research and development costs in the overall cost structure, %; X<sub>12</sub> – volume of investments in research work, USD; X<sub>14</sub> – the share of innovation and transaction costs in the overall cost structure of the enterprise, %; X<sub>22</sub> – fund return; X<sub>23</sub> – amount of capital; X<sub>24</sub> – material return; X<sub>25</sub> – amount of material; X<sub>26</sub> – material equipment; X<sub>27</sub> – capital adequacy; X<sub>28</sub> – return on capital; X<sub>29</sub> – capital intensity of labor; X<sub>30</sub> – material consumption of labor; X<sub>31</sub> – labor intensity; X<sub>32</sub> – productivity; X<sub>37</sub> – the level of economic effect from the implementation of innovation results; X<sub>77</sub> – costs of innovative activities per one monetary unit of profit, USD; X<sub>78</sub> – costs of innovation per unit cost of production, USD.

These indicators of industrial activity are typical and are used for different objects and levels of details. At the same time, for in-depth controlling of innovations and entrepreneurial activity of the subject of industrial branch it is recommended to carry out distribution of expenses on: preparation of innovations, in particular on internal and external researches and developments; the acquisition of external knowledge in terms of patents and licenses for inventions, utility models, industrial designs (cost management of intellectual resources); the purchase of machinery, equipment and accounting engineering; staff training and education; the market support of the proposed innovations.

According to the ways of action, it is proposed to use

indicators X<sub>5</sub>, X<sub>9</sub>-X<sub>12</sub>, X<sub>14</sub>, X<sub>22</sub>-X<sub>32</sub>, X<sub>37</sub>, X<sub>77</sub>-X<sub>78</sub> with their division into groups: 1) reliable (technological) costs; variable (managed) costs; unavoidable costs arising from previous liabilities (depreciation, staff salaries) which are funded. At the same time, to intensify the entrepreneurial activity of an industrial enterprise, the main costs for the implementation of accounting engineering will be: the cost of the license – 58%, consulting – 6%, purchase of equipment – 15%, reserve funds for transaction costs – 6%, bonus fund – 5%, interface development – 4%, staff training – 4%, support services – 2%. Thus, the proposed indicators form a system, as they allow assessing, on the one hand, the innovative processes of industrial enterprises and technical and economic efficiency of

innovation; on the other hand – the company's readiness for innovation, organization of innovation process and its resources, sound projects and competitiveness of innovation products.

To identify the prerequisites and needs of the tools of information and analytical support of controlling using the methodology of maturity (*Z*) [20; 56], adapted to the implementation of innovation management (planning, accounting, control and analysis), the following subsystems are recommended: the functionality of controlling innovations, technical and technological support, organizational support, instrumental and analytical support, competence of professional judgment [57-59]. At the same time, the level of development of controlling innovations of industrial enterprises will be determined by comparing the calculated level of maturity or readiness of its functional subsystems for management on the following scale: *Z* from 0 to 200 points – low level; *Z* from 201 to 400 points – average level; *Z* from 401 to 600 points – high level.

It is proposed to choose the maximum level (600 points) for the target value of the efficiency of controlling the innovation of industrial entities. It is recommended that the generalized value of the level of maturity of controlling innovations or readiness of its functional subsystems for management is determined by the sum of points on a set of directions of estimation [20] (Eq. 6):

$$Z_m = \sum_{i=1}^6 Q_i \tag{6}$$

where *Z<sub>m</sub>* – the level of maturity of controlling innovations or readiness of its functional management

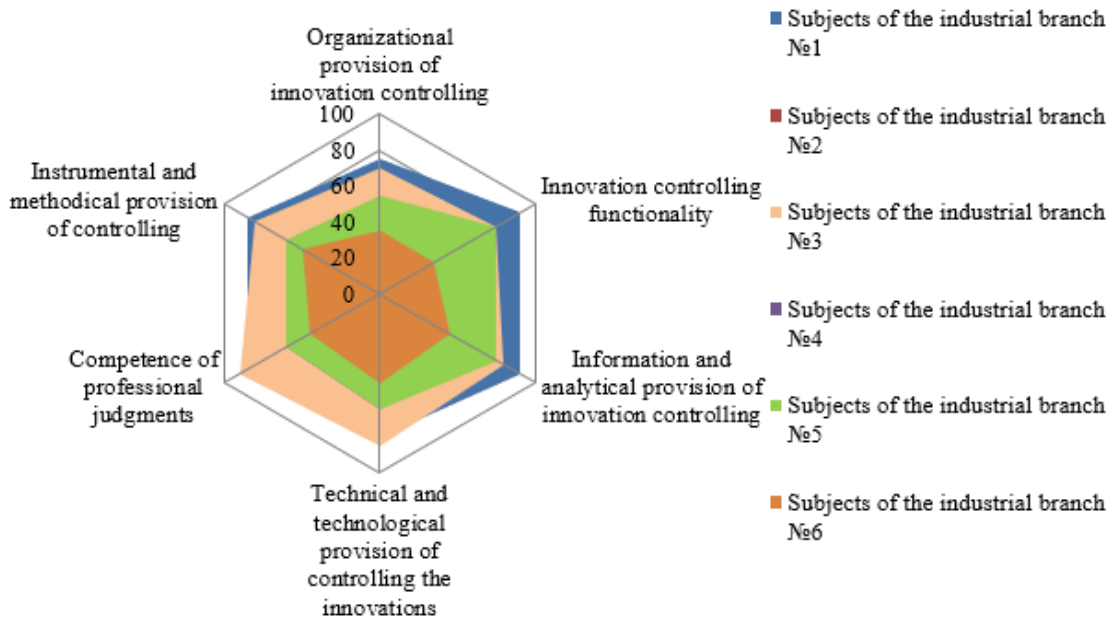
subsystems; *Q<sub>i</sub>*– the number of points for the *i*-th type of measurement.

The six most active subjects of the industrial branch of Ukraine are selected, which carry out entrepreneurial activity and implement innovative solutions in the production process of development and modernization of technological lines (Fig. 12).

Thus, industrial enterprises 1 and 4 with 505 and 480 points have a high level of maturity of controlling the innovations (readiness of functional management subsystems), medium level – enterprises 2 and 5 with 330 and 390 points respectively. Comparison of indicators of management strategy implementation and the level of maturity of controlling the innovations at the studied enterprises were calculated on the basis of approximation using a linear relationship (7):

$$Z_m = 341.64 \times R + 73.78; r^2 = 0.963 \tag{7}$$

The trend line proves the high reliability of the calculation and the probability of the result. Thus, with the growth of the level of maturity of controlling the innovations by 1% the indicator of strategy implementation improves by 1.12%. At the level of maturity below 75 points, the company is unable to implement it effectively. At the same time, the average readiness of functional management subsystems of industrial enterprises for the introduction of controlling the innovations is determined only at the level 21-25%. This proves that the potential of functional subsystems requires additional costs and bringing them to the maximum level.



**Figure 12.** Hexagons of assessing the maturity of controlling the innovations and activation of entrepreneurship of the subjects of the industrial branch of Ukraine



## 4. Conclusions

Thus, the innovative paradigm of management accounting and the determined vector of controlling development are exactly the system of management and high-quality implementation of innovations in enterprises based on business processes (process approach) of innovation and related management functions of planning, accounting, analysis and control. Accordingly, together with the quality management system, controlling the innovations gives a strategy for managing the development and activation of entrepreneurial activity of entities. Meanwhile, under the new world trends, the requirements of stakeholders are not only to satisfy the markets with their products of appropriate price, quality and quantity, but also in the production process – what are the consequences and under what conditions production processes affect the social and ecological environment.

Controlling innovations on the basis of innovative components of management accounting allows continuing the planning process and accompanies the process of implementation of plans. The practice of entrepreneurship shows that controlling has an important role in assessing the innovative activities of entities in the verification of social responsibility and social reporting. Formalized approach to innovation control subsystems in a scenario way proves that it should be used through criteria and indicators for assessing the impact of factors controlling the development of entrepreneurial activity of a particular territory or industry.

We recommend selecting accounting engineering products for information and analytical controlling procedures and methods assessing the readiness of its functional subsystems for implementation in the production and technological process. The results of controlling exert the formation of a synergistic effect due to the interaction of the functional components of controlling innovations and the consistency of innovative components of management accounting in the socio-ecological and economic space.

---

## REFERENCES

- [1] I.A. Bebebeha. Accounting and calculation of the cost of agricultural products, Publishing House “High School”, Lviv, 1975.
- [2] S.V. Bulgakova. Management accounting, KNORUS, Moscow, 2017.
- [3] O.I. Hrytsai.. Application of cost management methods in the innovative activity of the enterprise, Bulletin of Lviv Polytechnic National University, 720, 9-16, 2011.
- [4] O.I. Hrytsai. Directions for improving cost accounting for innovation processes. Problems of economy and management, Bulletin of Lviv Polytechnic National University, 683, 198-201, 2010.
- [5] O.D. Kaverina, Management accounting. Moscow: Finance and Statistics, 2003.
- [6] T.H. Kaminska, T.M. Sliesar. Accounting and information support for innovation management, Business Inform, 4, 112-118, 2014.
- [7] G. Lamberton. Accounting for sustainable development – a case study of city farm, Critical Perspectives on Accounting, 11, 583-605, 2000.
- [8] G. Lamberton, Sustainability accounting – a brief history and conceptual framework. Accounting Forum, 29 (1), 7-26, 2005.
- [9] S.O. Levytska, I.V. Stovpovets. Management (internal) accounting of business entities: methods of organization, prospects for development. Bulletin of the National University of Water Management and Environmental Sciences. Series “Economy”, 2, 199-209, 2007.
- [10] M.A. Prodanchuk. The product of accounting in the system of management decisions. Efficient Economy, 7, Online available from: <http://www.economy.nayka.com.ua/?op=1&z=3203>, 2014.
- [11] S. Schaltegger, R. Burritt. Contemporary Environmental Accounting, Greenleaf, London, 2000.
- [12] M.A. Vahrushina. Management accounting, National Education Publishing House, Moscow, 2013.
- [13] Z.V. Zadorozhnyi. Internal accounting in construction, Ekonomychna dumka, Ternopil, 2006.
- [14] R.F. Brukhanskyi. Change of management paradigms as a factor in the development of accounting: a strategic aspect, Accounting and Finance, 3(65), 15-20, 2014.
- [15] F.F. Butynets. Accounting in Ukraine: mythology, Ruta, Zhytomyr, 2003.
- [16] R. Gray. A re-evaluation of social, environmental and sustainability accounting: an exploration of an emerging trans-disciplinary field? Sustainability Accounting and Management Policy Journal, 1(1), 11-32, 2010.
- [17] O.O. Kantsurov. Institutional aspect of accounting, NNCIAE, Kyiv, 2014.
- [18] A.M. Kolot. Innovative work and intellectual capital in the system of factors forming the knowledge economy. Economic Theory, 2, 3-13, 2007.
- [19] J. Nilsson, S. Bergstorm. Indicators for the Assessment of Ecological and Economic Consequences of Municipal Policies for Resource Use, Ecological Economics, 14, 175-184, 1995.
- [20] M.S. Pushkar. Conditions for the development of a new accounting paradigm. Economic sciences, Series “Accounting and Finance”, 7(25), 3, 46-52, 2010.
- [21] A.A. Pylypenko, I.P. Dzobko, O.V. Pysarchuk. Formation of accounting and analytical support for cost management of enterprises and their associations, Publishing House KhNEU, Kharkiv, 2011.
- [22] I.B. Sadovska, O.V. Machulka. Accounting and analytical support of management decisions, Editorial and Publishing

Department of LNTU, Lutsk, 2010.

- [23] S. Schaltegger, R. Burritt. Sustainability accounting for companies: catchphrase or decision support for business leaders? *Journal of World Business*, 45(4), 375-384, 2010.
- [24] E.Yu. Voronova. Institutional foundations of management accounting (theory, methodology, practice), Publishing house "MGOU", Moscow, 2011.
- [25] V.M. Zhuk. Fundamentals of the institutional theory of accounting, SPb, ANO IPEV, Kyiv, 2013.
- [26] O.V. Karpenko. Management accounting: organization, methodology, teaching methods, RVC PUSKU, Poltava, 2005.
- [27] H.H. Kireitsev, O.D. Hudzynskyi, T.M. Pakhomova. Theoretical aspects of the formation of the accounting and analytical mechanism of management, *Accounting and Finance of Agro-Industrial Complex*, 1, 11-15, 2008.
- [28] S.A. Kuznietsova. The concept of accounting information for management, *Economy and Region*, 4, 184-187, 2007.
- [29] E.V. Muhomedzyanova. Controlling as a function of enterprise management, *Bulletin of the Moscow State Technical University*, 4(9), 655-658, 2006.
- [30] I.B. Sadovskaya, The influence of institutional theory on the development of the concept of management accounting, *Problems of Economics and Management, Scientific and Practical Journal*, 3(31), 119-123, 2014.
- [31] S. Schaltegger, R. Burritt. Environmental Management Accounting – Overview and Main Approaches, Lueneburg and Canberra: Center for Sustainability Management (CSM), 2000.
- [32] V.M. Zhuk. The paradigm of accounting for the economy of harmonious development, *Economic sciences, Series "Accounting and Finance"*, 6(24), 1, 171-182, 2009.
- [33] S. Naumenkova, S. Mishchenko, D. Dorofeiev, Digital financial inclusion: Evidence from Ukraine, *Investment Management and Financial Innovations*, Vol. 16, No. 3, 194-205, 2019.
- [34] O. Paliienko, S. Naumenkova, S. Mishchenko, An empirical investigation of the Fama-French five-factor model, *Investment Management and Financial Innovations*, Vol. 17, No. 1, 143-155, 2020.
- [35] S. Naumenkova, S. Mishchenko, D. Dorofeiev, Digital financial inclusion: Evidence from Ukraine, *Investment Management and Financial Innovations*, Vol. 16, No. 3, 194-205, 2019.
- [36] E.I. Zatsarinnyi, N.I. Malykh, Y.N. Severina, A.L. Gendon, A.Y. Minnullina, K.A. Malysenko, Current trends in the financial market development, *Journal of Advanced Research in Law and Economics*, Vol. 8, No. 8, 2629-2635, 2017.
- [37] R.H. Bekmansurov, K.E. Kovalenko, K.M. Utkina, Y.A. Novikova, E.I. Zatsarinnyaya, A.I. Rozentsvaig, State support for persons with disabilities in the field of entrepreneurship, *Journal of Entrepreneurship Education*, Vol. 22, Special Issue 2, 15-28, 2019.
- [38] A. Lapidus, I. Abramov, An assessment tool for impacts of construction performance indicators on the targeted sustainability of a company, *IOP Conference Series: Materials Science and Engineering*, Vol. 753, No. 4, 042089, 2020.
- [39] S.A. Lochan, D.V. Fedyunin, V.V. Bezpалov, D.S. Petrosyan, Theoretical issues of the formation of the industrial policy of enterprises, *International Journal of Economics and Financial Issues*, Vol. 5, No. 3S, 274-280, 2015.
- [40] A. Nurbasari, M.N. Lukiyanova, P.T. Nguyen, R.A. Shichiyakh, K. Shankar, Role of social media in the successful implementation of business user data management, *Opcion*, Vol. 35, No. 88, 2899-2921, 2019.
- [41] Y.O. Romanenko, I.V. Chaplay, Marketing communication system within public administration mechanisms, *Actual Problems of Economics*, Vol. 178, No. 4, 69-78, 2016.
- [42] S. Bondarenko, B. Liliya, K. Oksana, G. Inna Modelling instruments in risk management, *International Journal of Civil Engineering and Technology*, Vol. 10, No. 1, 1561-1568, 2019.
- [43] Yu. Akatkin, E. Yasinovskaya, V. Drozhzhinov, V. Konyavskiy, Towards the digital government in Russia: Integrative approach, *ACM International Conference Proceeding Series*, St. Petersburg: ACM, 41-48, 2016.
- [44] I.O. Bashynska, Using the method of expert evaluation in economic calculations, *Actual Problems of Economics*, Vol. 7, No. 169, 408-412, 2015.
- [45] E.M. Akhmetshin, D.K. Dzhavatov, E.A. Sverdlikova, M.S. Sokolov, O.A. Avdeeva, G.P. Yavkin, The influence of innovation on social and economic development of the Russian Regions, *European Research Studies Journal*, Vol. 21, Special Issue 2, 767-776, 2018.
- [46] A.V. Bobrova, R.I. Garipov, Universal system of indicators for assessing the activities of customs authorities, *Journal of Advanced Research in Law and Economics*, Vol. 9, No. 6, 1910-1923, 2018.
- [47] A.V. Bobrova, Positional antagonism of subjects of tax relation, *International Journal of Economics and Financial Issues*, Vol. 6, No. 2, 260-267, 2016.
- [48] Z.H. Shadova, P.A. Gurianov, S.N. Fedorova, A.V. Zemlyakova, O.V. Grishchenko, The structure of the share capital and the interests of the majority shareholder, *International Journal of Economics and Financial Issues*, Vol. 6, No. 1S, 211-219, 2016.
- [49] P. Gurianov, Formation of pollutant emissions trading optimum model at the international market, *Metallurgical and Mining Industry*, Vol. 7, No. 8, 94-99, 2015.
- [50] P.A. Gurianov, Small business in Russian Federation: State, potential threads, barriers and medium-term development perspectives, *World Applied Sciences Journal*, Vol. 30, No. 9, 1166-1169, 2014.
- [51] G. Galiullina, The evolution model of territories of advanced development based on the institutional-synergetic approach, *E3S Web of Conferences*, Vol. 208, 08028, 2020.
- [52] G.F. Galiullina, A.N. Makarov, A.A. Mullakhmetova, Genesis of territories with a special business regime, *Journal of Environmental Treatment Techniques*, Vol. 7,

- 1112-1116, 2019.
- [53] S.V. Laptev, F.V. Filina, D.V. Timohin, Competitiveness management of Russian innovation entrepreneurship, *Studies in Systems, Decision and Control*, Vol. 282, 325-331, 2020.
- [54] S.V. Laptev, F.V. Filina, L.V. Degteva, The organization of agricultural markets as a factor of innovative development in the agricultural economy, *Studies in Systems, Decision and Control*, Vol. 282, 347-355, 2020.
- [55] L. Harrington, I.G. Jones, M. Wino. Indicators of sustainability, Measurements and a consultancy team, Cali: Centro International de Agricultural Tropical (CIAT), 1993.
- [56] I.O. Bashynska. Using the method of expert evaluation in economic calculations, *Actual Problems of Economics*, 7(169), 408-412, 2015.
- [57] O.V. Prokopenko, T.V. Kasyanenko. Complex approach to scientific grounding at selecting the direction (variant) of ecoaimed innovative development at deferent levels of management, *Actual Problems of Economics*, 139(1), 98-105, 2013.
- [58] A. H. Abubakar, N. Mansor, W. I. A. Wan-Mohamad. Corporate tax avoidance, free cash flow and real earnings management: evidence from Nigeria, *Universal Journal of Accounting and Finance*, Vol. 9, No. 1, 86-97, 2021. DOI: 10.13189/ujaf.2021.090109
- [59] W. Hariyanti, F. M. Noor, A. L. Dewa. Pluriform motivation as moderation of budget participation relationship towards managerial performance (empirical study on manufacturing industry in Indonesia), *Universal Journal of Accounting and Finance*, Vol. 8, No. 4, 131-139, 2020. DOI: 10.13189/ujaf.2020.080405