

Improving Accounting and Analysis of Innovative Costs



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Abstract: Based on the goal set in the beginning of the work and formulated tasks, the research is devoted to the study of theoretical and normative bases of accounting and analysis of innovative costs of the enterprise. The essence of innovation and innovation costs as an object of accounting and analysis is investigated. The actual problems of accounting of expenses on innovations are analyzed. The methodical bases of the enterprise innovative cost analysis are investigated. Investigating the current issues of accounting for innovation costs before accounting for innovation costs has identified a key direction - displaying innovation costs as a separate accounting entity.

The study provides recommendations on how to improve accounting and analysis of innovation costs, namely, the authors proposed an accounting approach that provides for the preliminary creation of additional analytical sections on the expense accounts and in the accounts, which keep records of capital investment and proposed to analyze innovation costs as part of a comprehensive analysis of innovation activity of the enterprise. An algorithm for analyzing enterprise innovation has been developed, which includes five stages of analysis, a system of indicators for analysis of innovation, a statement of sources of financing of innovation-investment activity and a statement of the volume of innovation costs, which will provide a well-reasoned and reasonable estimate of costs.

Keywords : Accounting, Analysis, Enterprise, Innovative Costs.

I. INTRODUCTION

Structural transformations occurring in the world economy are conditioned by the transition from an "industrial economy" to a "knowledge economy" characterized by the dominance of intellectual capital and innovation [1-3]. These should be the basis for the dynamic development of production, a necessary component of the process of ensuring successful, long-term and sustainable functioning of the enterprise,

one of the fundamental components of an effective strategy and an important tool for ensuring competitive advantages.

At the same time, there is a need to create a system of accounting for costs of innovation and their operational control, which would enable to provide information to each enterprise, including the state innovation policy in general in the conditions of globalization and uncertainty of the economy [4-7].

As a result of the conducted researches the imperfection of the scheme of accounting of expenses for innovative processes of industrial enterprises has been found out. This imperfection is as follows:

- there are no methodological recommendations for the accounting of the costs of innovation processes;
- information on the cost of innovation processes is scattered across different accounting accounts;
- there is no internal reporting that would provide systematic information for the operational management of costs for innovation processes;
- the compilation of statistical forms of reporting on the cost of innovation processes requires a considerable amount of information to be processed [8].

Partial solution to these problems is possible through the use in the account of the proposed account "Costs of innovative processes". This will help you quickly find the data you need and quickly use your information to manage the cost of innovation processes.

II. INNOVATION AND INNOVATION COSTS AS AN OBJECT OF ACCOUNTING AND ANALYSIS

The ambiguity in the interpretation of the term "innovation" is explained by the complexity of combining material and intangible features, which are characterized by qualitatively different categories.

The concept of "innovation" can not be understood not only as investments in fixed capital, but also refer to the costs of research and development and human capital, which are components of intangible assets.

The process of transforming an innovation into an intangible asset as an accounting object can be schematically presented (Fig. 1).

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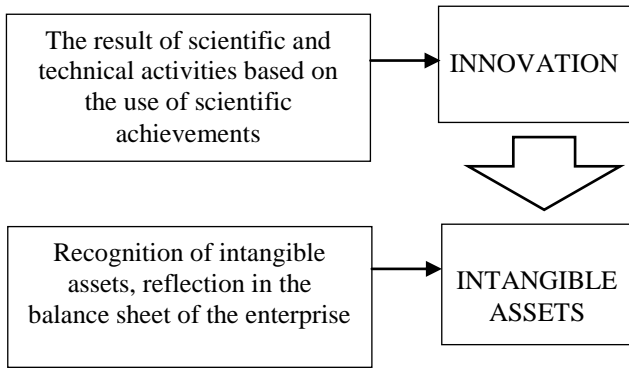


Fig. 1. The process of transformation of innovation into intangible assets

As can be seen from Fig. 1. Innovation becomes an intangible asset only after it recognizes the costs incurred to create it. Therefore, the concept of innovation in accounting is broader than intangible assets, since not all innovation results are reflected in the balance sheet.

The level of theoretical study of accounting problems is far behind the needs of business entities, including the lack of methodological support for accounting for entities that require innovation, which in turn requires their identification and classification. With this in mind, the existing accounting system should disclose information about the impact of business activity on the objects of the innovation process in order to meet the information needs of external and internal users.

This function can be implemented by accounting for objects related to innovation.

Business entities keep track of innovation expenditures in different balance sheets, which indicates that current accounting methods are imperfect. An analysis of the current economic literature on accounting for innovation spending accounts for several options. It should be noted that, by proposing an appropriate approach to the methodology of their accounting, the authors mainly give its descriptive characteristics, but do not give specific examples in the context of analytical accounts and subaccounts.

One of the most difficult stages of analyzing the effectiveness of innovation and the cost of innovation is to build a system of monitoring the external environment of the enterprise, ie a system of continuous monitoring of the directions and achievements of NTP in specific and related industries. The second problem is the lack of forms that allow you to visually analyze the innovative costs of the enterprise, sources of financing innovation and investment activities, the volume of innovative costs of the enterprise, etc.

III. METHODOLOGY OF IMPROVING ACCOUNTING AND ANALYSIS OF INNOVATIVE COSTSHINTS

A. Methodology Description

The research has shown that accounting and analysis of innovative costs can be improved in several aspects:

- Accounting and analysis practices that exist in most enterprises do not allow them to fully generate the necessary information about the processes occurring in the framework of innovation activities. This is

partly due to the fact that innovation has not yet become an obvious business object for management, and the costs arising from the innovation process have not yet been properly reflected in the accounting system;

- Many companies do not analyze innovative costs.

All this is the basis for the development of recommendations for accounting and analysis of innovative costs in the enterprise, which are illustrated in Table. 1.

Table- 1: Justification of the development of recommendations for accounting and analysis of innovative costs at the enterprise

Problem identified	Effects	Proposed measures
<i>Recommendations for accounting for innovative costs</i>		
The existing accounting and analysis practice in the enterprise makes it impossible to fully generate the necessary information about the processes occurring in the framework of innovation activity.	The inability to estimate, control and analyze the cost of innovation. Difficulties in determining the efficiency of innovation activity and innovation potential of the enterprise.	A methodology for accounting for innovation costs, which will help to provide reliable information, increase its analytics, and identify reserves to reduce costs.
<i>Recommendations for analyzing innovative costs</i>		
Innovation cost analysis is not conducted	The enterprise does not have a reasonable and reasonable estimate of innovative costs, lack of operational analysis of resource use, identification and elimination of causes of costs and deficiencies in the organization of activities and violations of technological processes, search and mobilization of internal reserves of the enterprise.	Introduce innovation cost analysis as part of a comprehensive analysis of enterprise innovation activity.

Thus, the developed recommendations, above all, will allow to streamline and improve the accounting and analysis of innovative costs at the enterprise.

B. Methodology of Improving Accounting of Innovative Costshints

Investigating approaches to cost accounting for innovation has identified a key direction - to reflect cost of innovation as a separate accounting entity.

An assessment of the nature and content of the approaches considered shows that the vast majority of them are accounted for in the system of accounts as standalone accounting items in the form of expenses and capital investments. The scientific development of the feasibility of maintaining a separate account of the cost of innovation, which are given in the works of domestic scientists, is based on the double reflection in accounting of the same costs.

To avoid this situation, as well as to meet the information needs of the innovation cost management system, we propose our own accounting approach (Fig. 2), which involves the preliminary creation of additional analytical sections on the expense accounts and in the accounts on which the capital investments are kept (Table 2).



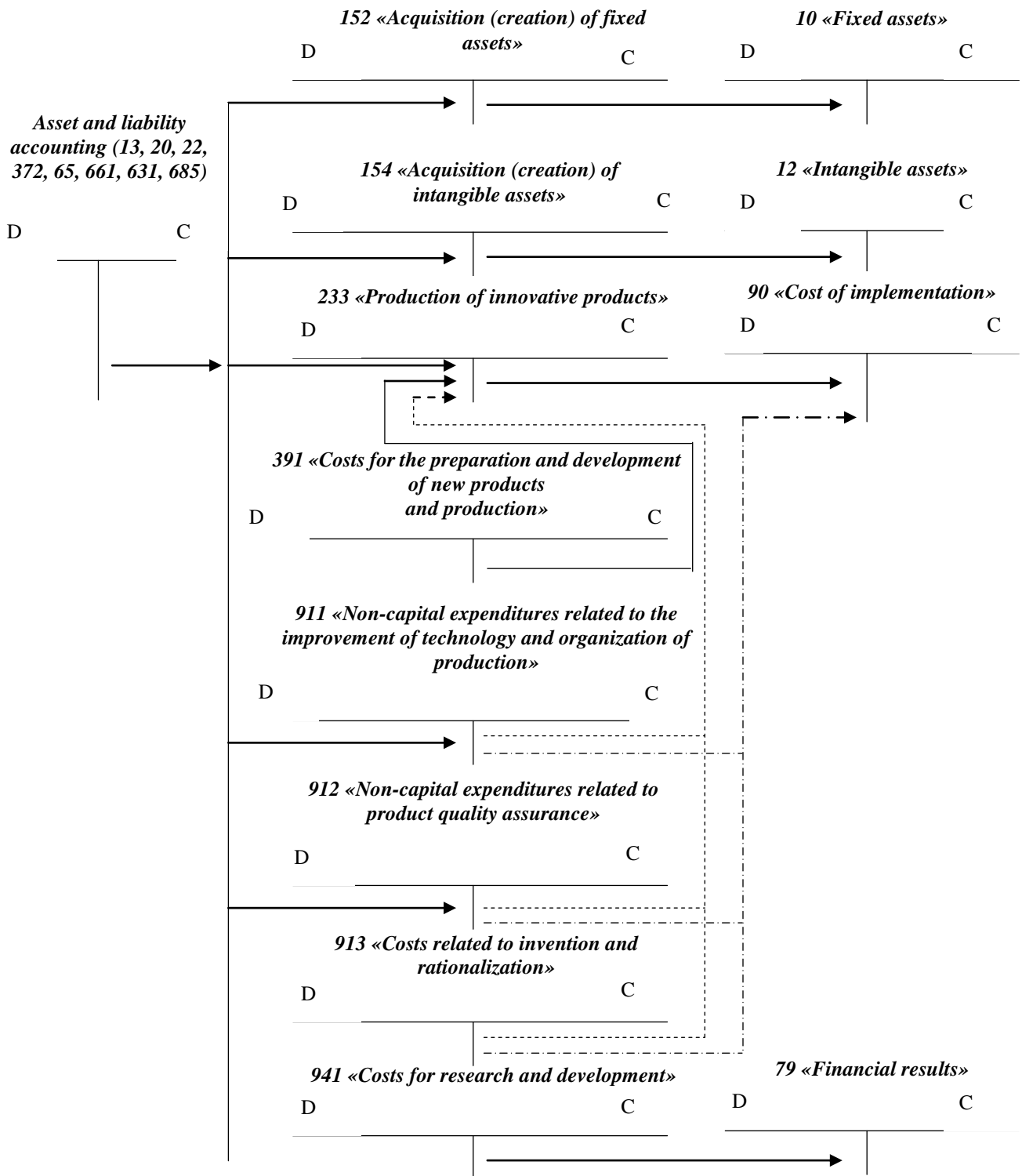


Fig. 2. A general scheme for accounting for innovation costs

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Table- II: Proposed snippet of the work plan for accounting for innovation spending

Synthetic Accounts		First-order subaccounts		Second-order subaccounts		Third-order subaccounts	
code	name	code	name	code	name	code	name
1	2	3	4	5	6	7	8
CLASS 1. NON-CURRENT ASSETS							
15	Capital Investments	152	Acquisition (creation) of fixed assets	152X	By types of new and / or significantly improved fixed assets		
		154	Acquisition (creation) of intangible assets	154X	By types of new and / or significantly improved intangible assets		
CLASS 2. INVENTORIES							
23	Production	233	Production of innovative products	233X	By types of innovative products		
CLASS 3. FUNDS, CALCULATIONS AND OTHER ASSETS							
39	Expenses of future periods	391	Costs for the preparation and development of new products and production	3911	Costs for preparation and development of production of new products	3911X	By types of new products
				3912	Costs for development of new production, workshops and units (start-up costs)	3912X	By types of new production, workshops and units
				3913	Costs of preparatory work in the extractive industries	3913X	By type of work
CLASS 9. ACTIVITY COSTS							
91	Total expenditures	911	Non-capital expenditures related to technology improvements and production organization	911X	By types of production structural units		
		912	Non-capital expenditures related to product quality assurance	912X	By types of production structural units		
		913	Costs related to invention and rationalization	913X	By types of production structural units		
94	Other operating expenses	941	Costs for research and development	9411	Research costs	94111	Costs for basic scientific research
						94112	Costs of applied scientific research
				9412	Research costs	94121	Costs of development of design and technological documentation
						94122	Costs for the development and manufacture of laboratory equipment
						94123	Costs for the manufacture and testing of the prototype
						94124	Other expenses

Costs for innovation are not an entirely new accounting feature, but they are also a management feature and are one of the key indicators in the management decision making process for improving the financial and economic performance of businesses.

The accounting information system is able to provide cost data in various sections, including reflecting the cost structure involved in the processes of new product creation and technological upgrading of production.

Simulation of accounting information systems used by business entities makes it possible to carry out such modifications without considerable time and labor. In this case, modern software creates the opportunity to generate the necessary information and to obtain additional analytical indicators for a relative comparison of the amount of expenses incurred with the planned and identify reserves for

their reduction.

C. Methodology of Improving Analysis of Innovative Costshints

Research has shown that innovation cost analysis must be comprehensive in order to obtain comprehensive, relevant information to make informed management decisions. Secondly, it is inappropriate to analyze the cost of innovation alone, because the cost of the analysis will far outweigh the potential benefits. Therefore, we believe that the analysis of innovation costs is part of a comprehensive analysis of innovation activity of the enterprise.

We propose an algorithm for analyzing the innovative activity of an enterprise, which includes five stages of analysis that are functionally interconnected (Fig. 3).

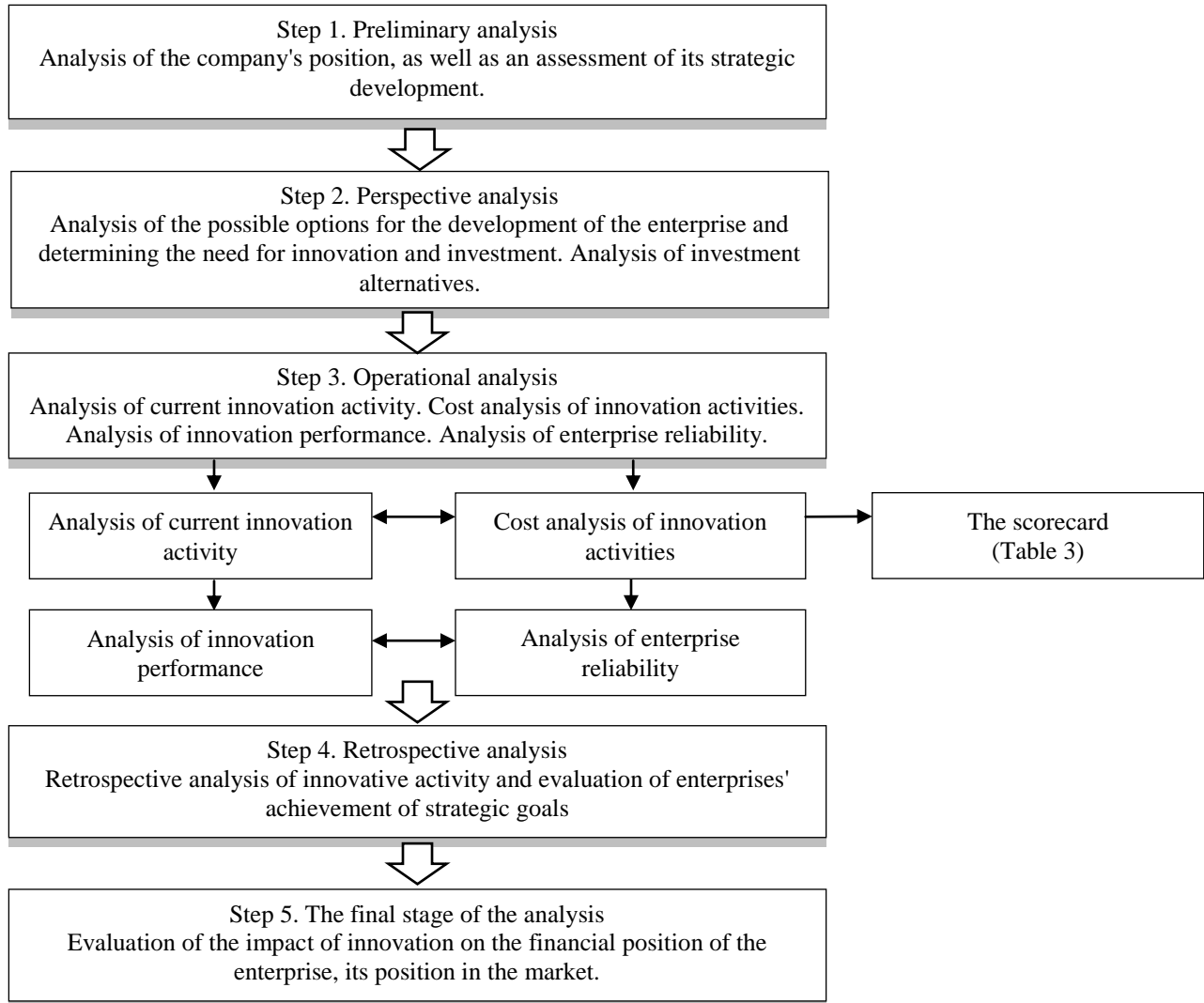


Fig. 3. Scheme of proposed complex analysis of innovative activity of the enterprise

The first and second stages are integrated into the process of strategic enterprise policy-making based on the analysis of internal and external factors. At these stages, an analysis of possible options for the development of the company is determined and its capabilities, investment needs are determined, the possible alternatives for investing are searched. At the same time, the role of equity in the formation and development of innovation potential is evaluated. Subsequently, the influence of the main technical and economic factors on the change in the structure of innovation potential in the reporting period in comparison with the previous one is analyzed and the intra-economic reserves of growth of the innovation potential of the enterprise are revealed.

In the third stage, an operational analysis is carried out, which contains the following components:

- analysis of current innovation activity, in the process of which the performance indicators of current innovation activity are calculated: simple rate of return on share capital, current liquidity ratio, utilization rate of enterprise costs for innovation activity, ratio of purchased and self-developed innovations, etc., acquisition of intangible assets and fixed assets based on the dynamics of changes in the

cost of innovation and the number of innovative projects under development in the reporting period compared to the previous one. The influence of the main factors on the change of these indicators is revealed. Then internal reserves of increase of innovative activity of the enterprise are revealed.

- analysis of innovation performance. At this stage, the productivity of the enterprise's innovation activity is determined by calculating the relevant indicators (cash flow ratio, the share of profit from innovation activity in the total profit of the enterprise, etc.). The dynamics of indicators in comparison with previous periods is analyzed, the efficiency of innovations implemented by the enterprise and their impact on the performance indicators of the enterprise are evaluated, and at the same time the possible reserves of improvement of these indicators are identified.
- cost analysis of innovation activities. For this type of analysis, we propose to use a system of indicators for different components, presented in Table 3.

Table- III: Proposed system of indicators for the analysis of innovative costs

Indicator	Designation	Formula
<i>Financial component</i>		
Share of internal R&D expenditures and technology acquisition in total manufacturing costs	K1	$K_1 = \frac{(C_{R\&D} + C_m)}{C_{tot}}$
Specificity of the products produced	K2	$K_2 = \frac{C_{R\&D}}{C_{prod}}$
Security of intellectual property	K3	$K_3 = \frac{C_{IP}}{C_{tot}}$
Share of intangible assets acquisition costs in total R&D expenses	K4	$K_4 = \frac{C_{IA}}{C_{R\&D}}$
Share of training costs in total R&D expenditures	K5	$K_5 = \frac{C_{tr}}{C_{R\&D}}$
State sources of R&D funding	K6	$K_6 = \frac{CD}{C_{R\&D}}$
<i>Personnel component</i>		
The share of R&D workers in the total number of employees	K7	$K_7 = \frac{Q_{R\&D}}{Q_{tot}}$
Provision of top-quality personnel	K8	$K_8 = \frac{Q_{tq}}{Q_{R\&D}}$
The level of wages of scientific and technical workers	K9	$K_9 = \frac{W_{stw}}{W_C}$
<i>Material and technical component</i>		
Techno-technological base intended for R&D	K10	$K_{10} = \frac{E_{R\&D}}{E_{tot}}$
Progressive equipment	K11	$K_{11} = \frac{E_{pr}}{E_{tot}}$
Modernization of equipment	K12	$K_{12} = \frac{E_m}{E_{tot}}$
Coefficient of introduction of new equipment	K13	$K_{13} = \frac{FA_n}{FA}$
<i>Information component</i>		
Expenses for information activities	K14	$K_{14} = \frac{C_{ia}}{C_{R\&D}}$
Staff busy information activities	K15	$K_{15} = \frac{Q_{ia}}{Q_{R\&D}}$
<i>Market component</i>		
Indicators of development of new products	K16	$K_{16} = \frac{CP_{in}}{CP_{totr}}$
Frequent product innovation in total industrial output	K17	$K_{17} = \frac{O_{in}}{O_{tot}}$
Profitability of innovative products	K18	$K_{18} = \frac{P_{in}}{P_{tot}}$
Competitiveness of new products	K19	$K_{19} = \frac{Q_{in}}{Q_{comp}}$

- analysis of the reliability of the enterprise, namely the financial results of the enterprise, a detailed analysis by its subsystems (including the investment-innovation subsystem) and the analysis of total input, output cash flows. Factor analysis of the impact of innovation activity on the level of reliability of the enterprise, on the level of its solvency, profitability, business activity, liquidity of the balance, etc. is carried out.

The next stage is a retrospective analysis, which is necessary to form an information base and create the preconditions for strategic management. It includes the evaluation of quantitative and qualitative indicators reflecting the efficiency of the enterprise's innovation activity.

The final stage analyzes the reasons that hinder innovation development, which will allow to develop measures for the further development of innovation activities, summarizes the enterprise's innovation activities compared to the previous period.

IV. RESULT AND DISCUSSION

For a visual perception of innovation costs, we propose a Sheet of sources of financing of innovation-investment activity (Fig. 4).

Source name	Per month		Increasing result since the beginning of the year	
	total investment activity	including on innovation	total investment activity	including on innovation
Own, total				
including due to:				
profit				
depreciation				
funds from the sale of shares				
mobilization of internal assets				
insurance policies				
share and others. contributions of members of collectives				
Involved, total				
including:				
domestic investors' funds				
funds of foreign investors				
loans				
financial leasing				
bond loans				
Free financing, total, incl. funds:				
the state budget				
local budget				
extra-budgetary				
centralized business associations				
Total				

Fig. 4. Proposed Statement of sources of financing of innovation-investment activity

As part of the relevant synthetic accounts, we consider it advisable to open analytical accounts to account for the costs, output, revenues and performance of new technologies.

To the above analytical accounts for accounting of innovation costs, we propose to compile a Notice (report) by types of innovation costs (Fig. 5).

Source name	Per month		Increasing result since the beginning of the year	
	UAH	percent to the total	UAH	percent to the total
Total, thousand UAH.				
including by directions:				
research and development				
acquisition of new technologies				
purchase of machines, equipment, installations, etc. fixed assets and capital expenditures related to innovation				
production costs for new technologies				
crop production				
livestock products				
marketing, advertising				
others				

Fig. 5. Statement of Innovation Costs

Such a Statement will allow systematization of disparate information about innovative processes and more efficient use of this data for management purposes.

V. CONCLUSION

The study provides justification for the development, as well as recommendations for improving accounting and analysis of innovative costs in the enterprise, namely:

- to provide information needs of the innovation cost management system, we propose an accounting approach, which involves the preliminary creation of additional analytical sections on the expense accounts and in the accounts on which the capital investments are kept;



- 2) it is proposed to carry out the analysis of innovation costs as part of a comprehensive analysis of the innovation activity of the enterprise. An algorithm for analyzing enterprise innovation has been developed, which includes five stages of analysis, a system of indicators for analyzing innovation costs in the enterprise, a statement of sources of financing innovation and investment activity, and a statement of the volume of innovation costs, which will provide a reasoned and reasoned cost estimate.

Thus, the suggested recommendations can help the enterprise streamline and improve the accounting and analysis of innovative businesses.

REFERENCES

1. Svitlana Bondarenko, Olena Laburtseva, Olena Sadchenko, Vira Lebedieva, Oleksandra Haidukova, Tetyana Kharchenko, Modern Lead Generation in Internet Marketing for the Development of Enterprise Potential, *International Journal of Innovative Technology and Exploring Engineering*, Volume-8 Issue-12, October 2019, pp. 3066-3071 DOI: 10.35940/ijitee.L2477.1081219
2. I. Bashynska, I. Lytovchenko, D. Kharenko, Sales tunnels in messengers as new technologies for effective Internet-marketing in tourism and hospitality, *International Journal of Innovative Technology and Exploring Engineering*, Volume-8 Issue-12, October 2019, pp. 594-598 DOI: 10.35940/ijitee.L3470.1081219
3. I. Bashynska, M. Baldzhy, L. Ivanchenkova, L. Skliar, O. Nikoliuk, G. Tkachuk, Game risk management methods for investment portfolio optimization, *International Journal of Recent Technology and Engineering*, Volume-8 Issue-2, 2019, pp. 3940-3943 DOI: 10.35940/ijrte.B1729.078219
4. Prokopenko, O., Eremenko, Y., Omelyanenko, V., Role of international factor in innovation ecosystem formation, *Economic Annals-XXI*, 3-4, 2014, pp. 4-7
5. Krykavskyy, Y.V., Industrial supply chains: Between efficiency and responsibility, *Actual Problems of Economics*, 179 (5), 2016, pp. 30-41.
6. Krykavskyy, Y., Falovych, V., The principle of the extended responsibility in the formation of multimodal transportation attractiveness, *Economic Annals-XXI*, 159 (5-6), 2016, pp. 67-70. doi: 10.21003/ea.V159-14
7. V.N. Nesterov, A.Sh. Akhtyamova, E.S. Domracheva, Accounting and Analysis in Managing the Cost Of Innovation, *Mediterranean Journal of Social Sciences*, 6(1), 2015, DOI: 10.5901/mjss.2015.v6n1s3p217
8. E. V. Demidko, Accounting and analysis of the cost of quality, January 2019, DOI: 10.18411/lj-03-2019-49