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EFFICIENCY OF THE IMPLEMENTATION OF INNOVATION AND INVESTMENT PROJECTS AT HEALTHCARE INSTITUTIONS: INTEGRAL ANALYSIS AND WAYS OF ENHANCEMENT

Introduction. *Improving the quality of medical services and raising the effectiveness of the operation of the subjects of the medical system of Ukraine requires intensifying innovation, which needs significant investments. So, the application of qualitative methods for analyzing the efficiency of such projects is of great importance.*

Problem Statement. *Scholarly research and methodological framework and practical recommendations deal with the identification of problem areas and aspects of the implementation of innovation and investment projects at healthcare institutions in Ukraine.*

Purpose. *The purpose is to comprehensively analyze and to identify the problematic aspects of the implementation of innovation and investment projects by healthcare institutions and to determine the measures to address them as well as to increase the effectiveness of the innovation.*

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Material and Methods. *In the course of the study, the method of economic and mathematical modeling has been used to perform a composite analysis (using the weighted average method) of the effectiveness of the implementation of innovation and investment projects by the example of healthcare institutions..*

Results. *It has been established that the efficiency of the implementation of innovation and investment projects at healthcare institutions of Ukraine is satisfactory, but such components as the financial and economic sustainability of the project and the quality of intellectual and personnel support, especially the structure of investments and their profitability, staff turnover and the level of professional qualification of medical personnel remain problematic. Financial and economic stability and investment and marketing development remain the most problematic components of the efficiency.*

Conclusions. *One of the key signs of the efficiency of investment and innovation projects in medicine is their systematic manner that involves a combination of measures to activate and develop investment and innovation in the organizational and institutional (1), the economic (2), the product and service (3), the social and psychological (4) components.*

Keywords: innovation and investment activity, design of innovation projects, medical service institutions, efficiency, integral assessment, resource and functional components.

The potential of the systemic development of healthcare institutions is formed in the plane of effective management decisions that allow for the rationalization and optimization of activity under the needs of clients of healthcare institutions while increasing the quality and range of consultation, as well as diagnostic and treatment services. Due to today's realities and the specifics of the functioning of entities that conduct activity in the field of providing medical services, the basis of the quality of business processes and ensuring competitiveness is directly related to enhancing the level of business innovativeness, in particular, to the implementation of specific innovation and investment projects by enterprises.

In recent years, quite a lot of attention has been paid to updating the problems of the effective functioning of institutions and the healthcare system in general, in particular in terms of the impact on the preservation and development of the country's human resources. The purely applied nature of these processes has been critically "exposed" by the war since it was waged against Ukraine in 2014. Therefore, the problems of preserving human resources, including the means of high-quality functioning of the medical system, and its reforming, are sufficiently comprehensively disclosed in publications on the formation of hospital provision of healthcare institutions [1], the expansion of the spectrum of medical rehabilitation services [2], the strengthening of social and demographic security of the country [3], the development of the market of voluntary health insurance [4], the definition of the tools of the regional policy of preserving human resources in countries that are in difficult conditions of the intensive outflow of human resources [5].

The field of healthcare rightly belongs to system-forming ones in the context of preserving and increasing the human capital of each state. That is why effective management here, especially based on an innovation and investment approach, has a priority. This is convincingly shown in the research of a number of scientists, in the sense of careful strategic planning of the processes of innovation- and technology-driven development of the healthcare system and its subsystems [6], in terms of using the tools of public-private partnership for the purpose of infrastructure development and the improvement of investment-innovation and material-technical support of healthcare institutions [7], and quality regulatory policy [8], in terms of improving the business environment and structural characteristics of the functioning and development of the medical services market [9], regarding the formation of an integral national system of providing medical services [10], for overcoming problematic aspects of the development of public health in the country [11], directly related to the transformation of the state management system in the medical sphere [12], carrying out a medical reform [13] and further regulating its defects and problematic aspects, and overcoming challenges and threats [14].

At the same time, it is necessary to take into account the peculiarities of the management of systemic innovation- and technology-driven development directly of healthcare institutions, among which the need to implement adaptive management functions, the transformation of classical management mechanisms towards market ones based on the development of contractual relations is dominant (healthcare institution — client; state — healthcare institution), as well as the implementation of measures related to the professionalization of medical staff and retraining of medical personnel, the modernization and updating of medical equipment, conducting the audit of the quality of medical services. These and other aspects have already been sufficiently systematically disclosed in publications devoted to the general issues of innovation principles of the development of the private healthcare sector [15], as well as the introduction of modern, innovation approaches to the innovation management of the development of healthcare institutions [16, 17].

However, when analyzing trends in the innovation-driven development of healthcare institutions, it should be understood that they have additional limitations, mainly clearly regulated by the system of standardization, supervision, and control in the area of medical activity. At the same time, it is about the system of internal (domestic) standardization [18, 19], including in the area of public control [20], and about international standards in this area [21, 22].

However, in addition to the standardization of services, healthcare institutions, especially domestic ones, also face the difficulties of instability due to the course of the modern medical reform, which is currently being implemented in Ukraine, forming a modern paradigm of the functioning and further development of medical institutions [23], as well as defining the competencies and ability of enterprise managers to actively and effectively participate in global and national projects in the field of healthcare of Ukraine [24], the ability to take into account the criteria and factors of success in the analyzed field [25].

Healthcare institutions belong to the service sector, in which one of the key factors is the human capital factor. Accordingly, while analyzing their systemic innovation- and technology-driven development, sufficient attention should be paid to the presence and adherence to following the paradigm of personnel management of a healthcare institution [26], the quality and efficiency of the system of work motivation [27], the professional development of personnel [28], the level and structure of the system of remuneration and financial incentives for employees of healthcare institutions, especially in a part of experts and specialists [29].

It is obvious that the specificity and non-commercial (in its predominant essence) nature of the activity and development of healthcare institutions led to the fact that today the method of analyzing the efficiency (the authors are mainly talking about economic analysis) of the formation and development of its scientific and technical, innovation and technological components is still practically at its nascent stage. However, separate existing developments in the field of analysis of the development of both the healthcare system in general [30] and healthcare institutions in particular, especially private ones, promote this process [31].

Thus, from the point of view of the systematicity and complexity (using methods of deduction and induction by clearly defined functional and structural spheres), conducting the integral assessment, the implementation of important innovation and investment projects by healthcare institutions is still not analyzed at the proper level, one of the factors of which was a lack of appropriate regulatory and methodological support. This research presents the results of its development and testing.

The purpose of the article is to perform a comprehensive analysis and identify problematic aspects of the implementation of innovation and investment projects by healthcare institutions, to determine measures to eliminate them and to improve the efficiency of innovation.

For deep and comprehensive research of both the system as a whole and the aspects of manage-

rial influence on the functional and structural characteristics of the quality and efficiency of their innovation and investment activity and the development of medical enterprises both as a whole and in the cross-section of their components, it is important to apply an integral approach to assessment.

The author's methodology for calculating the integral index of the efficiency of the implementation of innovation and investment projects of healthcare institutions provides for the implementation of such key and interrelated stages of research as the selection of indicators by the components of the efficiency of the implementation of innovation and investment projects of medical institutions and their standardization, the calculation of the weights of indicators within each of the groups, the calculation of partial indexes of components, the determination of the weights of the group of indicators, the calculation of the integral index of the efficiency of the implementation of innovation and investment projects of healthcare institutions calculated by the method of a weighted arithmetic mean.

In general, in the research process, 30 indicators were selected (4 destimulators, 26 stimulators), which were structured into 5 groups: financial and economic stability, material and technical support; effectiveness of production and economic processes; intellectual and personnel support, and investment and marketing activity.

For indicators that stimulate the processes of increasing the efficiency of the implementation of innovation and investment projects of healthcare institutions and make their functioning more efficient, the normalization was carried out by formula (1), while for indicators-destimulators — by formula (2):

$$s_{ji} = \frac{k_{ji}}{k_{\max j}}, \quad (1)$$

$$d_{ji} = \frac{k_{\min}}{k_{ji}}, \quad (2)$$

where s_{ji} is the standardized values of j-indicator-stimulator in i-period; d_{ji} is the standardized values of j-indicator-destimulator in i-period; k_{ji} is the value of j- indicator in i-period; $k_{\max j}$ $k_{\min j}$ are the maximum and minimum values of j-indicator in the studied period.

The normalization of indicators by the nature of the impact on the efficiency of the implementation of innovation and investment projects of healthcare institutions made it possible to form standardized series of indicators (z_{ji}) for each of the five groups of indicators and became a basis for further econometric calculations. Indicators' weights were calculated by the method of building correlation matrices for each group of indicators separately.

In general, the integral index of the efficiency of the implementation of innovation and investment projects of healthcare institutions is calculated by formula (3):

$$ISD_i^n = P_{fec} \cdot I_{fec}^{ni} + P_{mts} \cdot I_{mts}^{ni} + \\ + P_{ied} \cdot I_{ied}^{ni} + P_{ips} \cdot I_{ips}^{ni} + P_{ima} \cdot I_{ima}^{ni}, \quad (3)$$

where ISD_i^n is the integral index of the efficiency of the project of n-healthcare institution in i-period; P_{fec}, P_{mts}, P_{ied}, P_{ips}, P_{ima} are the corresponding values of the weight of the groups of indicators (*fec* is financial and economic stability; *mts* is material and technical support; *ied* is the efficiency of production and economic processes; *ips* is intellectual and personnel support; *ima* is investment and marketing activity); I_{fec}^{ni} is the group index of the financial and economic sustainability of the project of n-healthcare institution in i-period; I_{mts}^{ni} is the group index of the material and technical development of the project of n-medical institution in i-period; I_{ied}^{ni} is the group index of the efficiency of production and economic processes of the project of n-healthcare institution in i-period; I_{ips}^{ni} is the group index of intellectual and personnel development of the project of n-healthcare institution in i-period; I_{ima}^{ni} is the group index of the investment and marketing development of the project of n-healthcare institution in i-period.

The values of the calculated indexes can range from 0 to 1. At the same time, according to the

Harrington scale, their values at the level of 1—0.81 and 0.8—0.64 indicate, respectively, a very high and a high level of efficiency of the implementation of innovation and investment projects of healthcare institutions and its components, while the approaching of the index values to 0 signals a weak and unsatisfactory state of efficiency of the implementation of innovation and investment projects of the healthcare institution and insufficiently high effectiveness of management actions in ensuring the efficiency of business processes.

The assessment of macroeconomic indicators of the functioning of economic entities, the main type of economic activity of which is the provision of services in the field of healthcare, confirmed the thesis about the formation of a highly competitive environment, which in the statistical assessment from 2015 to 2021 in Ukraine was reflected in almost threefold quantitative growth of medical service entities from 46 to 70 per 100,000 population, more than a two-fold increase in the volume of services provided per business entity, from 39 to 172 dollars US. It is noteworthy that in the structural dimension, as of 2020, more than 90% of the participants in the medical services market belonged to small business entities, including an average of 76% for individual entrepreneurs [32, 33].

These and other trends, firstly, actualized the importance of strengthening the competitive positions of healthcare institutions, the key factors of which, naturally, are the high quality of services and the innovativeness of preventive medical and diagnostic measures; secondly, they increased the dependence of many characteristics of the quality of life of the population on the quality of the functioning of the healthcare system, in which leading technological innovations also play a significant role.

The effectiveness of managing the processes of creation and implementation of innovations is largely based on the full-fledged information and analytical support of these processes. At the same time, the analysis of their course should be systematic and take into account the impact on key functional areas of entities providing medical services.

To assess the functional and structural features of the management of the systemic innovation-driven development of medical institutions, the 5 healthcare institutions were selected in the research process that implement innovation projects for the implementation of technical and technological innovations in the medical and aesthetic field in the following directions: alternative plastic surgery of the face and body; minimally invasive plastic surgery; hardware, classical, and injection cosmetology; personal complexes for hardware correction of the figure; physiotherapy (treatment and rehabilitation programs), etc. The justification of the sample of enterprises is explained by the same type of activity profile that provide consultation, diagnostic, and treatment services in the field of plastic surgery and otolaryngology in the western regions of Ukraine. Among them are *Genesis* Esthetic Clinic Ltd, TDC *My Doctor* Ltd, *Before and After* LOR Clinic of Endoscopic and Plastic Surgery of Stakhiv's Ltd, *ProCosmetik* Ltd, and *Med-Atlant* Ltd.

Taking into account the complexity and multifacetedness of all aspects of the implementation of innovation and investment projects, the research of their effectiveness on the example of specific medical enterprises in an analytical dimension was carried out based on the data from management and financial and statistical accounting and reporting by groups of indicators that reveal aspects of the financial and economic sustainability of projects in dynamics, the peculiarities of their material and technical, production-economic and intellectual-personnel support, as well as information and marketing trends.

The results of monitoring the values of the financial and economic indicators of the implementation of the enterprises' innovation and investment projects show (Table 1) that, in general, the financial stability of the analyzed enterprises within the limits of the relevant innovation and investment projects was not fully ensured, since in 2015—2021 the estimated financial indicators were within satisfactory limits and mostly showed a tendency towards deterioration.

Since the management of financial and economic processes in the context of ensuring the systemic innovation-driven development of healthcare institutions took place to a greater extent through the capitalization of long-term and short-term obligations than own resources, management actions created conditions for meeting current financial needs within the limits of innovation and investment projects, which, however, under the condition of low profitability and efficiency of the use of additional resources, will probably increase the risks of slowing down the pace of the implementation of relevant projects of healthcare institutions in the future reporting periods due to the increase in the costs of servicing financial debt and current credit obligations.

A sharp reduction in the total liquidity for innovation and investment projects of enterprises in the field of healthcare and a decrease in its average value from 1.292 in 2015 to 0.813 in 2021 (threshold value ≤1) in general negatively affects their financial and economic stability and solvency, therefore leaves its mark on the ability of medical institutions to timely fulfill their obligations in the short term, especially in the event of force majeure situations. At the same time, it should be noted that innovation and investment projects of healthcare institutions are characterized by a sufficiently low level of investment attractiveness, which in the analytical dimension is primarily determined by the positive dynamics of the values of the financial risk ratio at the simultaneously low value of the investment ratio.

The high values of the financial risk coefficient allow stating that the innovation and investment projects of the researched healthcare institutions are currently in the stage of formation and expansion of business processes, therefore they require significant current infusions of investment and financial resources to serve the current needs of systemic development and ensure financial and economic stability. The increased demand for investment resources in the conditions of relatively low profitability of the medical business is a prerequisite for increasing financial risks, which, in the case of irrational management decisions, can slow down the processes of systemic development and scare off potential investors. On the other hand, a slight decrease in the investment ratio in the conditions of systemic uncertainty as a result of market turbulence, as well as the COVID-19 pandemic, allows concluding that the existing mechanisms for managing investment and financial risks and resources are quite effectively adapted to the specifics of the healthcare sector.

Table 1. **The Average Indicators of Financial and Economic Component of Efficiency of Implementation of Innovation and Investment Projects of Healthcare Institutions, 2015—2021**

Indicator	Year							Absolute deviation, ±	
	2015	2016	2017	2018	2019	2020	2021	2021—2015	2021—2020
Equity ratio	0.453	0.443	0.432	0.428	0.427	0.405	0.384	–0.069	–0.022
Growth rate of own capital, %	119.1	113.3	109.5	102.8	106.2	138.2	112.8	–6.3	–25.3
Coefficient of long-term financial independence	0.775	0.758	0.734	0.747	0.758	0.735	0.670	–0.104	–0.065
Investment ratio	0.640	0.655	0.642	0.619	0.637	0.617	0.520	–0.119	–0.097
Coefficient of total liquidity	1.292	1.293	1.086	1.178	1.183	1.105	0.813	–0.479	–0.291
Financial risk ratio	1.290	1.316	1.362	1.380	1.349	1.146	1.233	–0.056	0.087
Asset Ratio (Mobility)	0.387	0.435	0.434	0.414	0.454	0.484	0.365	–0.022	–0.120
Coefficient of receivables and accounts payable	0.700	0.697	0.783	0.847	0.843	0.792	1.060	0.359	0.267

Source: own research results.

Thus, the management of financial and economic processes within the innovation and investment projects of enterprises in the field of healthcare created prerequisites for increasing their potential for systemic development through the accumulation of financial resources, which in terms of value directly affect the state and quality of the material and technical equipment of medical diagnostic institutions. It is worth noting that the management of material and technical resources of healthcare institutions was carried out at a fairly high level, which as a result made it possible to significantly increase the material and technical base and ensure a relatively balanced implementation of innovation and investment projects of the analyzed medical enterprises due to the improvement of the values of most of the indicators of this component (Table 2).

In particular, in 2021, as compared with 2015, the average annual cost of fixed assets per employee increased more than 1.5 times from UAH 297.2 thousand to UAH 463.7 thousand, respectively, in the studied medical institutions. At the same time, the rate of growth of equity capital per employee was less intense, as it increased on average by only a quarter for the period 2015—2021. The dynamics of the indicators show that as a result of management decisions, the material and technical base of medical institutions was formed to a greater extent due to the development of borrowed financial resources than own capital.

Equally important when evaluating the effectiveness of non-current assets management within the innovation and investment projects of healthcare institutions are the indicators of renewal and wear and tear of fixed assets, which in the conditions of rapid aging of technologies determine the efficiency and competitiveness of production and economic business processes. The results of the comparative analysis of the values of these indicators for the period 2015—2021 allowed concluding that, in general, the state of technological updating and modernization of the medical equipment of the compared medical and diagnostic institutions improved, but the level of wear and tear of fixed assets continued to be quite high.

The rational management of financial and material and technical resources within the framework of innovation and investment projects of healthcare institutions forms a basis for the activation of systemic development processes, while the realization of the resource potential of medical institutions in practice is determined in the plane of increasing the values of indicators of production and economic nature. In general, the results of monitoring the values of indicators of the

Table 2. **The Average Indicators of Material and Technical Component of the Efficiency of Implementation of the Innovation and Investment Projects of Healthcare Institutions, 2015—2021**

Indicator	Year							Absolute deviation, ± / Growth rate, %	
	2015	2016	2017	2018	2019	2020	2021	2021—2015	2021—2020
Capital-labor ratio, thousand UAH / persons	297.2	306.0	301.7	312.9	324.9	418.2	463.7	56.0	10.9
Equity per employee, thousand UAH / persons	203.6	204.1	196.7	195.8	209.3	254.2	260.4	27.9	2.5
Depreciation of fixed assets, %	25.1	29.1	32.0	35.9	36.3	31.9	29.7	4.6	–2.2
Upgrade of fixed assets, %	28.7	33.7	35.0	34.1	37.2	57.4	45.5	16.8	–11.9
Growth rate of the residual value of fixed assets, %	104.6	109.1	105.4	97.1	102.0	163.9	138.2	33.6	–25.7

Source: own research results.

production and economic component of the efficiency of the implementation of innovation and investment projects on the example of the studied medical institutions showed that the management of operational activities was carried out at the appropriate level since the efficiency of production and economic processes in healthcare institutions mostly improved (Table 3).

This was mainly achieved due to a more than two-fold increase in the average level of labor productivity in 2015—2021, as well as an increase in income per UAH 1 of medical services provided and UAH 1 of equity by almost 60% and 40%, respectively. The profitability of the operational activity of healthcare institutions grew along with the quantitative increase in the volume of medical and diagnostic and consulting services provided by medical enterprises, the annual growth of which during 2015—2021 was fixed at the mark of 15.0%.

On the other hand, despite the quantitative growth of revenues from the implementation of medical services, the profitability of the studied healthcare institutions in the analyzed period of 2015—2021 continued to remain quite low, although it showed a growing trend from 11.3% to 18.4%, while the cost of provided services ranged from 77.7% to 81.1%. The insufficiently satisfactory level of the profitability of medical enterprises and, accordingly, the high cost of medical and diagnostic services significantly inhibit and in the long term make impossible the systemic development of healthcare institutions, as they are not fully able to cover their growing financial and economic needs. At the same time, the preservation of the existing trend of low profitability of the medical business significantly increases the risks of increasing financial dependence on external creditors, which probably in the forecast periods may have an even more negative impact on the increase in the gross costs of the activities of healthcare institutions due to the direction of profits to a greater extent to servicing debt obligations of previous reporting periods than ensuring further business development.

After all, the peculiarity of the implementation of innovation and investment projects of healthcare institutions is that, along with production and economic processes, intellectual and human resources, the rational management of which is a

Table 3. **The Average Indicators of Production and Economic Component of Efficiency of Implementation of Innovation and Investment Projects of Healthcare Institutions, 2015—2021**

Indicator	Year							Absolute deviation, ± / Growth rate, %	
	2015	2016	2017	2018	2019	2020	2021	2021—2015	2021—2020
Share of the cost in medical services sold, %	78.2	79.9	81.1	81.0	79.3	77.7	78.3	0.1	0.6
Profitability of medical institution activity, %	11.3	10.7	10.6	9.3	15.1	17.9	18.4	7.1	0.5
Labor productivity, thousand UAH / persons	419.5	497.3	546.4	574.7	720.7	790.1	880.4	109.9	11.4
Capital productivity, UAH	1.5	1.6	1.9	2.0	2.4	2.0	1.9	34.0	–2.5
Income for 1 UAH of own capital, UAH	2.6	2.9	3.3	3.3	4.0	3.6	4.2	59.7	17.2
Income for 1 given service, UAH	1027	1147	1316	1202	1445	1353	1427	39.0	5.5
Growth rate of assets, %	101.7	115.6	111.1	105.0	105.0	149.5	119.2	17.5	–30.3
Growth rate of the number of services provided, %	105.7	116.9	111.1	115.8	106.5	130.6	120.6	14.9	–10.0

Source: own research results.

basis of supporting the processes of systemic development of medical enterprises, play an equally important role in creating added value. The results of the analysis of the indicators that characterize the state of intellectual and personnel support for the efficiency of the implementation of innovation and investment projects of healthcare institutions allowed for determining the following results. So, on the positive side, for the period 2015—2021, the efficiency of using the intellectual and personnel potential of medical workers increased by more than 50% on average in the studied enterprises, which is understood as the number of consumers of medical services per employee of a medical and diagnostic institution. It is worth noting that the significant increase in costs for the training and retraining of medical personnel in 2020—2021 can be partially explained by the impact of the COVID-19 pandemic, which to some extent transformed the traditional activities of healthcare institutions, diversifying the nomenclature and range of services in accordance with the needs of consumers in the conditions of the spread of the corona virus infection.

On the other hand, the assessment of the qualification characteristics of the medical staff in terms of individual professional groups of employees revealed a negative average tendency of the deterioration of the level of certification of the junior medical staff by 8.1% during 2015—2021, which in general has a rather destructive effect on a qualitative component of the intellectual and personnel provision of the efficiency of the implementation of innovation and investment projects of the analyzed healthcare institutions and indicates the presence of not fully substantiated approaches to personnel management depending on their professional characteristics.

At the end, the competitiveness of a healthcare enterprise at the current stage of the intensive implementation of digital technologies and the digitization of the economy and society largely depends on the effectiveness of the management of investment and marketing processes, which collectively ensure a high level of recognition and branding of healthcare institutions, increase consumer confidence in enterprises in the field of medical services and contribute to the technological intensity of business processes (Table 4).

The results of the diagnostics of the values of indicators that reveal the aspects of the investment and marketing efficiency of the implementation of innovation and investment projects of healthcare institutions showed (Table 5) that, in

Table 4. **The Average Indicators of Intellectual and Personnel Component of Efficiency of Implementation of Innovation-Investment Projects of Healthcare Institutions, 2015—2021**

Indicator	Year							Absolute deviation, ± / Growth rate, %	
	2015	2016	2017	2018	2019	2020	2021	2021—2015	2021—2020
Staff turnover, %	31.7	29.3	23.7	26.7	24.2	25.9	13.7	–17.9	–12.2
Number of patients per employee	412	442	442	504	551	595	624	51.7	5.0
Expenses for training and development of personnel, thousand UAH per employee	12.7	15.6	16.8	16.3	24.3	35.2	40.5	218.1	14.8
Level of certification of doctors, %	66.8	68.7	70.9	73.1	75.8	77.4	78.8	12.1	1.5
Level of certification of junior medical personnel, %	63.8	61.9	59.3	58.5	57.9	56.5	55.7	–8.1	–0.8
Growth rate of number of employees, %	102.9	109.1	111.9	101.6	99.4	115.2	114.3	11.4	–0.9
Growth rate of average monthly wage, %	113.4	129.7	122.7	108.4	124.2	129.9	127.6	14.2	–2.4

Source: own research results.

general, the management staff in the process of economic activity paid more attention to measures related to the promotion of medical services, while the investment and innovation component of the efficiency of the implementation of innovation and investment projects developed comparatively less dynamically in the qualitative plane.

In particular, from 2015 to 2021, the annual growth of marketing costs of medical institutions ranged from 2.7% in 2020 to 30.1% in 2021, and their share in the cost of medical services from 2015 to 2021 increased by 0.2pp.The annual growth rate of investments in quantitative terms also showed a moderate upward trend while varying within 5.6%—13.6% from 2015 to 2019 and in 2021 and a sharp increase in their value in 2020 as compared with 2019 by almost 50%, which is probably related to the spread of the COVID-19 pandemic, which positively affected the investment attractiveness of healthcare enterprises and created prerequisites for rapid innovative and technological modernization of business processes.

Thus, the analysis made it possible to reveal the key trends of changes in the values of individual determinants of the efficiency of the implementation of innovation and investment projects of the studied healthcare institutions.

As for the integral index, the results of its calculations under innovation and investment projects of healthcare institutions from 2015 to 2021 (Fig. 1) clearly demonstrate that, in general, the efficiency of the implementation of innovation and investment projects of enterprises in the field of healthcare was characterized by a sinusoidal principle. From 2015 to 2021, the periods of slow recession (from 2016 to 2018 and in 2021) and relatively rapid growth (in 2020) can be distinguished.

In general, the weighted average value of the efficiency index of the implementation of innovation and investment projects of healthcare institutions ranged from 0.452 in 2018 to 0.543 in 2020 and as of 2021, it was recorded at 0.537. In general, the efficiency of the implementation of innovation and investment projects of healthcare institutions according to the Harrington criterion remains satisfactory, which indicates the insufficiently high quality of resource management of medical institutions and the presence of significant reserves for improving the values of indicators that determine the effectiveness of innovation management, in particular in the direction of ensuring systemic development.

In addition, in the process of calculating group indexes of the efficiency of the implementation of innovation and investment projects of healthcare institutions, the role of each group of indicators in ensuring the activity of medical institutions was determined. Therefore, according to the results of the calculations, the highest weights fell

Table 5. **The Average Indicators of the Investment and Marketing Component of Efficiency of Implementation of Innovation and Investment Projects of Healthcare Institutions, 2015—2021**

Indicator	Year							Absolute deviation, ± / Growth rate, %	
	2015	2016	2017	2018	2019	2020	2021	2021—2015	2021—2020
Share of marketing expenses in the cost of medical services, %	7.6	7.5	7.7	8.9	9.7	7.7	7.9	0.2	0.1
Growth rate of marketing expenses, %	119.2	129.3	126.0	128.3	129.9	102.7	130.1	4.3	27.4
Capital investments at the rate of UAH 1 of the sold products	0.3	0.3	0.3	0.3	0.2	0.2	0.2	–31.8	–9.8
Growth rate of investment, %	107.0	107.8	113.6	113.2	105.6	148.5	113.5	6.5	–35.0

Source: own research results.

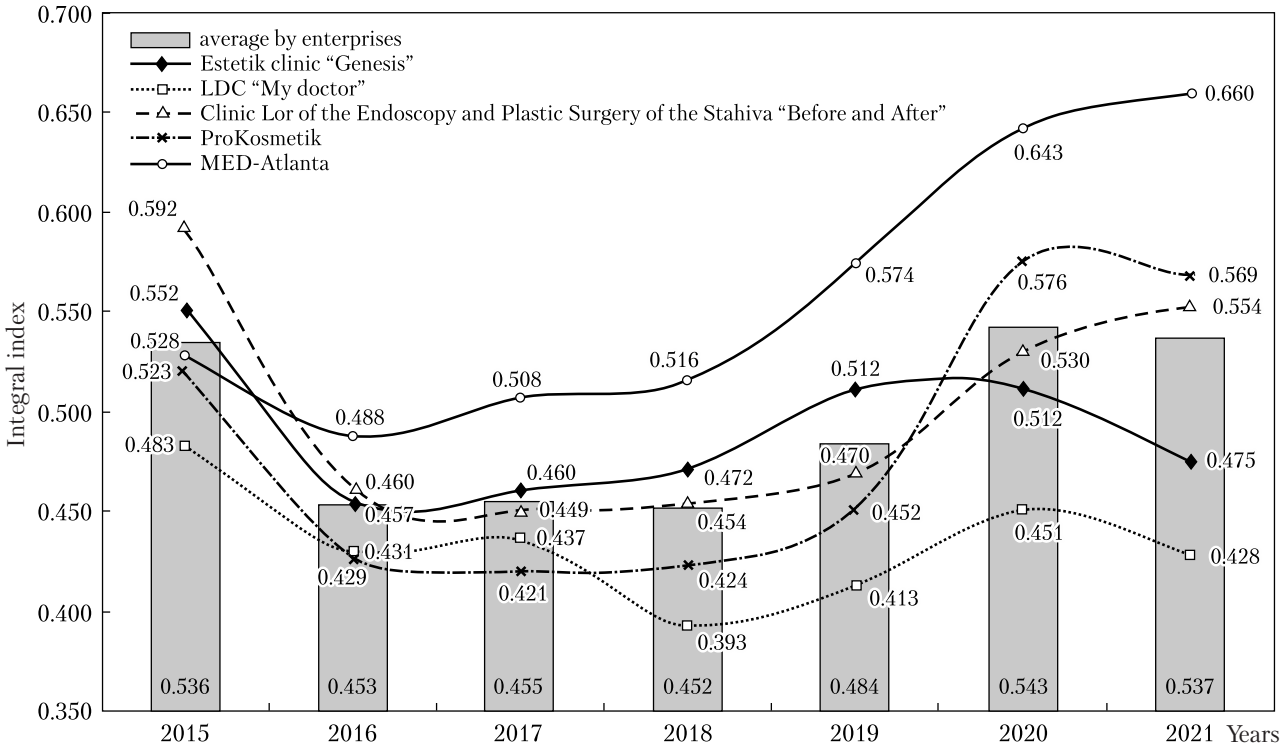

Fig. 1. Integral indexes of efficiency of implementation of innovation and investment projects of healthcare institutions, 2015—2021

Source: own research results.

on the material and technical, investment and marketing, and production and economic components of system development: 22.6%, 21.3%, and 19.7%, respectively, which collectively form the potential for the efficiency of the implementation of innovation and investment projects of medical enterprises and obviously need special management control, while the lowest is for financial and economic stability (17.6%).

The results of the diagnostics of the values of the weighted average group indexes of the efficiency of the implementation of innovation and investment projects (Fig. 2) showed that from 2015 to 2021, in the structural section, the values of the indicators of intellectual-personnel and material-technical support improved most dynamically, as the corresponding group indexes of the efficiency of the implementation of innovation and investment projects of medical institutions showed a steady upward trend of increasing values from 0.564 to 0.734 and from 0.513 to 0.672.

On the other hand, the most vulnerable component of the efficiency of the implementation of innovation and investment projects remained the financial and economic stability of medical enterprises, which, despite the increase in the values of the production and economic index, from 2015 to 2021 mostly deteriorated and as of 2021 it was only 0. 51. This allows confirming the thesis that the actions of management personnel in the analyzed healthcare institutions were mostly concentrated around the issues of production and economic nature, and development took place at the expense of increasing obligations without due consideration of their impact on financial and economic sustainability in the long term. In addition, the insufficiently high level of efficiency of the implementation of innovation and invest-

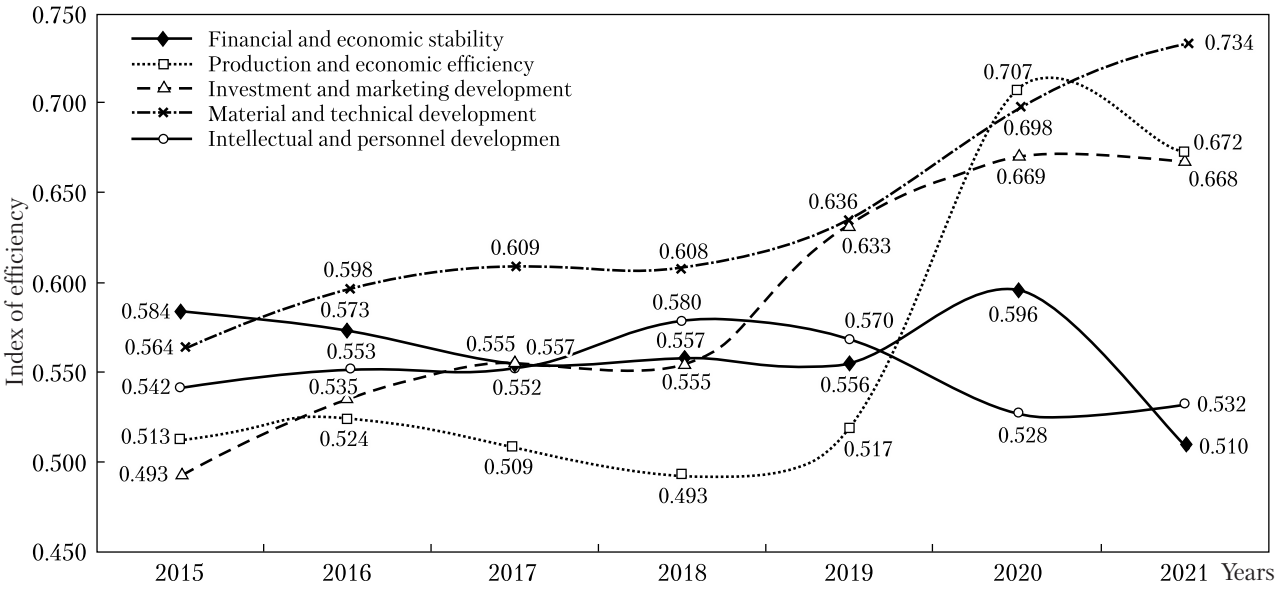

Fig. 2. Average weighted group indexes of efficiency of implementation of innovation and investment projects of healthcare institutions, 2015—2021

Source: own research results.

ment projects is also manifested in the trend of low values of the group index of the investment and marketing development of healthcare institutions, which from 2015 to 2021 remained practically at a constant level, within 0.542—0.532. The low investment and marketing activity of medical enterprises indicates the need to take this factor into account when forming strategic priorities of the policy of further management of the efficiency of the implementation of innovation and investment projects of healthcare institutions.

Based on the results of the analysis, the formation of policy priorities for increasing the efficiency of the implementation of innovation and investment projects of healthcare institutions should be carried out according to directions — the components of efficiency in this area. At the same time, the achievement of proper systematicity in this area requires the determination of a systematic set of measures under leading tools, which are defined as organizational and institutional, economic, product and service, and social and psychological (Fig. 3).

Because of this, such a tool for the efficient innovation- and technology-driven development of healthcare institutions as the initiation of the creation of (active participation in) regional innovation clusters, which can become a promising means of increasing the efficiency of innovation and its investment support for enterprises of the analyzed industry, is characterized by significant prospects. This will make it possible to turn them into more investment and attractive business units, achieve higher financial and economic results, strengthen cooperative forms of collaboration, ensure vertical and horizontal integration, diversify the forms and formats of providing a wide range of high-quality medical and related services, and implement and commercialize all types of innovations. The procedure for the formation of innovation clusters involves going through such stages as initiation, motivation, the attraction of investments, integration, IT development, and innovation.

The existing trends to increase the number of healthcare institutions (especially not state-owned) in Ukraine are mostly positive and indicate

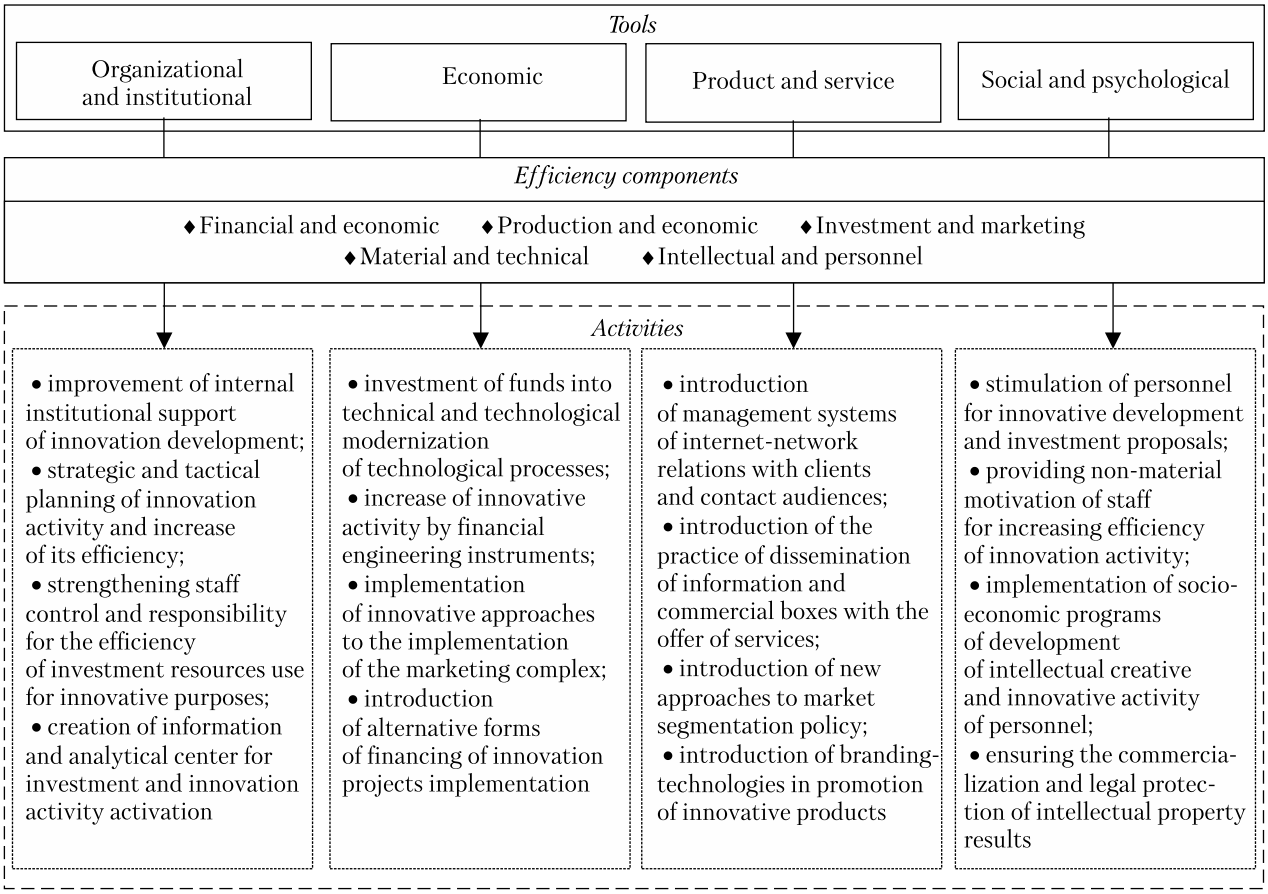

Fig. 3. Tools, components of efficiency and means of intensification of innovation- and investment-driven development of healthcare institutions

Source: own research results.

the formation of a competitive environment and competition as such, expanding the spectrum of medical and diagnostic, preventive, and other medical services. However, the further systematic development of this industry and the growth of its contribution to the progress of the national economy and the improvement of the quality of life of the population are objectively connected with the implementation of innovation projects and the formation of their investment support, because the innovation- and technology-driven type of development has no alternative if it is oriented towards the comprehensive strengthening of competitive positions, increasing the efficiency of business processes, and increasing the level of service quality, etc.

In turn, decision-making in the field of management of the processes of the implementation of innovation and investment projects is based on a full-fledged information and analytical basis, among the criteria of which are systematicity and complexity. To improve the methodological support for the analysis of the efficiency of the implementation of innovation and investment projects of healthcare entities, an author's approach is developed, which involves the calculation of the integral index of the efficiency of the implementation of innovation and investment projects of healthcare institutions by going through such research stages as the selection of indicators (which characterize the results of the implementation of

innovation and investment projects according to 30 indicators within 5 groups of criteria: their financial and economic stability, material and technical support; the efficiency of production and economic processes; intellectual and personnel support, and investment and marketing activities) and their standardization, the calculation of indicators' weights within each of the groups, the calculation of partial indexes of components, the determination of the weights of a group of indicators, the calculation of the integral index of the efficiency of the implementation of innovation and investment projects of healthcare institutions by the method of a weighted arithmetic mean.

The approbation of the author's methodology has made it possible to identify such weak aspects of the efficiency of the implementation of innovation and investment projects of healthcare institutions as their financial and economic stability and investment and marketing development. This has proven the importance of forming a toolkit, the implementation of which ensures and coordinates the processes of facilitating innovation-driven development, raising the economic efficiency, strengthening financial stability and liquidity, as well as speeding up the return on investments and improving the system of marketing communications of enterprises with consumers. The leading directions under which it is necessary to form means of the policy for increasing the efficiency of the implementation of innovation and investment projects of the healthcare services providers are the organizational and institutional, the economic, the product and service, and the social and psychological components.

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ЕФЕКТИВНІСТЬ РЕАЛІЗАЦІЇ ІННОВАЦІЙНО-ІНВЕСТИЦІЙНИХ ПРОЄКТІВ ЗАКЛАДІВ ОХОРОНИ ЗДОРОВ'Я: ІНТЕГРАЛЬНИЙ АНАЛІЗ ТА НАПРЯМИ ПІДВИЩЕННЯ

Вступ. Зростання якості медичних послуг та підвищення ефективності функціонування суб'єктів системи медицини України передбачає активізацію інноваційної діяльності, яка потребує значних вкладень. Це актуалізує важливість застосування якісної методики аналізування ефективності таких проєктів.

Проблематика. Науково-методичні положення та практичні рекомендації стосуються з'ясування проблемних сфер та аспектів реалізації інноваційно-інвестиційних проєктів закладів охорони здоров'я України.

Мета. Здійснення комплексного аналізу й ідентифікація проблемних аспектів реалізації закладами охорони здоров'я інноваційно-інвестиційних проєктів, визначення заходів з їх усунення та ефективізації інноваційної діяльності.

Матеріали й методи. Використано метод економіко-математичного моделювання задля здійснення композиційного аналізу (методом середньої зваженої) ефективності реалізації інноваційно-інвестиційних проєктів на прикладі закладів охорони здоров'я.

Результати. Встановлено, що ефективність реалізації інноваційно-інвестиційних проєктів закладів охорони здоров'я України задовільна, однак проблемними залишалися такі її складові, як фінансово-економічна стійкість проєкту та якість інтелектуально-кадрового забезпечення, особливо структура інвестицій та їхня прибутковість, плинність кадрів та рівень професійної кваліфікації медичного персоналу. За складовими ефективності найбільш проблемними є фінансово-економічна стійкість та інвестиційно-маркетинговий розвиток.

Висновки. Однією з ключових ознак ефективності інвестиційно-інноваційних проєктів у медицині є їхня системність, яка передбачає поєднання заходів з активізації та розвитку інвестиційно-інноваційної діяльності за такими напрямами, як організаційно-інституційний (1), економічний (2), продуктово-сервісний (3), соціально-психологічний (4).

Ключові слова: інноваційно-інвестиційна активність, проєктування інноваційних проєктів, заклади медичних послуг, ефективність, інтегральна оцінка, ресурсно-функціональні компоненти.