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## **THE ROLE OF BANKS IN NATIONAL INNOVATION SYSTEM: GENERAL STRATEGICAL ANALYTICS<sup>1</sup>**

**Abstract.** In this paper the role of the banking system in the processes of innovation system as a new direction of banking strategy is considered. Innovation ways of increasing the role of banks and minimize the risks of innovation by integrating with an innovation infrastructure is offered. Analysis of the mechanisms to support innovation by banks in India, Great Britain, Norway was conducted.

The purpose of this research is to consider the main points of banking strategy development within the innovation system. Methods of current research are institutional and evolutionary approach, methods of strategical development of innovation systems and the ways of innovation development ways selection, which used for the bank's innovation strategy development.

According to analysis of the main issues of innovation banks we propose to consider the strategy of innovation investment cycle. The main points of banks innovation strategy were considered. While forming the intellectuals' property and innovation projects portfolio banks the authors have proposed to consider peculiarities of the innovations marketing. Implementation of agreements and cooperation between bank and innovation infrastructure element will create mechanisms for information exchange, constant interaction with the participants providing and accompanied by innovation projects implementation, and for ensuring of consistent communications to support the development of specialized institutions.

Analysis of financing innovation models allows to conclude that for Ukraine the corporate-state system, in which various government agencies responsible for conducting scientific and technological policies play a crucial role, is the most appropriate. Identified features of the bank's strategy can be used in the activities of innovation system and innovation structures development.

**Keywords:** innovation, banks, project, innovation system, innovation banks, strategy.

**JEL Classification** G21, G28, O31

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## **РОЛЬ БАНКІВ У НАЦІОНАЛЬНІЙ ІННОВАЦІЙНІЙ СИСТЕМІ: ЗАГАЛЬНИЙ СТРАТЕГІЧНИЙ АНАЛІЗ**

**Анотація.** Розглянуто роль банківської системи у процесі формування інноваційної системи. Запропоновано напрями підвищення інноваційної ролі банків і мінімізації інноваційних ризиків шляхом інтеграції з інноваційною інфраструктурою. Зроблено аналіз механізмів підтримки інновацій банками на прикладі Індії, Великобританії та Норвегії.

Метою нашого дослідження є розгляд основних моментів розвитку банківської стратегії в рамках інноваційної системи. У ході проведеного дослідження широко використано ряд методів, зокрема інституційний та еволюційний підходи, методи стратегічного розвитку інноваційних систем та способи вибору шляхів інноваційного розвитку. Перелічені методи ляжуть в основу розробки інноваційної стратегії банку.

Розроблено основні положення інноваційної стратегії банків. За результатами аналізу основних проблем інноваційних банків пропонуємо стратегію інноваційно-інвестиційного циклу. При формуванні банківського портфеля інтелектуальної власності та інноваційних проєктів пропонуємо враховувати особливості маркетингу інновацій. Реалізація угод і співробітництво між банком та елементом інноваційної інфраструктури створюють механізми для обміну інформацією, постійної взаємодії з учасниками, що забезпечують і супроводжують реалізацію інноваційних проєктів, а також для забезпечення послідовних комунікацій щодо підтримки розвитку спеціалізованих установ.

За результатами аналізу фінансування інноваційних моделей доведено, що для України найбільш доцільною є корпоративно-державна система, в якій різні державні установи, відповідальні за проведення науково-технічної політики, відіграють вирішальну роль. Виявлені особливості стратегії банку можуть бути використані в діяльності з розвитку інноваційної системи та інноваційних структур.

**Ключові слова:** інновації, банки, проєкт, інноваційна система, інноваційні банки, стратегія.

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## **РОЛЬ БАНКОВ В НАЦИОНАЛЬНОЙ ИННОВАЦИОННОЙ СИСТЕМЕ: ОБЩИЙ СТРАТЕГИЧЕСКИЙ АНАЛИЗ**

**Аннотация.** Рассмотрена роль банковской системы в процессе формирования инновационной системы. Предложены направления повышения инновационной роли банков и минимизации инновационных рисков путем интеграции с инновационной инфраструктурой. Произведен анализ механизмов поддержки инноваций банками на примере Индии, Великобритании и Норвегии. Разработаны основные положения инновационной стратегии банков. По результатам анализа основных проблем инновационных банков предлагаем стратегию инновационно-инвестиционного цикла. При формировании банковского портфеля интеллектуальной собственности и инновационных проектов авторы предлагают учитывать особенности маркетинга инноваций. Выявленные особенности стратегии банка могут быть использованы в деятельности по развитию инновационной системы и инновационных структур.

**Ключевые слова:** инновации, банки, проект, инновационная система, инновационные банки, стратегия.

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**Introduction.** Foreign experience shows, that for banks the companies possessing their own unique technologies are the most strategically attractive clients with whom long-term mutually beneficial cooperation is possible. This is not surprising, because in modern economic conditions, any production can be competitive in the market, only by generating innovation ideas. This factor is also important, as the banks have practically exhausted the potential for further development, and only in small business there are excellent prospects for business growth, not only credit, but also commission, for which many banks are aimed. The number of entrepreneurs in the world is growing, and this trend is greatly accelerated by innovations and the emergence of various online services, solutions and business platforms. Also, financial start-ups may soon become a real competitor to banks and the entire the banking sector. A serious threat to banks is represented by large technology companies, like Apple, Facebook or Alphabet. For example, all these companies

already allow payments to be made, which allows them to receive revenue from the commission. Moreover, billions of dollars of users are stored on the accounts of Apple ID and Google ID users, who buy content online and many experts assume, that this is only a matter of time, when companies launch their financial services. So the necessity of banking sector active participation in addressing of multi-functional and complex problem of innovation development is based on external and internal factors of economic trends. The external factors include the financial markets globalization expanding, increased integration of financial and industrial capital and growing needs of domestic producers in foreign investment attracting to innovation projects. The internal factors influence the effectiveness of economic reforms, due to the interest of banking sector in the further integration of industrial & financial capital. The main of these factors deals with the banking business universalization that is growing every year, caused by the competition between commercial banks and non-banking institutions, the necessity to expand the range of new banking products.

From the point of view of strategic development, one must take into account, that the formation of national innovation system is impossible without assessing the potential of national economy, in the resource subsystem of which the financial system is defined by the banking system as an integrator of internal and external sources of financial and credit support for innovation.

**Research analysis and problem statement.** In the study «Does Banking Affect Innovation?» [1], scientists at Georgetown University of Business has shown, that banking competition can help small businesses by increasing access to credit, which allows small businesses to work independently and not be acquired by potentially large companies.

The banks play significant role in developed states considering innovation objects as an important part of their client strategy [2]. Also banks become active participant of innovation networks and clusters [3; 4] and initiators of innovation project cycles of companies [5]. New technologies are also important for banking strategy enable the new co-operation forms in banking and innovation policies [6].

In banks competitive landscape analytics [7] it is underlined, that banks must take immediate steps to move towards innovations by:

- current innovation capabilities and performance critically assessing;
- innovation roadmap developing and supporting capabilities and processes;
- aligning the innovation agenda with the organization's broader strategy;
- creating opportunities and incentives for employees to be entrepreneurial.

Nanda and Nicholas (2014) have found, that the sharp drop in external bank finance availability not only impacted the innovation rate, but changed the innovation trajectory away from more experimental and radical innovations to incremental and sustaining innovations [8]. Also the changes in bank finance availability or cost have been shown to impact both the rate and nature of innovation by firms [9].

Also study [9] confirms the growing interest in the multi-stage financing of innovation, both in established firms and startups, and understanding the optimal contracts and policies that might stimulate innovation.

In this case the study of [10] illustrates the basics of patents using as collateral in banks. According to his estimations 16% of aggregate stock of patents at the US Patent and Trademark Office (USPTO) has been pledged as collateral at some point, and that companies with patent-backed debt have performed over 40% of USPTO patenting since 2003.

According to OECD experts [11] and authors of analytical review [12] the reforms of banking and financing system following the financial crisis (e.g. banks' increased capital requirements), can reduce the motivation for risk among the traditional investors. Governments are therefore promoting new ways to stimulate access to finance for R&D and innovation, including public-private partnerships.

In this regard, the study of theoretical and methodological foundations and practical mechanisms of investment activity of banking institutions in the innovation sphere, the

systematization of domestic and foreign experience of banking investment state regulation, problems and prospects of bank innovation credit, project and venture financing for innovation are of great importance [13].

The relationship between of capital accessibility to start-up firms (venture capital) and bank financing is still poorly understood in domestic practice. Typical obstacles in the relationship «bank-borrower» (information asymmetry, agency costs) are exacerbated for these firms, which as a result are experiencing face with financial difficulties. This is why innovation banks are created to better meet the demand for financial resources and diversify activities.

Due to the complexity and variety of innovation processes, that are taking place, their effective development is impossible without the development and consistent implementation of innovation strategies, that have not yet been adequately addressed in scientific research for the banking business.

The purpose of this research is to consider the main points of banking strategy development within the innovation system.

Methods of research. Methods of current research are institutional & evolutionary approach, methods of strategical development of innovation systems and the ways of innovation development ways selection, which will be used for the bank's innovation strategy development.

The study is based on the hypothesis, that at present banks are initiating project cycles of companies, providing them and themselves with an acceptable level of project and credit risks, and the most important link in initiating investment plans for the world economy. This hypothesis is confirmed by foreign experience: the key loan products of banks are products for project initiation and risk management, in which banks act as project organizers, risk managers and consultants [5].

The project financing should be considered not just as a way of financing projects, but as an integrated bank product for arranging project financing, which allows banks to take into account their specifics and, if possible, improve project indicators. According to study of Business Banking Fees Rank 2017 conducted by Marksw Webb, banks, actively working with the SME segment, are practically equal in tariffs [14]. The trend was reflected throughout the world: banks began to consider SMEs as one of the priority client segments in all spheres. If banks will not occupy a niche in the near future, it will be done by companies from related industries (IT, retail, etc.). For example, services for European entrepreneurs, for example, are going to be offered by Rakuten Europe Bank, built on the basis of Japan's large online trading platform Rakuten and Rakuten Finitex fund with capital of \$ 100 million.

Research results. It is also worth noting that innovations (investment in technology with a low probability of payback in the future 3—5 years) in the activity of banks has always been present, as banks are the leading sectoral sector in terms of the number of technologies consumed.

The innovation bank specializes in lending operations for innovation developments, know-how, research of technical and technological progress, and also on operations for lending to venture capital. In other words, it is a specialized bank created for lending primarily to risky projects, for example, developments with an uncertain or very long-term effect. The bank receives its main resources from its own funds, state contributions, investment funds, customer deposits, and sponsorship. Loans of such a bank are mainly of long-term nature. With successful financing of projects or inventions, the bank receives a part of the founder's income, the share of profit from the introduction of innovations; profit is obtained, first of all, from the rapid growth of the value of shares.

Loans, issued by innovation banks, are used to introduce innovations and inventions into production, to raise the level of production of enterprises, to produce the latest high-performance products. In an innovation bank you can apply for a loan for design development and for the development of new activities [15; 16].

Implementation of agreement between bank and innovation infrastructure element will create mechanisms for information exchange, constant interaction with the participants providing and accompanied by innovation projects implementation, and for ensuring of consistent

communications to support the development of specialized institutions. So participants can carry out cooperation in such areas:

- financial support for innovation projects of SMEs at different stages;
- innovation projects advanced monitoring;
- attraction of private investment to projects, which are supported by financial institutions;
- development of common approaches for the selection, evaluation, structuring and implementation of innovation projects.

For the participation of domestic banks in new forms of innovation activities financing of enterprises with a view to enhancing the development of innovation component of SMEs in Ukraine it is necessary [17]:

- creation at the state level of specialized innovation banks should be encouraged. This can be assisted by: the use of differentiation of the tax rate on banks' profits in lending high-tech projects, depending on resources use direction, granting privileges and banks encouraging to buy shares of innovation enterprises by exempting from tax the part of banks' profits, invested in shares of these enterprises. It is also possible to establish a lowered norm of mandatory reservation for banks, which are lending of innovation projects;

- it is necessary to implement a mechanism for state insurance of loans, granted to SMEs, that develop and implement innovation high-tech products and activities, that are associated with significant investment risk;

- at the level of domestic banks, more attention should be paid to the development and implementation of new credit technologies for innovation projects, development of venture departments in their structure or separate funds with the banks participation, and new banking products development for innovation SMEs.

There are such peculiarities in the bank financing:

- special character of banking system regulation in most world countries, which limits its participation in the risky operations by way of administrative actions, oriented to keep stability and security of credit organizations. For example, the higher reservation system, as far as delinquency probability is increasing, raises the bank resources cost in comparison with capital markets. Obviously, such a circumstance prevents from banks' participation to finance risky productions;

- structural differences. While financing the innovation enterprises, non-conformity with the innovation sectors functioning system is particular for banks. Most high technological markets have high level of «minimum effective production amounts», caused by dynamic effect of scale («teaching effect»), i.e. decrease of average costs per product unit during some period of time due to the cumulative issue growth. As a result of econometric research, dynamic effect of saving plays a significant role by scale at early stages of the product life cycle in sectors, where there is a high share of labour, especially high qualified one, i.e. in the high technological sector.

Analysts of Infosys found out how retail banks relate to innovations and how they actively plan to deal with them at the earliest date. The company published the annual report «The Innovation in Retail Banking», which formed the base for 150 banks inquiry in the whole world. Analysts tried to find out, how banks relate to innovations, whether they have and plan to carry out concrete innovation strategy soon (special block in business- and IT-strategy with own budget) and whom they see as main competitors in the sphere of competitive innovations formation. In 2013 60% of banks keep the innovation strategy. As a comparison, in 2009 the index was 1.6 times lower — 37% of banks. The strategic priority of innovations leads to the budget increase. According to data of Infosys, 77% of banks raise budget for innovations and only 5% of them decrease it [19].

By way of IT tools development, banks have great opportunity to influence both society development and its informational competence through service market development, and first of all — through development of distant serving channels and self-service offices [18; 20]. Banks increase accessibility of such service and in such way form an additional consumer demand.

According to analysis of the main issues of innovation banks we propose to consider the strategy of innovation investment cycle (Fig. 1).

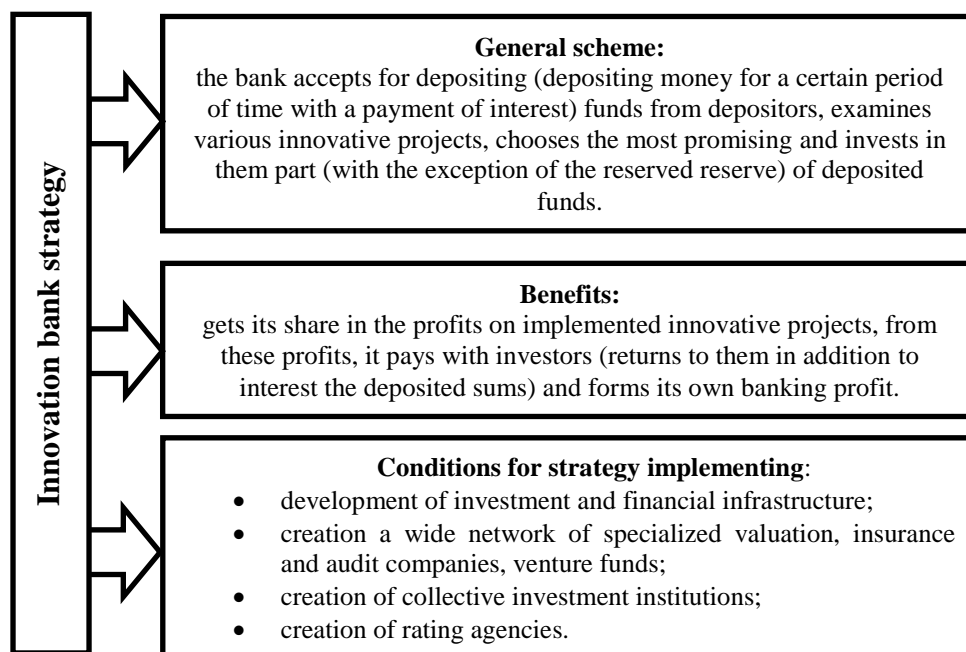


Fig. 1. Bank's innovation financing strategy

Source: Created by authors.

Within this strategy the following stages of bank's work on innovation projects lending such activities can be distinguished:

- attachment objects searching;
- assessment of profitability and risk of project;
- financing scheme development;
- conclusion of agreements (determination of loan agreement conditions, choice of form and type of collateral for loan obligations, choice of the way of registration of contractual relations, determination of responsibilities of the parties and liability for violation of obligations under the loan agreement);
- implementation of R&D, production and commercial program to full repayment of loan, control over repayment of loan;
- evaluation of project financial results and their comparison with the planned ones.

While forming such portfolio banks have to consider peculiarities of the innovations marketing:

- 1) technological prediction must take a significant place, which finds directions of R&D activity, the result of which will be competitive in the future;
- 2) it is necessary carefully to study directions of demand changings both in the scientific and technical and in final product;
- 3) marketing efforts have to be oriented to study abilities of the intellectual product to provide the saving of direct and materialized labor in the material sphere;
- 4) it is necessary to make efforts to protect and to save intellectual property rights, since an intellectual product is subjected to faster moral aging, than material ones;
- 5) searching of the intellectual product replication ways is one of its marketing peculiarities, because it can be sold at various markets to different consumers.

The innovation commercial banks are intended first of all to engage in such activity, but it may be interesting for any commercial and specialized bank, which receives an opportunity of innovation risks security (Table 1).

Table 1.

Parameters of the financed sector and corporative management, which are peculiar for countries with various systems of innovations financing

Main features of the financing sector and corporative management	Types of the financing systems			
	Market	Corporative and state	Cluster (net-wide)	Meso-corporative
Financial market development	High	Not high	Not high	Not high
Banking concentration	It does not matter	High	High	High
Banks participation in the management of companies	Not developed	developed	Not developed	developed
Accessibility of the venture capital	high	low	high	high
Share of institutional investors in the venture funds financing	30–50%	Less than 10%	30–40%	Less than 10%
Share of the venture funds banking financing	Less than 20%	40–60%	20–30%	30–40%

Source: [21].

The following types of insurance policies are popular at the intellectual property international insurance market:

- to cover the patent rights breach — recovery of expenses, related to the legal prosecution of a person, who entrenched on rights to the intellectual property object of policy holder;
- to cover expenses for the patent rights protection, i.e. it protects policy holder, when someone gives him a claim on infringement of rights for IPO, belonged to the third party;
- to cover losses in case of insufficient licensed payments. Western banks often require to take out an insurance of the borrower's intellectual property, used to secure credit, in bank's favor.

One can distinguish four main types of successful systems to finance innovations: market, corporative and state, cluster (net-wide) and meso-corporative (table 1).

Next, we will consider the most successful banking initiatives in the framework of innovation systems.

In India, Venture Investment Association (IVCA) was established in 1992. Until recently only Indian players were united. The largest of them were founded by the Small and Medium Enterprise Support Bank (SIBDI) — National Venture Fund for Software and Information Technologies with a total volume of \$ 250 million and the SME Growth Fund with a total volume of more than \$ 1 billion.

The main objectives of these funds are reduction of long-term risks characteristic for innovation industries, search and investment in new companies in such sectors as “living systems”, IT, retail, engineering, food industry, healthcare infrastructure and logistics. Venture divisions of some other major Indian banks, engaged in traditional direct investment, willingly finance innovation start-ups.

To stimulate innovation, the UK government has developed a scheme called Small Firms Loan Guarantee (SFLG).

Within this scheme, the government provides guarantees in the event that the firm fails to comply with the terms of the loan agreement between the lender and the borrower. However, this scheme operates under certain conditions under which the government guarantees full or partial repayment of loan, covers part of credit rate, etc. In fact, SFLG is a joint venture between the BERR department and a number of participating creditors, who manage it and carry out all commercial borrowing operations. The guarantee premium is 2% of the loan amount and is paid quarterly by the borrower to the BERR department. In principle, the government guarantee covers 75% of the cost of the loan and is provided to small firms with an annual turnover of up to 5.6 million pounds [12].

In Norway, 20 banks and technology companies have gathered and created a financial & tech hub to promote the global innovation agenda in conditions of growing cooperation between banks and financial & tech start-ups.

The participants of the new association Finance Innovation became such well-known banking groups as Nordea, DNB, Skandiabanken, Monobank, Sparebanken Vest, and also the companies Tryg Forsikring, Tripod, Knowit, Stacc, Webstep. Among the educational partners are Norwegian School of Economics and University of Bergen. The formation of cluster coincided with the new regulatory requirements of PSD2 and MiFID II, as well as advanced technologies in the field of artificial



intelligence and distributed registries, which catalyzed the development of new business models and services in financial sector. All this, in the end, contributes to the use of new technologies and financial & tech services among consumers in Norway, where penetration of smartphones is 80%, and 90% of the country's inhabitants use the Internet to perform various banking operations.

Cooperation between banks and start-ups is becoming a familiar tool of the local financial technology market. For example, Skandiabanken's recent investment in the robotic consulting service Quantfolio, or Sparebank's partnership with the online agent Boost.AI and the online loan platform Vest, as well as Nordea's social savings platform Spiff.

The cluster will catalyze the launch of new initiatives in research, education, innovation infrastructure and internationalization. A new financial & tech cluster for each of the stakeholders (existing businesses or start-ups) serves as a competitive advantage when entering the global scene. The cluster also benefits greatly from the joint efforts of strong and committed partners, as well as the growing portfolio of private investors. Using strategic resources, the Norwegian financial & tech cluster has all the prerequisites to become an influential international hub.

**Conclusions.** Within the modern financial strategies banks need to adopt flexible and customer-centric strategy, which should be based on responsibility to global innovation changes, regulatory demands and technologies, which deals with the value networks creation new wave. Full use of the banks' capacities for innovation development and production economic growth requires an increase in the role of the government. The state of the banking system is characterized as a post-crisis adaptation to the current economic conditions of functioning. Analysis of financing innovation models allows us to conclude that for Ukraine the corporate-state system, in which various government agencies responsible for conducting scientific and technological policies play a crucial role, is the most appropriate. At the same time, venture funds and small innovation business in such a system often play a subordinate role, being affiliated with banks, corporations and research institutes. Necessary condition is also a system of powerful universal banks acting as strategic partners of companies.

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