Formation of an information basis in the management accounting system for making decisions on the effective management of enterprise costs for innovations

*Svitlana LABUNSKA**

Vytvorenie informačnej základne v systéme manažérskeho účtovníctva pre rozhodovanie o efektívnom riadení podnikových nákladov na inovácie

Abstract

The article proposes an approach to improving the identification and estimation of costs for innovative activities in the general enterprise management system. This, in turn, will increase the efficiency of the management of innovation processes, leading to an increase in business profitability both at the level of individual enterprises and economic sectors.

Based on the conducted regression analysis (indicators of business activity of 26 branches of the Slovak economy in 2020 and 2022 were included in the observation), it was proved that the volume of the total revenue is closely related to the volume of capital investments in innovative activities. Pearson's correlation coefficient equals 0.92 and 0.85 in 2020 and 2022, respectively. The decrease in this ratio in 2022 indicates a need to improve cost management approaches in the process of innovative activity.

To organize effective innovation cost management, the study formulates requirements for structuring information flows in a subject-oriented cost management system of innovative activity, considering the overall architecture of the enterprise management. A general assessment of costs in the innovation cost management system is proposed, considering the costs of implementing functional influence from the management system of innovative processes.

Keywords: *Innovative activity, evaluation, cost, innovative costs*

JEL Classification: C51, M21, O30, 032

Introduction

In the contemporary economic environment, shaped by global and national factors, globalization stimulates integration and intensifies a new type of competition. These processes require the development of competitive advantages based on innovativeness. In the digital transformation era, innovation plays a critical role in economic growth at both the national and enterprise levels, demonstrating a direct impact on GDP.(Dobrovolska, O. Sonntag, R. et al (2023) /[3] and Labunska, S., Cibák, Ľ.et al (2023)/[6].

The strategic importance of innovation development in forming the overall competitiveness of a national economy underscores the need to find ways to enhance innovation. On the micro level, innovation depends on the resources available to support this process, Report of Aon-Ponemon (2022)/[4] Trinugroho, Law et al. (2021)./[13]. Emphasize that such resources are essential for building effective management systems, particularly for innovation processes, Kiselakova D. et al (2020)/ [5].

As the economy becomes more information-driven, traditional structures of coordination and management of companies' business processes face problems ensuring the efficiency of management actions, which is most noticeable in innovation activities. Improving the management of innovation activities requires changing the tools of the economic system in which the real processes of production, exchange, and consumption are coordinated. The study by Melnik L., Matsenko O., et al. (2022)/[8] notes that such coordination is based on the perception, processing, and transfer of information and knowledge, as well as on the preparation and adoption of decisions for effective actions and rational allocation of costs for the implementation of innovations of various types.

The information paradigm of global economic development changes approaches to the formation of the economic potential of an enterprise and the importance of different types of resources to ensure competitiveness. Dimitru, A. P. (2022) / [2]. The development potential of an enterprise depends not only on

* Svitlana Labunska, DrSc in Economics, Professor, Established Researcher, Institute of Public Administration of the Bratislava University of Economics and Management, Furdekova 16, 85104 Bratislava, Slovak Republic,
Department of Accounting and Business Consulting, Simon Kuznets Kharkiv National University of Economics, Av. Nayka 9-A, 161166 Kharkiv , Ukraine, Svetlana.lab@gmail.com

the availability of resources but also on the quality and efficiency of consumption in the process of economic activity. Thus, each component of the economic potential for the possibility of effective involvement in the process of activity should be characterized by innovativeness created due to the presence of an innovative intellectual resource in the capital structure Serpeninova, Yu., Lehenchuk, S. et al. (2020) / [10].

The main goal of the article is to justify approaches to improving the process of evaluating capitalized and non-capitalized costs in the process of innovation and forming an information base for making managerial decisions regarding the direction of investments to ensure innovative implementations from the standpoint of decision-making in the subject-oriented management subsystem.

During the research, statistical observation, comparative and correlational analysis, synthesis, and grouping were used to solve the scientific problem. The results are visualized using charts, graphs, and tables.

1. The Role of Innovative Activity in Increasing Business Results in Economic Sectors and Increasing the Overall Enterprise Competitiveness

On the highest level of abstraction, innovation is a dual phenomenon: the abolition of the existing and the establishment of the new. Due to this, innovation (**I**) gives rise to the phenomenon of economic growth (**EG**) through the mechanism of competition (**C**). Schematically, such a movement can be represented as follows, Labunska,S. et al (2019/ [7]):

$$\mathbf{I} \Rightarrow \mathbf{C} \Rightarrow \mathbf{EG} \quad (1)$$

Innovative changes generate "internal energy" of economic growth in the economic system and fostering to the transition of the system to a new qualitative state. Thus, the generalized task of managing innovative activities is to ensure the system's transition to a new balanced state.

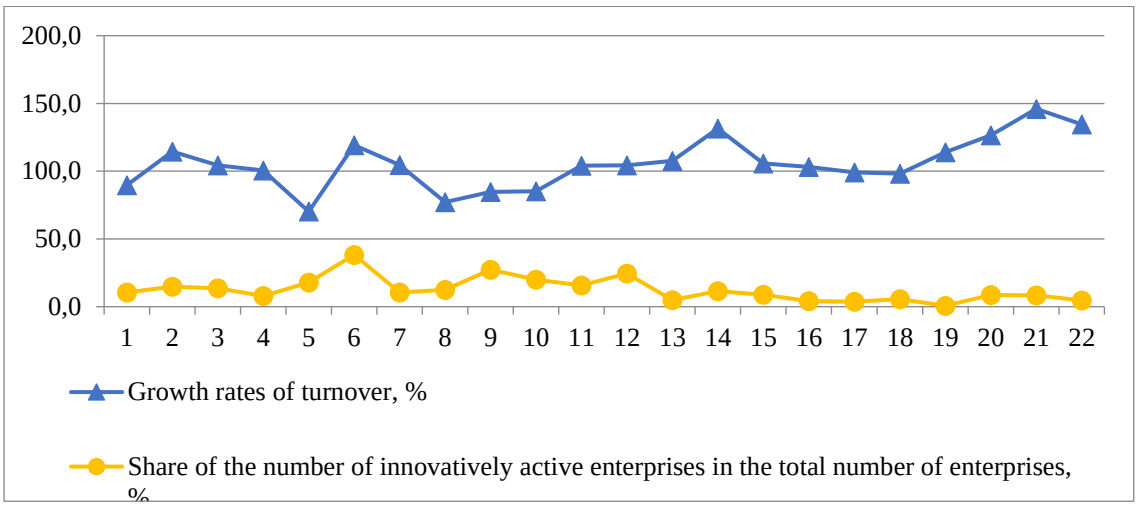
To understand the general relationship between indicators of revenue changes and innovation activity within various sectors, indicators from key economic sectors of Ukraine (2021 compared to 2020) and Slovakia (2022 compared to 2021) were analyzed in Tab.1.Statistical Office of the Slovak Republic (2024) / [9] & State Statistics Service of Ukraine(2024)[12]
The results of the analysis of the dynamics of changes in indicators of the rate of change in total income and the rate of change in innovative activity of enterprises by economic sectors in Ukraine and Slovakia are depicted in Fig. 1 and Fig. 2, respectively.

Tab 1. Main economic sectors of Ukraine and Slovakia (summarized for comparison)

	Types of economic activity:				
1	Mining and quarrying	9	Manufacture of computer, electronic, and optical products	17	Transportation and storage
2	Manufacture of food products, beverages, and tobacco	10	Manufacture of electrical equipment	18	Publishing activities
3	Manufacture of textiles	11	Manufacture of machinery and equipment	19	Motion picture, video, and television program activities production, sound recording and music publishing activities, programming and broadcasting activities
4	Manufacture of wood, paper products, and printing	12	Manufacture of other transport equipment		
5	Manufacture of coke and refined petroleum products, chemicals, and chemical products	13	Repair and installation of machinery and equipment	20	Telecommunications
6	Manufacture of basic pharmaceutical products and pharmaceutical preparations	14	Electricity, gas, steam, and air conditioning supply	21	Computer programming, consultancy, and related activities
7	Manufacture of rubber and plastic products and other non-metallic mineral products	15	Water supply; sewerage, waste management and remediation activities		
8	Manufacture of basic metals and fabricated metal products,	16	Wholesale trade, except for motor	22	Information service activities

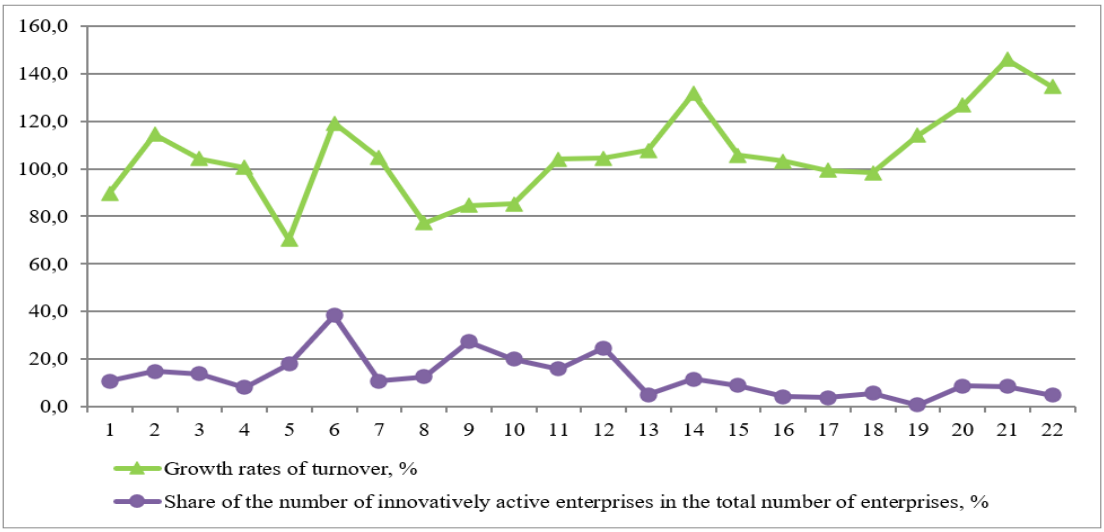
	except machinery and equipment		vehicles and motorcycles		

Fig. 1. Dynamics of growth rates of trade turnover and the share of innovatively active enterprises by economic sectors of Slovakia (2022 compared to 2021)



Source : own processing based on the databases [9]

Fig. 2. Dynamics of growth rates of trade turnover and the share of innovatively active enterprises by economic sectors of Ukraine (2021 compared to 2020)



Source: own processing based on the databases [12]

The presented analysis of the relationship between changes in income and changes in the innovative activity of economic sectors indicates their close mutual influence, which proves the dual nature of the innovation process. On the one hand, industries with a large number of innovatively active enterprises quickly increase their total revenue, and on the other hand, obtaining additional income stimulates business units of the industry to implement various types of innovations.

In this context, the problem of managing innovation costs requires special attention from the management system.

The conducted regression analysis of the impact of capital expenditures on innovation by individual industries in Slovakia proves a close relationship between the total level of capital expenditures (X) and the total income of the industry (Y). Statistical data for assessing the relationship contain 26 observations of the classification of economic sectors according to the Statistical Office of the Slovak Republic for 2020 and 2022 [xx] and are given in Appendix A. The results of the correlation analysis are presented in Fig. 3-6.

Fig. 3. Results of correlation analysis`s dependence between of growth rates of trade turnover and the share of innovatively active enterprises by economic sectors of Slovakia (2020)

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,924
R Square	0,855
Adjusted R Square	0,849
Standard Error	2244692,54
Observations	26

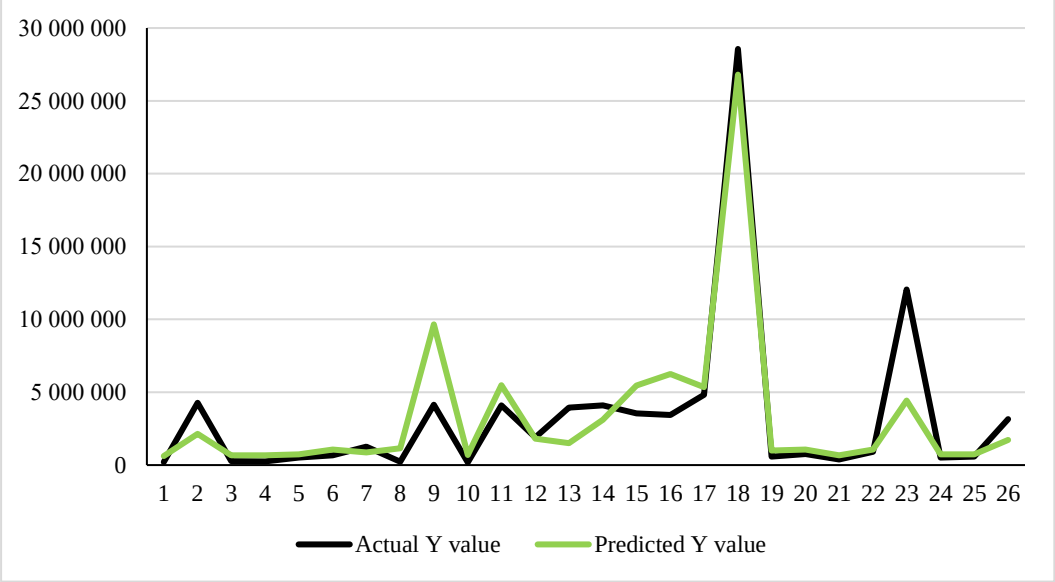
ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	7,1082E+14	7,10817E+14	141,073052	1,5454E-11
Residual	24	1,2093E+14	5,03864E+12		
Total	25	8,3174E+14			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	543248,321	497075,581	1,093	0,28529175	-482665,25	1569161,9
X Variable 1	58,0321454	4,88592275	11,877	1,5454E-11	47,95	68,12

Source : own processing based on the databases [9]

Fig. 4. Actual and predicted values of turnover in 2020, thousand EUR



Source : own processing based on the databases [9]

As can be seen from the constructed regression model of changes in the total values of turnover depending on the volume of capital expenditures, the overall indicator of the closeness of the relationship R (Pearson's regression coefficient) is equal to 0.92. This proves a very close connection between the studied variables. Along with the correlation coefficient, another criterion is used, which also measures the density of the connection between two or more indicators and checks the adequacy (correspondence) of the constructed regression model to reality. Such a criterion is the determination coefficient (R2), which in the constructed model is equal to 0.85. This shows that more than 85% of the changes in the Y indicator (total industry turnover) in this model are explained by the change in the value of the X indicator (capital expenditures in the industry on innovations).

Fig. 5 Results of correlation analysis`s dependence between of growth rates of trade turnover and the share of innovatively active enterprises by economic sectors of Slovakia (2022)

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,857
R Square	0,734
Adjusted R Square	0,723
Standard Error	3311817,18
Observations	26

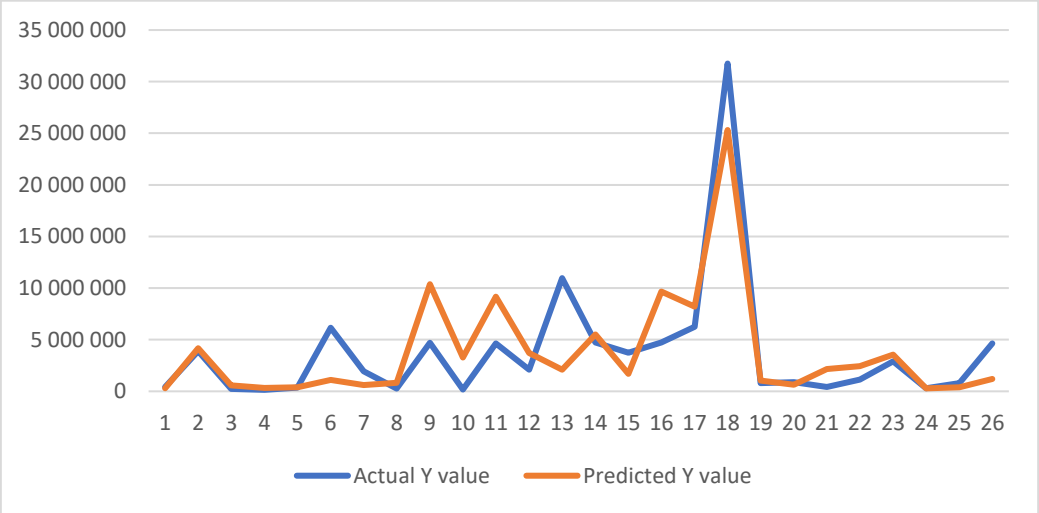
ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	7,25E+14	7,25E+14	66,1008662	2,3685E-08
Residual	24	2,6324E+14	1,0968E+13		
Total	25	9,8824E+14			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	215473,786	785673,359	0,274	0,786	-1406076,3	1837023,9
X Variable 1	72,887	8,969	8,13	2,3685E-08	54,38	91,39

Source : own processing based on the databases [9]

Fig. 6. Actual and predicted values of turnover in 2022, thousand EUR



Source: own processing based on the databases [9]

A similar regression analysis was carried out on the basis of indicators of the activity of economic sectors and the total volume of expenses in 2022. At the same time, the overall Pearson regression coefficient in the

model is 0.857, which also indicates a close relationship between the indicators, but the coefficient of determination is much lower and equal to 0.73.

If we consider the real state of the values of the turnover indicator and the trend of its forecast value, then in fig. 4 and fig. 6, respectively, its predicted value for sectors 9, 10, 11, 12, 16, 21 and 22 (Appendix A) significantly exceeds the actual value. According to the author, this can happen for two reasons.

First, in these industries (and they belong to industries with a high level of added value), technological innovations are introduced, which are characterized by a payback period of more than a year. Thus, there is probably a certain time lag in the manifestation of the impact of the cost of capital innovations on the turnover of the industry.

Secondly, for a correct construction of the model, data on actual innovation costs should be used, which do not have a capitalized form (actual expenses) and are included in the financial statements as part of the expenses of the period, without being capitalized in any type of assets. Unfortunately, information on this type of innovation costs is not available not only at the level of statistical observation of industries (this applies to statistical observations in most countries) but also at the level of individual enterprises and needs to define approaches and methodological justification.

Measures to improve the management of innovation activities both at the level of various sectors of the economy and at the level of individual business units require changes in the tools of the management system, in which the coordination of real processes of production, exchange, and consumption takes place. Such coordination is based on the perception, processing, and transfer of information and knowledge, as well as on the preparation and adoption of decisions for effective actions. This is due to changes in information flows, and knowledge flows about the actual costs of the enterprise's innovation activities on the basis of which decisions are made.

2. Construction Principles and Basic Requirements for the Cost Management System of Innovative Activities of Enterprises

From the standpoint of implementing management influence, the general architecture of business processes determines the principles of structuring the economic activity of an enterprise, identifying their main tasks, strategic priorities, and tactical development goals, as well as building an organizational and staff management system with the delineation of management functions and powers between them.

From the point of view of project-oriented modeling, it is the business process architecture adopted at the enterprise that determines the principles of structuring individual projects by structural components (business processes), which must be implemented through subject-oriented systems of management influence. That is, in his approach to substantiating the principles of building a general business architecture, the author adheres to a systemic approach based on the resource-functional platform of the process of implementing management influence.

The resource base of an enterprise, as an object of management influence, in the plane of its use for the implementation functions in subject-oriented systems should be structured according to the following components: subject-material resources (fixed assets and tangible material assets), labor resources (may differ in qualification and quantitative characteristics), financial resources, information, and intellectual resources, capitalized or not capitalized into intangible assets.

In the functional plane of exercising managerial influence, according to the author, the main classical functions of management should be singled out, such as: planning, accounting, analysis, organization and motivation. It should be noted that the presentation of the functional basis of the architecture can be deployed or decomposed within a certain subject system in accordance with the horizons of (strategic and operational) management influence and meet the special requirements of the implementation of a certain enterprise project Cooper R. & Kaplan R. (1999)/ [1].

Subject-oriented systems of managerial influence should include such systems as a production activity management system, an innovative activity management system, an enterprise cost management system, an enterprise economic security system, etc.

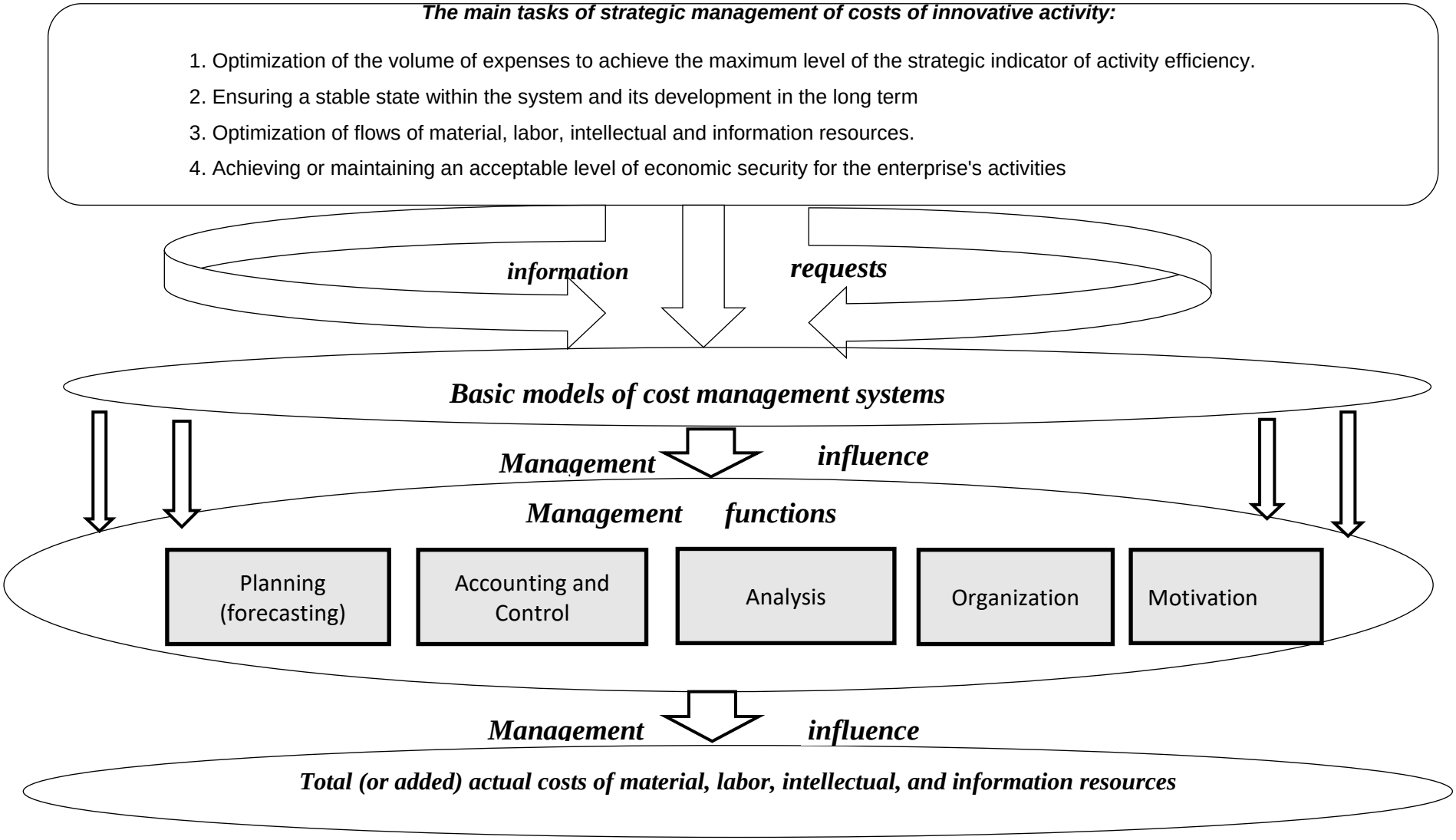
When considering the content of the business architecture component, it is advisable to take into account that it should be subordinated to the architectural methodology chosen by the enterprise, that is, to the established structured approach to solving the problem of making sound management decisions within the general architectural framework, which is based on the strategic goals of the business entity's development and scenario of enterprise development in the time perspective.

Thus, any architectural process must be described for processing in the echelon of the system architecture using semantic languages in the enterprise's information technology system based on the processing of all existing artifacts using certain methods and models of their description and calculation. Such artifacts, as defined by Zachman, J.A. (1987)/ [14] and Sessions, R. (2007)/[11], are interpreted as certain information registers: financial, statistical reports, internal accounting and management documents, etc., which

contain information about objects of management influence and are characterized by a certain set of quantitative and qualitative indicators; or primary information processing models to obtain signal indicators regarding the state or efficiency of the functioning of such objects.

The main characteristics of the subject-oriented system of managing the innovative activity of the enterprise for determining the object of managerial influence, namely the costs of innovative activity, are shown in Fig. 7.

Fig. 7. The main characteristics of the innovation activity cost management system (strategic level of influence)



Source: formed by the author

The fundamental basis (platform) for constructing a management system, according to the author's view, is the economic security management system of an enterprise. The robustness and stability of the overall architecture of enterprise management depend on it.

Therefore, when considering the expansion of functional opportunity or when building a new subject-oriented system, isolating an innovative cost management system as an independent management system, the enterprise should reinforce this foundation by allocating additional resources and distributing management influences across functional signs. Such expansion can occur either on an ongoing basis when building a new system is necessary or variably in cases of "special requests" (for example, implementing an innovative project) that have minimal impact on the enterprise's technological and product policies and are short-term.

Thus, when planning and evaluating expenses for innovative processes, the enterprise should consider certain costs associated with maintaining the overall stability of the management architecture by enhancing the economic security system (ESS).

In general, data within the cost management system and a specific management subsystem for comprehensive information unification should be structured based on the following characteristics (in both monetary and physical evaluations):

1. The required amount of a particular resource, characterized by:

- Total available resource amount;
- Required replenishment amount for performing certain management functions within an innovation project;
- Evaluation of the current efficiency of resource use across the enterprise;
- Evaluation of project-specific resource use efficiency.

2. Location of use in business activities (routing by structural departments) in accordance with the project.

3. Projected date of use.

4. Responsible individual for resource utilization.

5. Motivation principles and indicators of effective resource use.

6. Information registry system (existing documentation within the general document flow of the enterprise or developed for collecting managerial information on management objects).

In general, the management system's object plane, in terms of the functional influence of management systems, can be represented as a matrix. Which is characterizing the information component for each subject-oriented system, including the innovation cost management system:

$$\mathbf{IXcmsi} = \begin{bmatrix} \text{Xcmsi } \boldsymbol{mpl} & \text{Xcmsi } \boldsymbol{mor} & \text{Xcmsi } \boldsymbol{mm} & \text{Xcmsi } \boldsymbol{mac} & \text{Xcmsi } \boldsymbol{man} \\ \text{Xcmsi } \boldsymbol{lpl} & \text{Xcmsi } \boldsymbol{lor} & \text{Xcmsi } \boldsymbol{lm} & \text{Xcmsi } \boldsymbol{lac} & \text{Xcmsi } \boldsymbol{lan} \\ \text{Xcmsi } \boldsymbol{fpl} & \text{Xcmsi } \boldsymbol{for} & \text{Xcmsi } \boldsymbol{fm} & \text{Xcmsi } \boldsymbol{fac} & \text{Xcmsi } \boldsymbol{fan} \\ \text{Xcmsi } \boldsymbol{ipl} & \text{Xcmsi } \boldsymbol{ior} & \text{Xcmsi } \boldsymbol{im} & \text{Xcmsi } \boldsymbol{iac} & \text{Xcmsi } \boldsymbol{ian} \\ \text{Xcmsi } \boldsymbol{intpl} & \text{Xcmsi } \boldsymbol{intor} & \text{Xcmsi } \boldsymbol{intm} & \text{Xcmsi } \boldsymbol{intac} & \text{Xcmsi } \boldsymbol{intan} \end{bmatrix} \quad (2)$$

in which:

IXcmsi - generalized information characteristics of objects of cost management for innovative activities;

X cmsi, - information about the object of innovation cost management in subject-oriented management systems from the standpoint of functional characteristics;

pl, or, mot, ac, an- functions of **planning**, **organizing motivation, accounting and analysis**, respectively;

m,l,f,i,int - **material, labor, financial, informational, intangible intellectual resources**, respectively

This approach entails a consolidated information base composed of data from each subject-oriented subsystem within the general management system. Such information can be structured by resource or function as needed.

At the same time, the information diffusion processes that define innovation accelerate dynamic changes within the enterprise's internal environment on the one hand, while on the other hand, they are themselves products of accelerated external environmental dynamics, driven by the increasing information flow volume about a specific innovation within the macro system.

The accumulated information on management objects, according to the criteria outlined above, can be structured depending on managerial needs, technical and technological processing capabilities, calculation methods, and models for optimizing indicators for decision-making. This structured information can then be used to build databases within the system architecture. Decomposing the overall management process and identifying its individual components (business processes) allows the use of semantic approaches to their description in information systems.

Thus, the proposed approach to organizing the interaction and interdependence of domain-oriented management systems optimizes the functionality of all subsystems in the enterprise's general management system, grounding them on an effective economic security management platform.

3. Main Problematic Aspects of Identifying and Estimating Costs of Innovative Activity

Within this approach, a direction of cost assessment and identification should be singled out, which is based on the generalization of all types of costs, including alternative costs and costs for the implementation of managerial (functional) influence in the middle of a subject-oriented system. This includes accounting for enterprise losses from missed opportunities as well as forming costs based on alternative, rather than actual (accounting-recognized) values of resources consumed.

This way, the total costs in the management system should be determined by formula (3):

$$C_t = C_{\text{a}} + \sum_{i=1}^{n}(K_i \times R_i) \quad (3)$$

In which:

C_t – costs estimated in the cost management system for the purpose of exercising managerial influence in a certain period;

C_{a} – the actual costs of the enterprise reflected in the accounting system for a certain period;

K_i – an adjustment factor to adjust the actual value of the capitalized resource used in period i;

R_i – the accounting value of the resource consumed in the period i.

The approach to determining costs, taking into account the actual market value of the spent resource with adjustments for lost opportunities, allows you to estimate the real amount of profit from the commercialization of the chosen innovation project. However, if the actual (accounting) cost exceeds the market value, the use of the actual value recorded in financial accounting is preferable from the enterprise's standpoint because this value is a reflection of the actual value of the resource due to its untimely use, or an incorrectly made decision regarding the size of the insurance reserve in the company's management system.

Hence, the enterprise's costs in business activities should include the monetary value of all types of resources that have been spent (or changed their form), including those that are not recognized or cannot be recognized as an asset in the process of all types of enterprise activity, but which provide opportunities for the functioning of the enterprise as a certain economic structural unit. At the same time, Costs can be valued based on management influence goals, considering both actual and accounting (book) values.

At the same time, we note that it is intangible assets and intangible resources that are not recognized as such (experience of innovators, information resources created as a result of innovative activity, innovative ideas that have not reached the "product stage, etc.) are there key products of innovation activities at the stages of research, development and production adaptation of innovative. Such costs are rather difficult not only to estimate but also to identify and separate their capitalized portion in actual costs according to the stages of commercialization of innovations. Furthermore, all costs related to organizational and marketing innovations in the accounting system are classified as period expenses and are considered consumed period costs. These cannot be capitalized, do not add to the enterprise's asset value, nor enhance its investment attractiveness. This approach suggests that such costs are not objects of future management influence. From the author's point of view, such a position is unsuitable for constructing an effective cost management system for innovation

activities, does not correspond to the principles of determining the actual costs of the enterprise in the general management system, and requires refinement.

Another critical issue arises when determining the adjustment coefficient (Ki) in the case of the well-founded existence of a significant (greater than the term of the total turnover of the enterprise's capital) term of capitalization of the enterprise's assets. Such a correction coefficient should reflect:

- firstly, the impact of inflationary depreciation of the actual value of assets;

- secondly, the increase in the price of resources, which is associated with the costs of storage, insurance, natural depletion losses, etc.;

- thirdly, to take into account the rate of total profitability of the enterprise's capital or the average annual deposit rate of capital placement, if the specified indicators exceed the average planned rate of return on costs of the period.

The proposed approach for a refined definition of the actual cost of the period's costs, which is based on the distinction between actual (accounting) and actual (economic) costs, makes it possible to make informed decisions within the enterprise's innovation cost management system.

Conclusion

Based on the research, the following conclusions were drawn:

1) Statistical data from the economic sectors of Slovakia and Ukraine between 2020 and 2022 reveal a strong correlation between the growth rate of enterprise innovation activity and sectoral income. An in-depth analysis (based on regression modeling) indicates a somewhat uneven growth of the industry's income based on the volume of capital expenditures on innovation. This justifies the need for improving innovation cost management.

2) For the effective organization of the decision-making process in the subject-oriented system of the enterprise's innovation cost management system enterprise, it is necessary to have such an information environment for the functioning, which is characterized by:

- Structured information flows aligned with each decision-making stage;
- Adapted information carriers for sufficient data collection for analyzing and forecasting the state and dynamics of the investigated object;
- Established information processing systems to evaluate internal and external environmental impacts;
- A mechanism for determining the entropy level of unstructured information signals and assessing their impact likelihood on the investigated object.

3) In order to improve the identification and evaluation of innovative activity costs in the subject-oriented subsystem of management, a functional-resource approach is proposed. It takes into account the additional costs for the implementation of functional influence on the part of the cost management system of innovative activity to the cost of the consumed resource (the object of managerial influence).

4) It is proposed to evaluate and identify the management influence object based on an understanding of the real value of capital investments in innovation, expanding beyond the limits of the accounting approach.

Funding

Scientific Paper was elaborated within the framework of the project EU Next Generation EU through the Recovery and Resilience Plan for Slovakia under the project No. 09I03-03-V01-00081

References

1. Cooper R. & Kaplan R. (1999). Design of Cost Management Systems, Prentice Hall, 536
2. Dimitru, A. P. (2022). Intangible Assets – An Important Resource for Enterprise Performance Management. *Global Economic Observer, "Nicolae Titulescu" University of Bucharest, Faculty of Economic Sciences; Institute for World Economy of the Romanian Academy, 10*(1), 107- 111. URL: https://ideas. repec.org/a/ntu/ntugeo/vol10- iss1-107-111.html

3. Dobrovolska, O., Sonntag, R., Masiuk, Y., Bahorka, M and Yurchenko,N (2023). Is increasing a share of R&D expenditure in GDP a factor in strengthening the level of innovation development in Ukraine compared with GII's top countries?. *Problems and Perspectives in Management*, *21*(4), 713-723. doi:10.21511/ppm.21(4).2023.53
4. Intangible Assets Financial Statement Impact Comparison Report https://www.aon.com/getmedia/544c9634-bcb7-4fb3-ad10-82afba01ee49/Aon-Ponemon-2022-Intangible-Assets-Financial-Statement-Impact-Comparison-Report.pdf
5. Kiselakova D., Sofrankova, B., Onuferova, E., & Cabinova, V. (2020). Assessing the effect of innovation determinants on macroeconomic development within the EU (28) countries. *Problems and Perspectives in Management,* 18(2), 277-289. http://dx.doi.org/10.21511/ppm.18(2).2020.23
6. Labunska, S., Cibák, Ľ., Sidak,M. and Sobakar,M. (2023). The role of internally generated goodwill in choosing areas and objects of investment. *Investment Management and Financial Innovations*, 20(2), 215-231. https://doi:10.21511/imfi.20(2).2023.1
7. Labunska,S., Karaszewski,R., Prokopishyna,O., and Iermachenko., I.(2019). Cognitive analytical tools for cost management of innovation activity. *Problems and Perspectives in Management,* 17(1), 395-407. https://doi:10.21511/ppm.17(1).2019.34
8. Melnyk, L., Matsenko, O., Kubatko, O., Korneyev, M., & Tulyakov, O. (2022). Additive economy and new horizons of innovative business development. *Problems and Perspectives in Management,* 20(2), 175-185. https://doi.org/10.21511/ ppm.20(2).2022.15
9. Official site of the Statistical Office of the Slovak Republic. Retrieved from https://https://slovak.statistics.sk/wps/portal/ext/home/!ut/p/z0/04_Sj9CPykssy0xPLMnMz0vMAfljo8ziA809LZycDB0NLPyCXA08QxwD3IO8TAwNTEz1g1Pz9AuyHRUBtph-Sw!!/p0/IZ7_Q7I8BB1A00TK20INUT2SGE31E5=CZ6_Q7I8BB1A08NRE0ITAPGRJ41045=MECTX!QCPobsah-enQCPstatic-contentQCPHomeQCPRotator=ns_Z7_QFB7I8BB1A00TK20INUT2SGE31E5_WCM_Page.1af362d9-5abb-43fc-a9e5-6eea7706c9f8!3=WCM_PI!1==/
10. Serpeninova, Yu., Lehenchuk, S., Mateášová, M., Ostapchuk, T., & Polishchuk, I. (2022). Impactof intellectual capital on profitability: Evidence from software development companies in the Slovak Republic. *Problems and Perspectives in Management, 20(2),* 411-425.https://doi.org/10.21511/ppm.20(2).2022.34
11. Sessions, R. (2007). A Comparison of the Top Four Enterprise-Architecture Methodologies. Microsoft, http://web.archive.org/web/20170310132123/https://msdn.microsoft.com/enus/library/bb466232.aspx
12. State Statistics Service of Ukraine: website. .Retrieved from URL: https://www.ukrstat.gov.ua/
13. Trinugroho, I., Law, S. H., Lee, W. C., Wiwoho, J., & Sergi, B. S. (2021). Effect of financial development on innovation: Roles of market institutions. Economic Modelling, 103, 105598. https://doi.org/10.1016/j.econmod.2021.105598
14. Zachman J.A.(1987). A framework for information systems architecture. *IBM Systems Journal,Vol 26(3),276-292*, https://doi:10.1147/sj.263.0276

Appendix A

Tab1A Indicators of GII for regression modeling

№	Types of economic activity	Turnover for own performances and goods, thousand EUR (Y)		Innovation expenditure, thousand EUR (X)	
		2020	2022	2020	2022
1	Mining and quarrying	210 544	432 606	1 341	1218
2	Manufacture of food products, beverages and tobacco	4 284 461	3 906 755	27582	54 246
3	Manufacture of textiles	275 465	245 454	2040	4 955

4	Manufacture of wearing apparel	244 688	141 399	2 358	1 628
5	Manufacture of leather and related products	506 725	352 156	3 167	2 343
6	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	679 394	6 146 902	8 844	12 329
7	Manufacture of paper and paper products	1 271 727	1 935 133	5 437	5 458
8	Printing and reproduction of recorded media	219 258	268 854	10 648	8 324
9	Manufacture of coke and refined petroleum products, chemicals and chemical products	4 151 051	4 705 574	156 909	139 301
10	Manufacture of basic pharmaceutical products and pharmaceutical preparations	183 447	168 616	2 396	42 129
11	Manufacture of rubber and plastic products	4 097 189	4 641 144	84 924	122 772
12	Manufacture of other non-metallic mineral products	1 897 146	2 096 531	21 766	48 037
13	Manufacture of basic metals	3 945 812	10 980 546	16 724	25 744
14	Manufacture of fabricated metal products, except machinery and equipment	4 092 638	4 722 789	44 101	72 587
15	Manufacture of computer, electronic and optical products	3 558 440	3 730 351	84 747	20 104
16	Manufacture of electrical equipment	3 448 418	4 745 405	98 220	129 734
17	Manufacture of machinery and equipment n.e.c.	4 828 792	6 246 286	82 652	109 819
18	Manufacture of motor vehicles, trailers and semi-trailers	28 562 838	31 755 613	452 486	344 362
19	Manufacture of other transport equipment	578 340	784 252	7 928	11 542
20	Manufacture of furniture	763 814	878 928	9 148	5 609
21	Other manufacturing	392 875	410 693	2 046	26 436
22	Repair and installation of machinery and equipment	919 851	1 137 967	8 815	30 654
23	Electricity, gas, steam and air conditioning supply	12 052 879	2 902 904	67 019	45 853
24	Water collection, treatment and supply	521 465	293 925	3 379	991
25	Waste collection, treatment and disposal activities; materials recovery	571 428	783 256	3 236	2 490
26	Construction	3 154 140	4 637 150	20 516	13 441