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A MODEL OF FINANCING BUSINESS STRUCTURES WHEN INTRODUCING INNOVATIONS TO PREVENT CRISES

The study of anti-crisis innovations financing in business structures (BS) is determined by the need for the modern scientific-based methods of crisis management in economic processes. In accordance with the world trends in economic, scientific and technological processes development, the need for anti-crisis management arises not only during the steady economic functioning of integrated groups, but also during structural shifts implementation.

The question of science and practice integration is widely investigated by domestic and foreign scientists. The main complications of the innovation process are associated with the stage of scientific achievement implementation, which requires a significant financial resources investment in re-equipment, marketing research, etc. The peculiarity is that costs are not redeemable and investments are redundant at this stage, but these investments may pay off in future¹.

Enterprises and business structures operation and innovative projects realization are among research objects. In the working paper², the optimal strategy for innovation project investing on the basis of economic dynamics statistical model is substantiated, where the possibility of the technology's spin-like change is laid down, depending on the level of the innovation fund's filling.

In this regard, we explore the dynamic model of a vertically integrated business structure, which has financial and credit links. Taking into account approaches, we try to show that the use of innovations joint financing by an integrated association increases the economic efficiency of the BS and helps to prevent crisis situations.

In order to clarify scientific approaches to promising research in the field of crisis management, the authors' interpretation of the term «business structure innovation» is presented: new products, new financial and credit services, insurance, investment, trust and leasing services, new favorable conditions for

1 Bondarchuk Mariia, Vivchar Oleksandra (2022). Financing of anti-crisis innovations in business structures / Theoretical and practical aspects of modern scientific research : collective monograph / Compiled by V. Shpak; Chairman of the Editorial Board S. Tabachnikov. Sherman Oaks, California : GS Publishing Services., 256 p. ISBN 978-1-7364133-7-1 DOI : 10.51587/9781-7364-13371-2022-007/

2 Hryhoruk P, Khrushch N, Hrygoruk S (2019). Model for assessment of the financial security level of the enterprise based of the desirability scale. SHS Web Conference, vol. 65. <https://doi.org/10.1051/shsconf/20196503005>

customers, including prices, etc., which make it possible to improve the activity of such integrated associations. At the same time, taking into account the directions of influence, we propose the definition of anti-crisis innovations of the BS: these are technical and technological developments, new products, new financial and credit services, insurance, investment, trust and leasing services, new favorable conditions for customers, including prices, etc., which allow to provide anti-crisis activities of integrated associations.

Investigation of the innovations joint financing mechanism in the BS was carried out for a situation where there is a steady market demand for products of the integrated group and a stable financial and credit system. At the same time, we believe that all macroeconomic indicators that influence the efficiency of the BS (price level, level of interest rates on loans, discount rates, etc.) change over time in a slow manner, i.e. when we evaluate the investigated processes characteristics, we neglect these changes. BS entity's profit is used as the economic efficiency indicator. Increase of production competitiveness and usefulness is considered as a result of scientific and technological achievements introduction³.

It is advisable to create the Institute of innovations (perhaps it is going to be an innovation institute, innovation firm, innovation center, venture capital company, etc.), where an innovation fund is proposed to be formed in order to accumulate the necessary amount of financial resources within the BS.

The Institute of innovations should be included into the industrial and financial capital integrated group at a stable stage of its development.

To ensure the process of renovation (new products development and introduction, fixed assets modernization, new technologies introduction), BS entities should have the appropriate potential (R&D, designing, rationalization facilities production, etc.).

It is necessary to understand that Research and Development (R&D) of business structure entities is the number, qualification, efficiency of employees' work in the field of R&D, the degree of equipment fit-up, the level of management and organization. While introducing new products and technologies, a close relationship with fixed assets reproduction should be ensured. The existing potential should be used also during reconstruction and modernization activities. Modernization serves as the main form of fixed assets reproduction in order to increase the production efficiency. It involves a close relationship between investments in fixed assets renewal and major repairs. Each BS entity must have the capacity to produce the intended output.

3 Bondarchuk M, Druhov O., Voloshyn O. (2017). Research On The Problematics Of Anti-Crisis Innovations Financing In Business Structures. / Financial and credit activity: problems of theory and practice, Vol 2, No 23. <https://doi.org/10.18371/fcaptp.v2i23.121394>

It is advisable to propose the creation of a centralized R&D Institute or the Institute of innovations in a business system that may be used for applied fundamental research and renovation processes that are essential for development of BS. It is also advisable for some participants to have R&D units that focus on the maintenance and improvement of products and technologies. It is necessary to preserve and increase the potential of mentioned institutes and units for scientific saturation of the production process.

Thanks to the unified management, the manager of the BS's Institute of innovations manages the necessary capacities for preparation and implementation of the production renovation process. It has positive influence on concentration, improvement of own management activities and resource mobilization. An important aspect of the manager's activities at the BS's Institute of innovations is the effective organization of cooperation with scientific and technological units that exist in the BS entities. Also the manager is responsible for implementation of the strategic plan for scientific and technological development of the BS, as well as for rationalization and use of fixed assets, carrying out a unified policy on fixed assets' reconstruction, modernization and rationalization in the BS.

The innovation fund formation of the BS's Institute of innovations provides for mobilization of all possible financial resources, including third-party donors involvement on the basis of the share participation. The revenues sources of the innovation fund can be diverse: commercial bank loans, state interest-free loans, investment capital of legal entities and individuals in the form of equity participation in the joint project, own financial resources and other funds.

The bank, which is a part of such a group and act as an investor, receives a research work plan. As a rule, bank's representatives, as well as other donors, create board of directors of the Institute of innovations, participate in its functioning and influence the resolution of all issues. As a result, banking institutions can rely on the share of profits from mass production.

Let's consider the dynamic model of the vertically integrated group (BS), which includes the industrial enterprise A - producer of the main products; the manufacturing enterprise B - consumer of the main products and at the same time the enterprise, which is at risk of falling into crisis; the commercial bank - C; the Institute of innovations - I (fig.1).

Let's suppose that there is such an innovation project aimed to create a new technology that allows releasing new competitive products. Innovation project implementation requires additional costs by attracting part of the resources from the production sector. Project completion depends on the level of the innovation fund accumulations at the Institute of innovations.

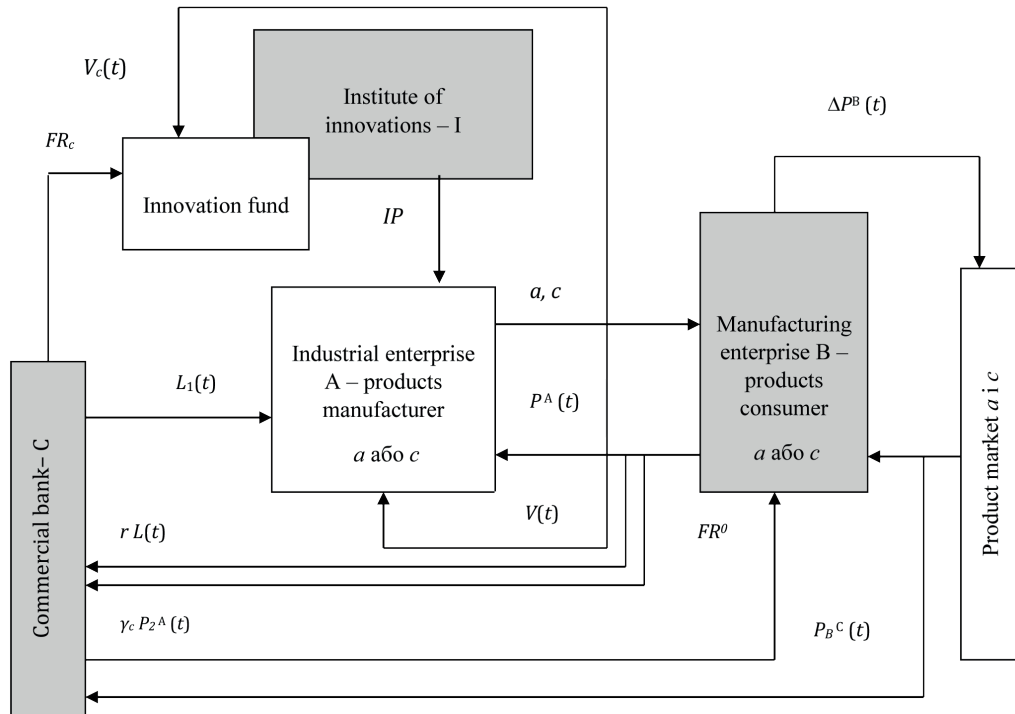


Fig. 1. Financing directions of business structures participants that implement anti-crisis innovations

Note: proposed by authors

The legend: IP denotes that the Institute of innovations implements a developed innovation project; $V_c(t)$ denotes the amount of money deducted from the profit of manufacturer A at every moment of time; FR_c denotes that commercial bank deducts a part of its resources (γ_b) in amount of FR_c for innovation project financing; FR^0 denotes that the bank can lend to enterprise A temporarily free funds $FR^0 = (FR - FR_c)$ (loan interest rate r) in order to reduce costs per unit; $L_1(t)$ is the loan granted by the bank to manufacturer A on terms of return (interest rate r) aimed to reduce costs per unit of the output a ; $rL(t)$ is the loan repayment with interest rate r ; $\gamma_c P_2^A(t)$ denotes that the bank receives a share of deductions (γ_c) from the profit of the enterprise A in proportion to invested funds in innovations at the first stage; a, c are types of sold products; $P^A(t)$ - profit of the enterprise A; $P_B^C(t)$ denotes that the bank receives a share of the consumer enterprise's (B) profit (γ_b) in proportion to the invested funds in innovations; $\Delta P^B(t)$ is the profit of the enterprise B; $V(t)$ denotes that the part of the profit V_c is deducted by the enterprise A into the innovation fund, and the other part is directed either to costs per unit reduction, or to the funds accumulations of the enterprise A.

Thus, we consider the deterministic model of innovations investing with a known threshold value of IF^* that is sufficient to complete an innovation project. The moment T^0 corresponds to the moment when the innovation fund volume reaches the value of IF^* . So there is an instantaneous transition of enterprise A to the new technology and new products manufacturing starts at both enterprise A and enterprise B, which has been in danger of getting into a crisis condition. The choice of financial resources allocation model (function) for the innovation project implementation may be carried out in accordance with the resource consumption dynamics in similar projects. Continuous or piecewise continuous functions correspond to the resource allocation dynamics during the project life cycle in the most adequate way, since the dynamics progression is an important feature of project implementation.

It is assumed in this model that the active investor of the innovation project is producer A, bank C, and the Institute of innovations I. The Institute of innovations I which implements the innovation project may use own funds and funds of third parties on the principles of share participation, herewith total funds amount is equal to IF_0 . Then the share of financial participation in the innovation transformations of all business structure participants is be equal to $Q_c = IF^* - IF_0$. At the same time, the bank's share is $FR_c = \gamma_c Q_c$, where $\gamma_c = \gamma_b FR / Q_c$ ($0 \leq \gamma_c \leq 1$), and the amount of proceeds from the of enterprise A deductions are $(Q_c - FR)$.

Let's consider the resources consumption dynamics with a constant absolute increase in the form of a linear function $Z(t) = IF_0 + FR_c + V_c(t)$, where $(IF_0 + FR_c)$ is the costs level at the initial moment t_0 ; V_c denotes the constant absolute growth per unit of time. Then finish period for the innovation project development is: $T^0 = t_0 + (Q_c - FR) / V_c$, $V_c = const$.

It is assumed for simplification that only enterprise A and enterprise B participate in joint financing of anti-crisis innovations in the BS, i.e. $IF_0 = 0$, what in turn does not significantly affect the following results and $t_0 = 0$. In this case, these participants' share of financial participation in the innovation project is $Q_c = IF^*$, in particular the share of bank participation is $FR_c = \gamma_c Q_c$. Hence, the equation which connects the parameters γ_c , V_c , T^0 looks like this:

$$T^0 = (1 - \gamma_c) Q_c / V_c, \quad (1)$$

We introduce the restriction for the accepted model:

$$0 \leq V_c \leq V_{cn}, \quad FR < Q_c, \quad FR + V_{cn} T^0_{pi} > Q_c, \quad (2)$$

where V_{cn} is the allowable level of deductions from the enterprise's A profit, which corresponds to the minimum amount of the producer's A profit per unit

time; T_{pi}^0 is the the minimum possible period of the innovation project implementation, $T_{pi}^0 = (Q_c - FR) / V_{cn}$.

Considering the finish period T^0 of the project development, it should be noted that by increase of T^0 there is a likelihood that new products' market advantages may be lost under the influence of external factors (moral aging of products, competitors' actions, political and economic changes in the country, etc.).

Therefore it is expedient to fix the value T^* in the form of a scheduled term, which determines the maximum allowable finish period of the innovations introduction, while $T_{pi}^0 \leq T^* \leq T$.

In this context, the anti-crisis study of innovative transformations of business structures is connected with the need for anti-crisis management arising not only during the sustainable economic development of integrated groups, but also during the implementation of innovative transformations.

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MILITARY BONDS AS A TOOL FOR INVESTMENTS

Under the conditions of wartime, the existence and development of the market system has grown significantly more and is gaining the demand; that is why the development of securities has become a special type of investment to finance the needs of the Armed Forces of Ukraine and the state under the conditions of war-time. Respectively, the purchase of military bonds helps to strengthen the financial front of Ukraine and further resist the enemy in the full-scale armed aggression.

Many scientists studied the prospects for the development of the war bond market and the role of war bonds in financing the state budget during the war, in particular, L.A. Vasiutynska, N.M. Vnukova, I.O. Dehtiarova, V.S. Kuibida, P.M. Petrovskyi, O.I. Nykyforuk. However, this issue needs further study and research.¹

The military bonds are targeted public debt securities intended for borrowing on the market to finance the needs of the Armed Forces of Ukraine and the state un-

¹ Vasiutynska, L.A. (2021). «Infrastructure bonds in project financing: world experience and opportunities for Ukraine.» *Skhidna Yevropa: ekonomika, biznes ta upravlinnia*, 3 (30): p. 79–84.; Vnukova, N.M. (2014). Development of financial services markets in the context of European integration: a monograph. Kharkiv, TO Ekskliuzyv. P.218.