

SCIENTIFIC FOUNDATIONS FOR THE FORMATION OF A SYSTEM OF FINANCING INNOVATIVE ECONOMIC DEVELOPMENT

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Abstract. A study has been conducted, the actualisation of which is aimed at solving problems arising in the process of financial support for the implementation of the innovative model of economic development of Ukraine and the participation of banks and other participants in the innovation process. The *purpose* of the article is to develop a methodological basis for the formation of a system of financing innovative economic development. *Methodology.* The information base of the study is the official statistical sources and the results of scientific works of leading foreign and domestic scientists. The following methods were used: system methodological approach, synergetic, analytical and synthetic approach; comparison and systematisation; observation; graphic method; logical generalisation. *Results.* The study highlights the general methodological provisions (purpose, objectives, functions, principles and object), which became the basis for the formation of the system of investor financing of innovative economic development. *Value/originality.* For the first time, the components of the system of financing the innovative development of the economy are specified, i.e., the levels, subjects, objects, purposes and instruments of influence. Macro-, meso- and micro-economic levels are identified, which are considered as a whole and are interrelated. Each of the economic entities contributes to the financing of innovative economic development within the framework of its objectives and instruments of influence. *Practical implications.* The application of the proposed system of financing the innovative development of the economy will ensure a synergetic effect, the implementation of the strategic goals of innovative development, the realisation of the economic interests of the state and the participants in the innovation process.

Key words: economy, innovative development, financing system, levels of economic management, financial resources, state, region, international organizations, bank, innovation-active business entities.

JEL Classification: G21, G23, O30

1. Introduction

The history of the world economy and the peculiarities of reproductive processes show that ensuring innovative development is an objective necessity for the survival of countries in global competition. Transformation of the system of economic relations in the direction of intensification of innovation processes in the context of globalisation and internal crises in Ukraine requires increasing the role of all sources of financial support of investment, including bank loans.

There are a number of problems in Ukraine that do not contribute to the effective solution of problems of innovative economic development, the most important of which are: imperfection of national legislation on innovative credit and mechanisms of tax incentives for innovation; unregulated system of

intellectual property protection of Ukrainian researchers and entrepreneurs; lack of financial incentives for the formation of venture capital investments; creation of conditions and adequate financing for the development of small and medium innovative enterprises, etc. Therefore, it is important to address the problems of creation and use of resources for financial support of innovation, along with other forms of stimulating the restoration of economic growth and maintaining economic stability in the country.

The above mentioned makes it necessary to create a system of financing the innovative development of the economy, the objectives of which are continuous monitoring of the cash needs of innovation-active economic entities; formation of the necessary amounts of financial resources; assessment of the effectiveness

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of investors in financing innovative projects; use of modern efficient methods of innovation risk management; identification of the facts of divergence of interests of the subjects of credit relations and implementation of timely measures to prevent shortage of financing sources in the economy.

2. Literature Analysis and Problem Statement

In a monographic study, Dyba et al. (2013) state that "the most important task of financial support for innovative projects is the development of the system itself and the mechanism of its implementation...". It is emphasised that it is necessary to "create a holistic hierarchical system of financial support, which will cover all stages, from the process of finding sources of its creation to the monitoring of its further movement". The authors emphasise both the lack of a unified, comprehensive approach to the definition of "financial support for innovative projects" and the impossibility of considering it as a sum of resources without taking into account the specifics of the relationship between them. This requires a thorough study of the concept of "financial support system for innovative projects" and the definition of its structural elements.

According to the work of Osmirko (2012), "in practice, the process of financial support for innovative development is implemented through the basic elements of the financial support system". Financial instruments, financial methods, forms of financing and financial levers of influence are defined as constituent elements of the system. It is emphasized that in the structure of methods of financial support special importance is attached to financial regulation, namely taxation. The author also emphasizes the lack of existing innovation infrastructure in Ukraine, which causes the problem of synthesis of production, financial and trade capital in education, science and industry.

In the scientific work of Kutsenko (2013) the foreign experience of creating a system of financing innovations is studied. Examples of state influence on innovation processes in the USA, Japan, France, Germany, Canada and England are considered, which are based on the creation of an effective system of stimulation of innovation development. It is found that the most common means of stimulating innovation processes are tax rebates and benefits, targeted free subsidies, grants, technical assistance, deduction of R&D costs from production costs, low-interest loans, loan guarantees, targeted bank loans. It is emphasized that the improvement of the existing system of innovation financing in Ukraine will be facilitated, first of all, by creating conditions for the development of innovation infrastructure at the intersectoral and regional levels and ensuring active participation of industrial enterprises, scientific organizations and other structures of the

region interested in state targeted programs in the field of innovation.

According to Zhuravel and others (2017), "innovative development begins when progressive changes are made in society, the most important of which are changing the structure of the economy, creating an effective institutional structure and building an optimal institutional environment". The authors note that only the creation of significant financial potential will contribute to the implementation of the investment and innovation breakthrough in Ukraine. This requires, first of all, "the creation of a mechanism for consolidating the financial resources of various owners and sectors in order to carry out innovative modernisation of the national economy". Successful implementation of the main methods of ensuring innovative development of the economy (self-financing, shareholder, budget, debt, venture financing, leasing, external borrowing and foreign investment) will be facilitated by:

- creation of a trust fund of financial resources;
- appointment of the State Development Bank as the main agent for consolidation of financial resources;
- creation of conditions at the legislative level to regulate relations in the field of public-private partnership, use of funds of joint investment institutions, part of the resources of the banking system and non-bank financial institutions to finance modernization projects;
- introduction of effective instruments of fiscal stimulation of innovative activity of business entities.

In their study, Zvieriakov and Zavadzka (2018), in determining the economic role of the state in the innovative development of the country, proved its key importance and the need to implement it through "an effective combination of public funding (project financing) and public incentives (tax incentives, soft loans, bank loan guarantees, etc.) with the help of financial institutions". Scientists also emphasise that "the essence of the problem in Ukraine is not so much the amount of budget funding, but the existing system of managing this process, the mechanism of implementing the main goals of state innovation policy". This requires the creation of an appropriate financial mechanism, financing instruments and measures of state stimulation of bank lending for innovative development.

In the dissertation of Pylypiuk (2019), based on the results of theoretical and applied principles and factors influencing the process of economic development, the directions of improving the financial support of innovative economic development are identified. Emphasis is placed on the need to create a non-profit organisation, such as the Centre for Financial Support of Scientific, Technical and Organisational and Economic Innovations. The peculiarity of the Centre's activity is the information support for the development

of innovative projects in the country and abroad, the support of innovation by grants, the raising of funds for technical assistance. As for the direction "Financial and credit incentives for innovation in the regional aspect", the author believes that the financing of innovation at the regional level cannot but depend on public funding. At the same time, the study draws attention to the credit programmes of the state banks PJSC Oschadbank and JSB Ukrgasbank. The expected result of the programmes is determined, on the one hand, by the improvement of financial and credit support of investment and innovation activities of legal entities and individuals in the region and, on the other hand, by the synergetic effect on the development of the banking sector.

A review of recent literature in the field of public financial support for open innovation conducted by Jugenda et al. (2020) is of interest. According to the results of a systematic review and qualitative analysis of 121 scientific publications by scientists from Brazil and Canada, it was found that government incentives for innovation development can be implemented in four areas: financial support for research; development through innovation (institutional change); support for industry programmes; and university-industry-government cooperation (triple helix).

At the same time, the study by Winden and Carvalho (2019) examines the results of the implementation of the "Startup-in-Residence" programme in Amsterdam. It turns out that the successful formation of innovative areas of interaction between government officials at various levels and startup companies is facilitated by the initiation of intermediary activities (functioning of intermediaries, initiators, moderators). The value of the programme is to create and strengthen the development of an innovation culture in the country and to promote institutional changes to support innovation.

The scientific paper by Fay and others (2021) addresses the issue of attracting decentralised (non-state, private) resources as a source of funding to bridge the infrastructure gap in developing countries. The conditions for combining government (public) and private sources of finance are examined. It is emphasised that private finance, in particular private investors' funds, represents a small share of the total sources of infrastructure finance in the poorest countries. It is also noted that institutional changes help to increase the attractiveness of public sources of finance by reducing their costs.

It is worth mentioning the empirical study of researchers from South Korea Doh and Kim (2014), which discusses the characteristics of government policies to support SME innovation in strategic industries of regions. It is shown that the development of the network economy (university – industry – government cooperation) and public financial support

have a positive impact on the acquisition of patents in the field of technological development and the registration of new applications for patents and inventions by SMEs in the region.

According to Moro et al. (2020), government initiatives (tax incentives and public financial support) encourage entrepreneurship. It is emphasised that government initiatives are particularly important for young, small and more innovative, fast-growing firms operating in conditions of fierce competition and increasing demand for bank loans.

Yano and Shiraishi's (2020) study of the impact of institutional factors on the efficiency of Chinese firms' sources of financing shows that the quality of institutional conditions, protection of property rights from state expropriation, and the reliability of contracts contribute to the reinvestment of profits and the increased role of banks in financing innovation.

At the same time, the scientific work by Guney and others (2017), based on empirical studies of the relationship between bank loans and innovation for a sample of European firms, notes that investment in R&D, as one of the areas of investment in innovation, can be associated with access to bank loans (revolving credit lines). It is emphasised that the advantages of using bank loans for research firms, compared to government loans, are the creation of strong incentives for banks to make appropriate business decisions. Banks' access to firms' private information and effective monitoring during the lending process reduce the degree of information asymmetry between insiders and outside investors. The researchers note that the use of bank credit lines plays an important role in financing firms' R&D investments during exogenous shocks. In times of financial crisis, credit lines can be seen as a source of liquidity support for the firm and as a put option, the use of which requires banks to set low interest rates.

It should also be noted that the involvement of banks in the financing of innovation is associated with significant risks. As research activities belong to the early stage of financing and the payback period of risky investments is 10-20 years, the level of financial risk is defined as "very high". In addition, the lending relationship between banks and companies does not involve the banks making a profit from the research activities of the borrowing companies. This requires the creation of institutional conditions to encourage banking institutions to invest in R&D.

Mostafavi et al. (2014) investigated the effects of the implementation of two main strategies for financing public roads in China – the General Fiscal Investment Strategy (GFIS) and the Innovation Finance Strategy (IFS). It is determined that the use of IFS has greater advantages in providing financial resources characterized by sufficient volume, stability and efficiency of distribution than GFIS.

The generalisation of the works of the leading domestic and foreign scientists published on this issue allowed to conclude that the approaches to the formation of the system of financing the innovative development of the economy are insufficiently developed in theoretical and methodological aspects.

3. Purpose and Objectives of the Study

The purpose of this paper is to develop methodological foundations for the formation of a system for financing innovative economic development.

In order to achieve this goal, it is necessary to solve the following tasks:

- to determine the foundations of the theoretical basis for the development of methods of financing the innovative development of the economy;
- to substantiate the components of the system of financing the innovative development of the economy.

4. Research Methodology

The information base of the study is official statistical sources and the results of scientific works of leading foreign and domestic scientists on the problems of financing innovative economic development. The following methods were used: systematic methodological approach, synergistic, method of analysis and synthesis; comparison and systematization; observation; graphic; logical generalization.

5. Results

5.1. Determination of the Theoretical Basis for the Development of Methods of Financing Innovative Economic Development

In order to successfully create a system of financing the innovative development of the economy, the author proposes to use the instruments of the system approach. The basis of the system approach is a set of measures aimed at studying the processes of formation and use of financial resources, the creation of appropriate management subsystems to solve the problems of innovative development of the Ukrainian economy.

The effectiveness of the system approach in the formation of the system of financing innovative development of the economy requires the definition of the essence of the economic category "system" as the foundations of the theoretical basis for the development of methods of financing innovative development of the economy. Therefore, it is necessary to consider the theoretical foundations of the general theory of systems, functioning and organisation of economic systems for the possibility of further development of the system approach to the formation of the system of financing innovative economic development.

Analysis of the works of leading foreign and domestic scientists to determine the nature of the category

"system" and the peculiarities of the system approach allowed the author to identify general methodological provisions that will be used in the future in the formation of a system of financing innovative economic development (Kononiuk, 2014; Von and others, 1951).

First, the system is a fixed set of heterogeneous, somehow structured elements (a set of subjects, objects and processes), which form a holistic union, inherent only to this system, creating the basis for achieving the goal.

Second, the system has such fundamental characteristics as heterogeneity; structure (organisation, interaction, communication); integrity; qualitative certainty (system quality); functionality; availability: objectives, functions, levels (interconnected parts (subsystems)) and hierarchy, two or more types of communication (spatial, functional, etc.), external system (environment), criteria for studying a certain set of elements. The absence of any of these characteristics does not allow the object to be considered as a system.

Third, since the system requires purposeful activities in the organisation of relations between components, it requires, in accordance with the basic provisions of the theory of regulation, the definition of "input", "output", "information processing", "law of behaviour", "management".

Fourth, the performance of system functions (purpose, objective conditionality of the environment) requires goal setting (system-forming factor, satisfaction of internal needs) as a result of determining the need (setting tasks), objects (cause of the problem situation) and a subject (a certain direction of research of the object).

Fifth, the success of the objective set depends on the integrated application of specific principles of system organisation (priority, involvement, systematics, functional labialisation, dynamism, hierarchy, unification, relative openness, probabilistic estimations, synergies, taking into account their relationship and interdependence).

Sixth, the systems approach is defined as a methodological representation of the principle of systematisation, qualitative research and modelling of various objects and processes (elements) as systems.

The importance of using a systems approach to achieve the purpose of the study is to use such methods as systems analysis (the process of determining the properties inherent in the new system), systems synthesis (the process of generating functions and structures necessary and sufficient to achieve certain results), cybernetics management and information exchange), synergetics (determining the laws of appearance, construction, organisation of the organisation (structure)) and efficiency (the level of compliance of the system with its purpose).

The creation of a system of financing innovative development of the economy requires the definition

of the main purpose and related goals. In order for the system of financing innovative development of the economy to fulfil its purpose (perform its functions), it is also necessary to determine the conditions for its fulfilment (at the macro-, meso- and micro-economic levels) that will ensure the implementation of its features (Figure 1).

It should be noted that the main goal of the system of financing the innovative development of the economy and its subsystems have a common direction, i.e., they do not contradict each other, but cannot be fully subordinated due to the different interests and needs of the subsystems. Depending on the level of the goal, the composition, functions, relations between the participants of the system of financing the innovative development of the economy and the instruments of financial support for the country's innovative development are determined.

The main purpose of the system of financing innovative economic development is to take into account the interests and meet the needs of innovation-active business entities for financial resources; to identify instruments of financial support for the country's innovative development (budget investments, guarantees, subsidies, loans; loans from international financial organizations, development banks, banks; public-private partnerships with institutional investors and development institutions, preferential taxation, regional investment programs, and so forth), forms (project financing, syndicated lending, government credit, bank lending, leasing, factoring, forfaiting), and methods (one-time, credit line) of lending with a given level of risk.

It should be noted that the systematic provision of resources for innovative economic development is possible only if the direction of their movement in the process of meeting the needs of innovation-active economic entities in credit, the order of formation and use is determined.

The main tasks of the system of financing the innovative development of the economy are: ensuring the balance between the demand for attracted sources of financing (investment and circulation) and the supply of financial resources; formation of resources from various sources for lending to innovation-active economic entities (formation of financial potential); allocation and investment of resources at different levels of financing innovation (meeting the demand for financial resources); ensuring transparency of investors' activities in solving problems of innovative development (reducing the risk of losses and maximising the return on investment on an innovative basis); accelerating the integration of innovation and credit activities of innovation entities (promoting animation and synergy effects).

The definition of its functions contributes to the implementation of the tasks of the system of financing the innovative development of the economy. The functions of the system, as a management system, reflect its purpose and the objective need to function.

The functions of the management system of financing the innovative development of the economy, which are a priority for all its subsystems, include the following (Fayol, 2013):

- forecasting – scientific foresight, systematic study of the state, structure, dynamics and prospects of

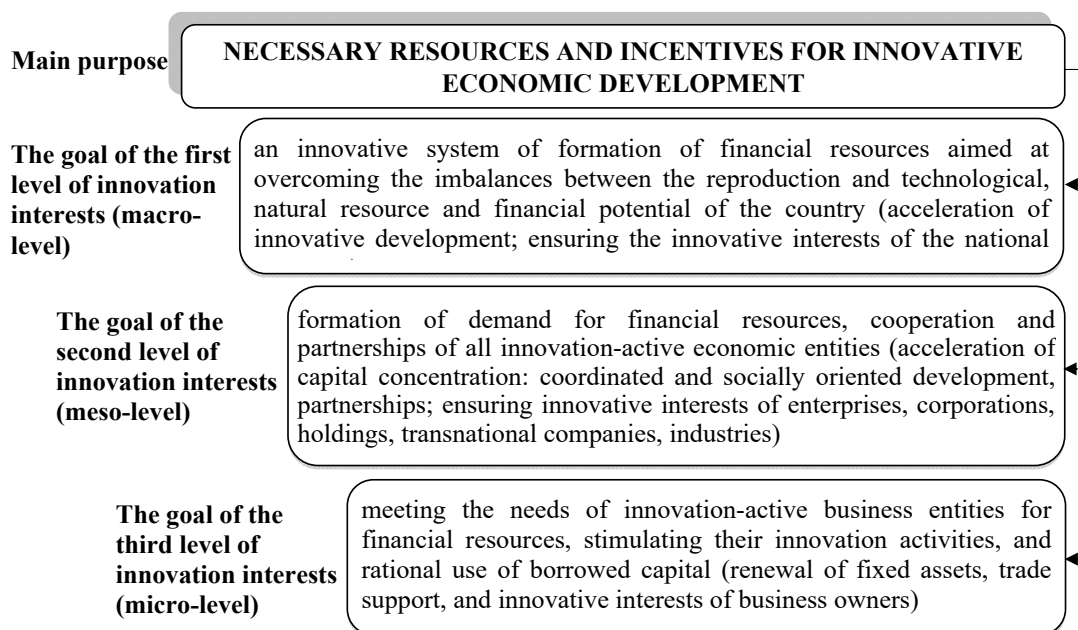


Figure 1. Objectives of the investment financing system for innovative economic development

Source: author's own development

development of managerial phenomena inherent in the object of financing innovative economic development (analysis, assessment and forecasting of the needs of innovation entities for financial resources at the macro-, meso- and micro-economic levels);

– planning – consists in the implementation of a set of specific tasks – actions, measures (transformation of investment resources that vary in time and conditions into long-term loans; maintaining the supply and demand of financial resources in the current and long-term perspective), etc. that ensure the achievement or approximation of the goals set in the current or forecast conditions at all levels of the hierarchy of the system of financing innovative economic development;

– organisation – creation of organisational mechanism of financial support of innovative development of economy – formation of managing and managed subsystems, connections and relations between them at macro-, meso- and micro-economic levels (formation of obligatory relations between the state, banks and other subjects of influence (the Bank for Development, banks, international financial organisations, institutional investors and development institutions); between banks and individuals; between the bank (lender) and innovation-active economic entity (borrower));

– regulation – direct management of the behavior of managed objects (regulation of the effective structure of borrowed capital, formation, mobilization and accumulation of financial resources funds in the financial and credit system; risk management of innovative projects); ability of the system of financing innovative economic development to maintain a balance of deviations;

– coordination – coordination and unification of actions of managers and other management structures at the macro-, meso- and micro-economic level;

– accounting – collection, transmission, storage and processing, registration and grouping of information on the functioning and efficiency of the system of financing innovative economic development (movement of information from the managed system to the controlling system and vice versa);

– control – constant provision of information on the current state of affairs regarding the implementation of the tasks of financing innovative economic development (monitoring and evaluation of the efficiency of the use of financial resources at the macro-economic level for further strategic planning and management of financial resources at the meso-economic level and formation of a portfolio of innovative loans at the micro-economic level).

According to the results of critical analysis of literature sources on the construction of a system of financing innovative development, the basic principles of its organisation are as follows:

– strategic goal-setting – coordination of the prospects for the development of the financing system with the prospects for innovative economic development;

– continuity – the repeated use of management tools to systematically provide financial resources for innovative economic development;

– cyclical goal setting – implementation and evaluation of the effectiveness of management decisions on the formation and use of financial resources in a certain period of time;

– commonality – the unity of methods of managerial influence aimed at financial support of the innovation system;

– hierarchy – the subordination of the levels of management of the system of financing the innovative development of the economy; the results of the management influence of higher levels of management are input for lower levels;

– unity – unity of management of all processes and subsystems; unity of policy of formation and distribution of financial resources (providing the system with "long financial resources" to solve the problems of innovative economic development);

– coherence – achieving coherence of interests of participants in the system of financing innovative economic development at all levels (coherence of different types and levels of management decisions on lending to the needs of innovation-active business entities in space and time, the relationship between goals and means of achieving them);

– systemicity – the relationship between the elements of the system of financing innovative economic development (subjects, objects, goals, tools, etc.), methods of interaction aimed at harmonizing the interests of participants to achieve the main goal of – financial support and stimulation of innovative economic development;

– process – a set of stages of innovation activity determined by meeting the credit needs of innovation-active business entities and characterizing the system as a process of formation, redistribution and use of financial resources at the macro-, meso- and micro-economic levels;

– management – management of numerous and interrelated processes of accumulation and use of financial resources, where the "input" of one process is the "output" of the previous one.

It should be noted that the implementation of the "management" principle ensures the effectiveness of the "process" principle.

The object of management (the general object of the system), in accordance with the above, is the sphere of interests of the system participants in the formation, accumulation, concentration and distribution of resources for financial support of innovative economic development.

5.2 Substantiation of the Components of the System of Financing Innovative Economic Development

The author identifies three levels of management (macro, meso and micro) in the system of financing innovative development of the economy, which are considered as a whole and are interrelated. In accordance with the principles of the systemic approach and the need to study the system as a structure, it should be noted that each level (subsystem) has its own characteristics, which makes it possible to identify the relevant goals, subjects, objects of influence, instruments of influence and measures for their implementation.

The need to separate the macro-economic level is due, firstly, to the unified creation of objects of the innovation environment in Ukraine. This causes breaks in innovation cycles, research and production chains, the sequence of implementation of which is provided by investments of a certain stage (scientific idea, applied project, innovative production) and significantly affects the competitiveness of innovative products.

Secondly, in Ukraine the financing of research and development is entrusted to the state, as there is a significant level of innovation risk, but public funding is insufficient. Thus, in the period 2010-2021, there is a steady trend to reduce the share of state budget expenditure on scientific and technical work and funding of innovation priorities in GDP. In 2020, the rate of knowledge-intensive GDP in Ukraine will be 0.41% (at the expense of public funds – 0.18%). The share of real funding of innovation priorities in relation to GDP (based on the results of scientific and technical activities of research institutions and higher education establishments) in 2021 will be 0.0066%, which is 1.7 times lower than in 2012 (0.011%) (State Statistics Service of Ukraine, 2023). In this regard, the question of the need to develop public-private partnership as an investment component of the national economy becomes relevant.

As a form of project financing, public-private partnership provides for cooperation between the state and the private sector aimed at achieving innovation development goals at macro-, meso- and micro-economic levels by attracting resources from the banking sector, institutional investors and development institutions to finance innovation programmes and projects.

At the macro-economic level (management system) – the institutional system of financing the innovative development of the economy is the regulation of the formation and use of financial resources, the formation of regulatory and legal support for the financing of innovation (Figure 2).

According to Figure 2, at the macro-economic level, the state plays a leading role in organising the system

of financing innovation activities of the economy and is the guarantor of compliance with the interests of entities in the implementation of public-private partnership projects. The state is represented by the National Bank of Ukraine, the Ministry of Finance of Ukraine, the Ministry of Economic Development, Trade and Agriculture of Ukraine, the Ministry of Digital Transformation of Ukraine, the Coordination Council for the Digital Economy of Ukraine, the Innovation Council, the National Council for Science and Technology, the Ukrainian Fund for Support of Entrepreneurship, the State Fund for Innovation, the Fund for Development of Innovation, the State Innovative Financial and Credit Institution, the Ukrainian Start-up Fund, the State Financing Institution for Innovations, the National Research Foundation of Ukraine, the Technology and Innovation Support Centres identified by the author as subjects of influence.

Potential investors in public-private partnership projects include the Bank for Development, international financial organizations, institutional investors, and development institutions. It should be noted that the key aspect of financing the country's innovative development is the long-term resources of pension funds, insurance companies, investment funds, etc., which, through the system of public and private banks, are involved in large capital-intensive innovation projects of national importance.

Therefore, when forming the system of financing innovative economic development, it is necessary to take into account both organisational and functional principles of creating a resource base of banks and creating favourable conditions for financing innovative projects with large market funds (institutional investors).

The second level (both managed and managed system) in the system of financing innovative economic development highlighted by the author is the meso-economic level, which reflects the partnership between the state, regional government and business with resources from development institutions to finance the needs of the regional economy or industry (Figure 3).

An important aspect of the functional subsystem of the meso-economic level is the formation of demand of the innovation process subjects for financial resources provided on preferential terms. At this level, according to Figure 3, the concentration and distribution of the generated financial resources takes place.

According to the concept of the smart specialisation strategy (European Commission, 2010; Foray & Ark, 2007), which aims at the efficient, effective and synergistic use of public and private investments, the distribution of funds between regions should be programme-based funding, where a guaranteed form of state support is a programme of cluster

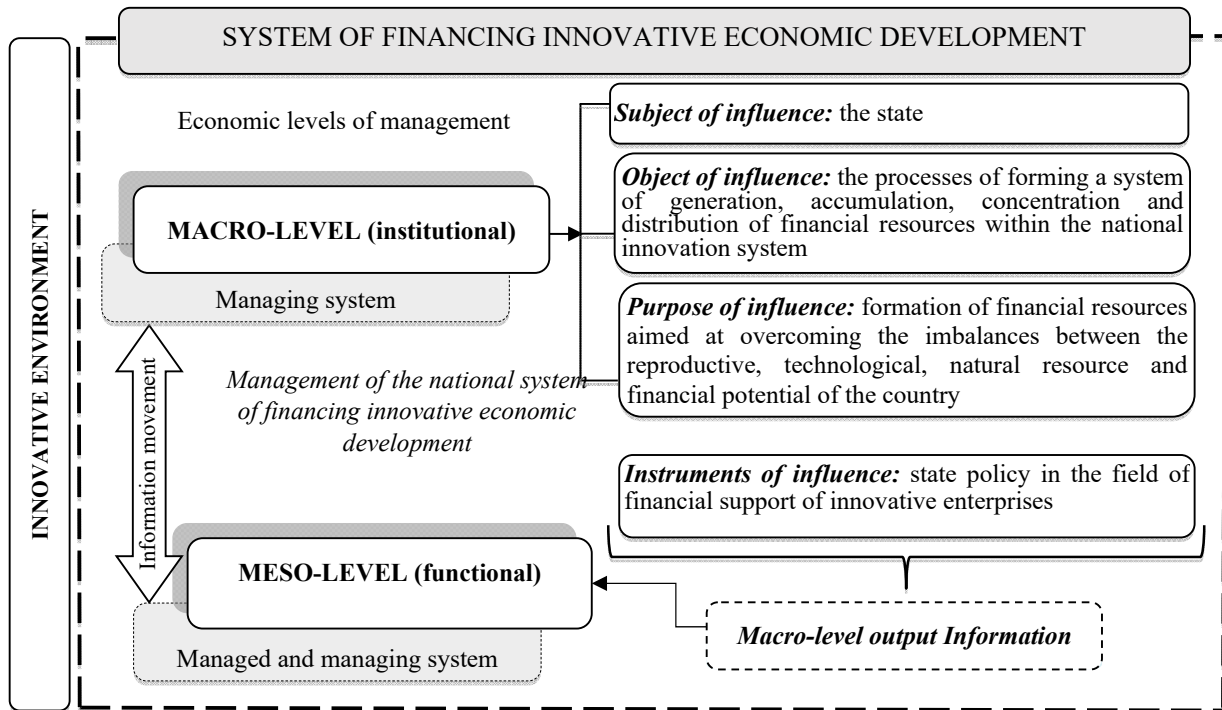


Figure 2. Scheme of formation of the system of financing innovative development of the economy at the macro-economic level

Source: author's own development

formation with a clear definition of the objectives of the tripartite form of public-private partnership. The purpose of using the instruments of public-private partnership at this level is to ensure dynamic socio-economic development of the region, while improving the efficiency of budget funds and increasing the quality and volume of public sector services based on investments from extra-budgetary sources. Accordingly, the sources of financing (internal (own), attracted, borrowed) and forms of concentration of resources (in a banking institution, the Bank for Development, etc.) are important (Matyushyn & Aborchi, 2016).

The functional subsystem of the meso-economic level consists of a significant number of participants, the composition of which is not static and can be constantly replenished.

An important role in the financing of PPP projects is played by seed investors – project initiators (so-called "project sponsors"), which can be project developers, an engineering or construction company, a management company or a private investor.

Another group of participants in the financing of public-private partnership projects are creditors – individuals who invest resources in the project after its development: international financial organisations, regional Bank for Development, banks, institutional investors, development institutions. The Bank for Development should become the main operator of the state in cooperation with business in public-private partnership projects. The author singles out commercial

banks as the main partners in the implementation of measures aimed at the development of financial resources within the framework of state programs to support innovative business. The author emphasizes the role of partner banks and the Bank for Development in servicing credit lines of international financial organizations in the process of financing innovative projects of national importance.

The criterion for the efficient use of financial resources at the regional level is the cumulative (multiplicative) effect achieved not only in the innovation sphere, but also in the real sector and in the economy of the region as a whole. The mechanism of multiplication is manifested in the fact that the investment of the generating industry is the impetus for the reproduction process to change intersectoral relations.

The last level of the system of financing innovative economic development (managed system) is the micro-economic level, the level of an individual bank that lends to meet the needs of innovation-active entities (Figure 4).

For the functioning and development of the system of innovative bank lending it is necessary to identify the factors influencing the participation of banks in the financing of PPP projects. Thus, the main factors of banks' participation in the financing of capital investments in PPP projects are the availability of the necessary resources, the evidence of participation in large projects and the ability to assume the maximum risk of participation in PPP projects. Therefore,

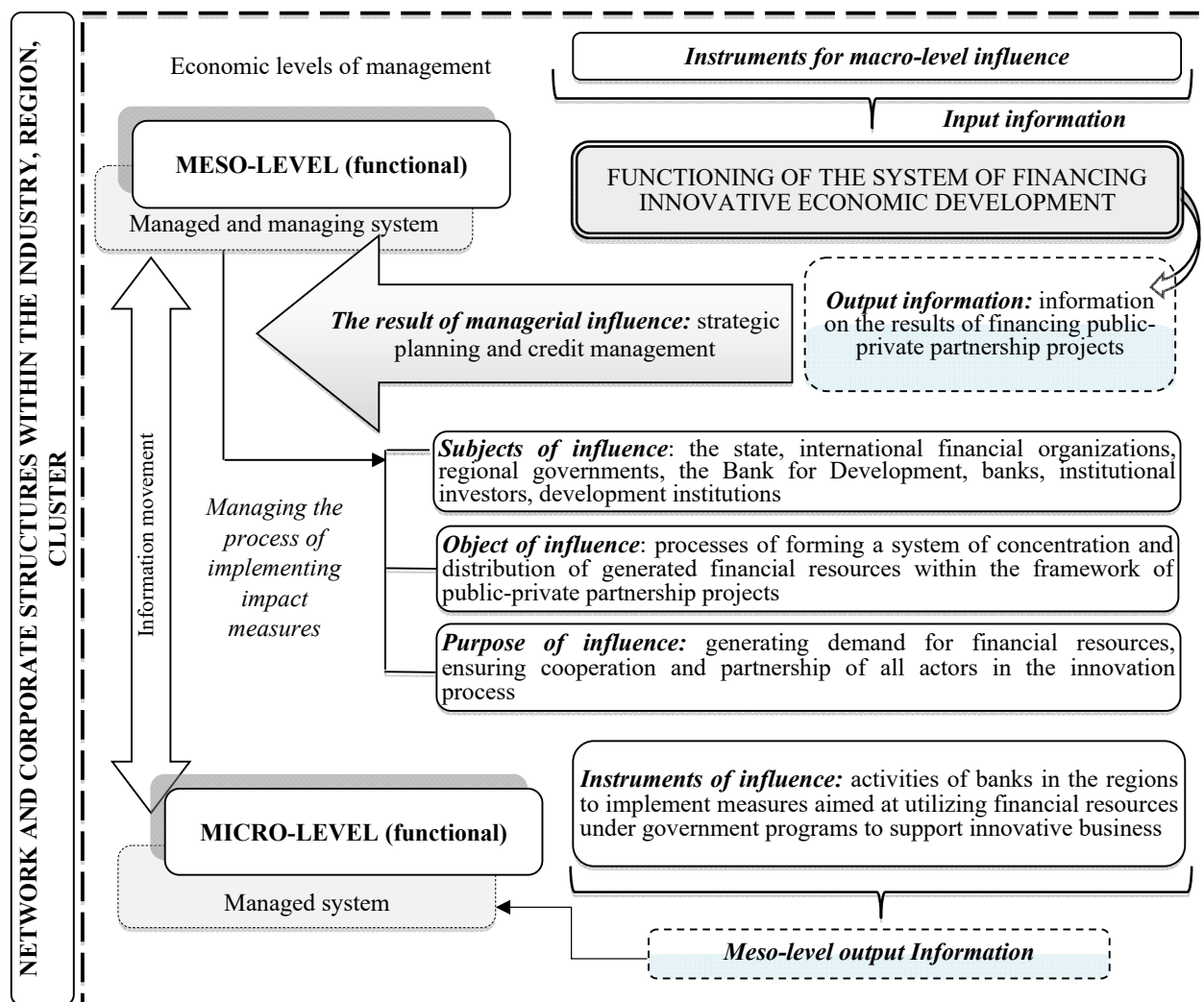


Figure 3. Theoretical approach to the formation of a system of financing innovative economic development at the meso-level

Source: author's own development

banks need to realise the economic viability of an innovative project, which will determine their income (Zavadzka, 2020).

The subjects of influence of the micro-economic level subsystem include internal bank structures (Bank Supervisory Board, Bank Management Board, Risk Management Committee, Assets and Liabilities Management Committee, Credit Committee, etc.), whose activities are related to coordination of financial resources management processes to ensure rational use of borrowed capital, namely: management of the innovative loan portfolio (its formation, monitoring, quality and risk assessment, etc.); control of credit operations carried out to provide financing services for individual innovative projects.

The efficiency of the functional system at the micro-economic level is ensured by the banks' ability to forecast changes at the macro-economic and meso-economic levels, taking into account the possibilities of developing a system of innovative bank lending.

6. Discussion of the Results of the Developed Methodological Framework for the Formation of a System for Financing Innovative Economic Development

The aim of the study is to formulate methodological foundations and a system of financial support for innovative development of the Ukrainian economy. The application of a systematic approach, generalization of the achievements of economists in identifying the problems of formation and use of resources for financial support of innovations allowed to substantiate the following:

Provision of the necessary financial resources to banking institutions and the system of financing innovative economic development requires a continuous, ongoing process throughout the entire period of its operation, as well as an effective management process:

- Monitoring of financing needs of the subjects of the national innovation system, taking into account the cyclical nature of the economy, industry, life cycle

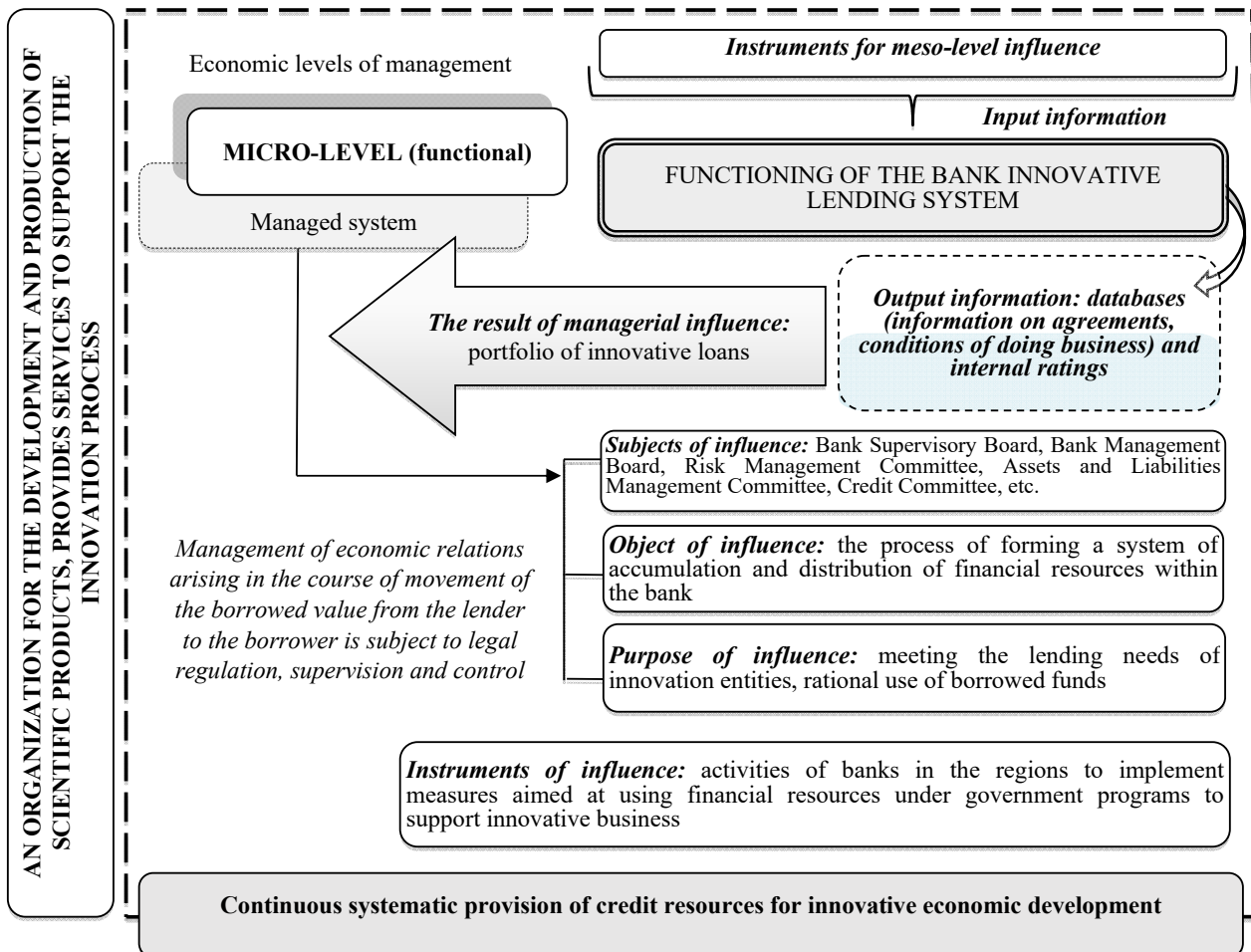


Figure 4. Theoretical approach to the formation of a system of financing innovative economic development at the micro-level

Source: author's own development

of the innovation project (regulation, supervision, regulatory and methodological support (standards and instructions), control); identification of factors of divergence of interests of the state, business and banking sectors, implementation of measures to overcome the deficit of financing sources in the economy of the country, region, industry (creation of a system of statistical accounting of innovation financing); monitoring of credit risks, assessment of the effectiveness of lending activities of banks in financing innovative projects.

Realization of economic interests is ensured by the state policy of financial support of innovatively active entities (demand generation) and production movement of borrowed capital in the process of financing innovative needs of borrowers (satisfaction of credit needs), namely:

- Formation of regulatory and legal support for financing and stimulation of innovative development at the national, regional and individual bank levels; development of a set of programmes allowing to accelerate financing of innovation activities in the priority areas of development of the country, region and innovation-active economic entities;

development of public-private partnership for financing innovative projects of state importance, supporting the most promising industries and organisations, attracting private investments (banks, institutional investors, development institutions, international financial organisations); preparation and implementation of methods of lending for innovative activities of enterprises of the real sector at the level of an individual bank (methodology of organising bank innovative lending).

The system of financing the innovative development of the economy is an integral system of interrelated elements that reflect the processes of formation, accumulation, concentration and distribution of the necessary financial resources aimed at achieving the continuity of financial support for the innovative development of the economy at all levels of government.

7. Conclusions

The theoretical foundations for the development of methods of financing the innovative development of the economy are determined: the purpose, tasks

and functions are formulated. As a result, it was concluded that:

- the system of financing the innovative development of the economy is focused on continuous monitoring of the needs of the national innovation system entities for financial resources (*macro-economic level*); identifying inconsistencies in the interests of entities, preventing a shortage of resources of financing sources in the economy (*meso-economic level*); reducing risks and assessing the efficiency of banks' lending activities in financing innovative projects (*micro-economic level*);
- innovative development is achieved through active interaction of credit policy elements as a component of monetary and general economic policy, innovation, investment, industrial and regional policy, as well as the introduction of effective legislation that meets the actual processes of financing innovation in the country.

The author substantiates the components of the system of financing the innovative development of the economy in accordance with the economic levels of management, and proposes its own definition. It is concluded that:

- the effectiveness of the system of financing innovative economic development requires the formation of a high-quality regulatory framework, taking into account the specifics of financing in the field of innovation and public-private partnership, consolidation of the necessary laws, regulations, programs of the public, corporate and banking sectors; the performance of the functional system of the meso-economic level is determined by the synergistic use of public and private investments based on the application of public-private partnership instruments; the success of the micro-economic level system is possible if banks are able to anticipate and predict complex economic phenomena in the external environment, taking into account changes in the internal environment;

- application of an integrated approach to solving the problem of financing innovative economic development, high-quality interaction (vertical and horizontal) of all levels of management of the system of financing innovative economic development will allow to obtain a synergistic effect in the long term.

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