Issues of Concern in Managing the Corporate Innovative Development

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Abstract: - The method of researching the development of an innovative enterprise suggested in the paper shows two possible ways to perform it: firstly, when the Competitiveness Commission regulates the excess profits to avoid ageing of existing businesses, and secondly, when the process takes place without any interference, leading to accumulation of fictitious capital and avoidance of obsolescence. The methods allow calculating the pace of these processes. The method of researching the possible negative consequences of corporate innovative development is suggested. The following two elements are the methodological basis of the suggested method: development of the formalized economic conceptual framework and construction of generalizing model of technical change by Hicks, Harrod, and Solow. Classical technical change models were developed in the framework of production functions methodology based on the research of three main factors – capital and labor inputs, and output. The suggested conceptual framework largely eliminates these shortcomings. The use of formalized economic categories fundamentally changes the opportunities of modeling the production and financial-economic processes due to emerging opportunities to transfer from exogenous parameters and processes to consideration of their endogenous properties. One of the possible approaches to establishing the causes of fictitious capital accumulation and obsolescence of fixed assets of enterprises due to innovative activity in the singled-out conditionally closed system (industry, market, etc.) is outlined. The conditions and causes leading to the emergence of financial crises when fictitious capital grows by a significant amount are shown. The nature of the "dichotomy (duality)" of an innovative process is specified – the interests of an enterprise do not meet the public interests, so the country has to prevent the conditions of financial crisis emergence.

Key-Words: - Innovations, Innovative Process, Dichotomy of Economic Process, Fictitious Capital, Obsolescence, Financial Crisis, Production Function.

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1 Introduction

The need for corporate innovative development is an obvious fact because it provides an opportunity to support competitive advantages at enterprises. Meanwhile, the enterprises failing to pay due attention to the development will certainly get into difficult situations that may end up with bankruptcy. Therefore, most economic studies on the subject offer almost a single thesis – the need for accelerated development of corporate innovative processes.

Yet, the flaw of the approach lies in the fact that the factors that can affect the overall condition of the economic system – an industry, national economy, etc. – are not considered. So the researchers are rather one-sided in their approaches to examining such a complex and multidimensional process as corporate innovative development. In reality, in addition to positive features, any phenomenon or process inevitably generates negative trends that can undermine all positive achievements under appropriate conditions. In our opinion, the global financial crisis observed in 2008 in most economically developed countries is an example of such a course of events.

The main problem with managing the corporate innovative development is that the process generates the following negative phenomena: fictitious capital accumulation and obsolescence of fixed assets.

2 Problem Formulation

2.1 Literature Review

Nowadays, numerous economic studies address the innovative process. O. Bilovodska et al. consider it from the viewpoint of legal framework and creation of additional analytical tools to evaluate innovative business strategies, [1]. L. Frolova et al. suggests the model of evaluating the opportunities to boost corporate innovative activity based on the use of a three-dimensional matrix of parameters for evaluation of competitive attractiveness, [2]. Prima project considers corporate sustainability and innovation in SMEs from a more general point of

view because the processes are examined from the sustainable development perspective, [3], [4], [5], [6], [7], [8]. M. Varis and H. Littunen, aims to study the practice of getting the information sources at SMEs regarding various types of innovations, [9]. The structure of organizational innovations and the results of their implementation in SMEs are examined by S. Laforet, [10]. Innovative strategies implemented due to process and product innovations are outlined, [11], [12], [13], [14], [15], [16]. New opportunities for researching operations management (OM) are presented by H.L. Lee, [17], who considers innovations in socially and environmentally responsible value chains. The approaches to Industry 4.0 management performed from the perspective of human resources management are addressed by S. Shamim et al., [18].

The specific feature of all these publications is that they belong to empirical studies because they are based on the processing of reporting and statistical data or surveys. Such studies are most assuredly an important and necessary element in the development of any sciences. Yet, there is an inevitable need to transfer to the next stage – the development of theoretical generalizing methods to examine innovative processes.

There are also many studies on this subject but they have some flaws related to the fact that innovative process is examined only with the sign "plus". That is, any negative consequences of the process are hardly considered. Y.V. Oliynyk, [19], I.D. Skljar, [20], N.V. Shvecz, [21], mention the obsolescence of fixed assets. Yet, the studies are rather descriptive, i.e. the respective method to calculate the obsolescence is not suggested and the conditions for it to take place are not established. The following can be noted regarding the fictitious capital. Investment and technological activity of corporate development is outlined in the works, [22], [23], [24], [25]. In post-soviet countries, the concept is used in economic literature by Hluxa Kh.J. and E.M. Lymonova, [26], V.O. Mandybura [27], O.O. Rosynka, [28], I.S. Kravchuk, [29], I. Burdenko and I. Makarenko, [30], G. Swathi, [31] T. Kulinich et al., [32], because it was actually first used by K. Marx, but he didn't provide, in our opinion, proper theoretical substantiation – he simply argued that the share capital that exceeds the value of fixed assets is fictitious because only the embodied form of capital can be the real capital. Therefore, he didn't consider two forms of value – consumed and consumable, [33], but concentrated only on the first form – labor input. Meanwhile, the consumable value determines the value of operating capital, which is characterized by the flow emerging from production. The bigger is the flow – especially the net cash flow (i.e. in the form of net income) – the higher is the value of operating capital that can substantially exceed its embodied form.

However, the research we have performed shows that the growth of the value of functional capital also has to have respective limits because the conditions for the generation of fictitious capital are created. The reason this capital, which has nothing to do with the Marxist approach, is accumulated is that the inflation process can emerge on the stock market – a fictitious increase of the value of the operating capital. Unfortunately, in Western economic literature, the concept of "fictitious capital" is hardly used (it is the consequence of an unreasonable Marxist approach). Nonetheless, there is no research substantiating the conditions of limiting the value of operating capital to prevent the emergence of an inflation process on the stock market. It leads to the situation when most economists do not understand the complexity of these processes, so they do not develop any measures to prevent the repeat of 2008 financial crisis (possibly, in tougher form).

The research aims to detect the causes of the emergence of fictitious capital or obsolescence of fixed assets, i.e. possible negative consequences that can occur due to corporate innovative development.

2.2 Materials and Methods

Nowadays, econometrics is considered the main quantitative method in economics. Yet, the fact that it is an "empirical" statistical method rather than "theoretical" is not taken into account. Empirical research is the necessary stage in any science but it is the initial one that should inevitably transfer to the next stage – theoretical. It is also worth taking into account that statistical methods play different roles in different sciences. For example, for natural science, it is the major method because it provides an opportunity to "experiment" – to repeat the same phenomenon any number of times under the same conditions. In economics, it is almost impossible to experiment, so the collected statistical data cannot be considered as justified. Therefore, the value of observances after the concluded experiment and collected statistical data is different.

The following are the main reasons the economists cannot perform quantitative theoretical research using mathematical apparatus: lack of formalized quantitative economic conceptual framework; misuse of natural laws of energy-

saving, amount of movement, etc. adjusted to economic conditions; lack of theoretically substantiated constant parameters. These three causes, in our opinion, are the most important and prevent the transformation of economics into theoretical science (the fulfilment of the latter condition will make it theoretical-exact science).

The conditions of complex research of the process of corporate innovative and investment processes development were first described by us in, where the law of saving the amount of movement of an economic system was substantiated [33]. The theoretical basis of these methods includes the following elements:

1) suggesting the formalized economic conceptual framework that generalizes most economic parameters and singles out "reserve", "flow", etc. in the spaces of natural and monetary dimensions;

2) considering an inertial conditionally closed economic system (company, industry), where the output is constant Output = const, P_0 – the reference limit value of profit flow; T_p – estimated period of the use of the company's fixed assets (Fig. 1):

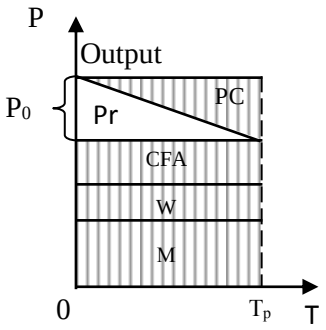

Fig 1: Main elements of the cost of output in an inertial economic system

3) removing the "neutral elements" that do not change in time from the production process: M materials, W – wages, and CFA – the cost of the use of fixed assets, and considering two elements – profits (Pr) and production cost (PC). The first element (profit) generates the function of investment cycle and the second – the function of depreciation cycle that defines the depreciation of fixed assets;

4) simplifying the model of technical change by Hicks, Harrod, and Solow developed in the methodology of production functions to concepts that use substantive parameters impacting the investment process by transforming from examining the production process (PF) to the investment cycle function (Table 1).

Table 1. Neutral types of the production process development ("neutral processes" do not change the price)

Type of technical change	The fixed parameter	Calculation formula
By Hicks	$C_{01} = C_{02}$	$P_{01} \cdot T_{p1} = P_{02} \cdot T_{p2}$ (1)
By Harrod	$T_{p1} = T_{p2}$	$\frac{P_{01}}{C_{01}} = \frac{P_{02}}{C_{02}}$ (2)
By Solow	$P_{01} = P_{02}$	$\frac{C_{01}}{T_{p1}} = \frac{C_{02}}{T_{p2}}$ (3)
Generalizing model	All parameters change	$\frac{P_{01} \cdot T_{p1}}{C_{01}} = \frac{P_{02} \cdot T_{p2}}{C_{02}}$ (4)

Note: C_{01} and C_{02} – initial cost of fixed assets before and after innovations are implemented

The transition takes place the following way. Three parameters are used in the PF: K – the cost of fixed assets, L – the number of employees, and Y – output. The disadvantage of this approach is that K and L are the reserves, while Y is a flow. The model is transformed into flows: K → Dd into depreciation deductions; L→ Pw into wages flow, but it is eliminated as a neutral element; Y→ P0 into profit flow. Next, we perform the invariant transformation of functions Y = f(K, L) → P0 = f(Dd) = f(K0, Tp), since Dd = K0/Tp. The result is that the graphs' functions are invariant – they are similar and have the same mathematical properties, i.e. the tangent lines to graphs intersect at the same points. However, it is hard to explain the economic content of these points according to the PF methodology, while it is rather easy according to the offered method, which is outlined in Table 1.

The major feature of suggested generalizing dependence is that the same permanent parameter is observed in it (as in all preceding ones) – investment's rate of return that can be turned into the constant one.

Having obtained the generalizing model of technical change and established the theoretical value of the investment's rate of return (RoR) amounting to RoR = e/2 = 2.718/2 = 1.359, where e is a Eulerian number (formerly called the Neper number), we have attempted to substantiate its statistical value. Meanwhile, rather strict conditions for the examined period must be observed: there mustn't be much inflation and crisis phenomena, profit taxation mustn't change, depreciation

deductions must be calculated following a unified methodology, etc. (Table 2).

The research resulted in making the following decision: the theoretical value of the investment's rate of return should be considered as the boundary, and the actual value of 1.5 as the statistical average.

Table 2. The investment's rate of return by types of economic activity (unit shares)

Years	2016	2017	2018	2019	2020	2021
Total investment's rate of return	1.410	1.408	1.450	1.561	1.617	1.660
manufacturing	1.534	1.441	1.531	1.568	1.581	1.488
agriculture	-0.048	0.687	0.969	1.062	1.022	1.183
construction	1.191	1.362	1.599	1.882	2.058	2.189
transport and communication	1.299	1.099	1.068	1.119	1.059	1.321
harvesting	1.655	1.354	1.222	0.929	1.134	1.151
supply and sale	1.724	1.921	3.608	3.176	3.463	3.397
trade	5.859	4.68	5.317	4.722	4.648	4.772

Source: compiled according to official data, [34].

The following algorithm is suggested to quantitatively research the parameters of obsolescence of fixed assets and plan the efficiency of corporate investment activity in a long.

1. Average production conditions (APC) are determined by sectoral efficiency (capitalization) coefficient, while, according to the suggested approach, it is the "capital turnover in relation to marginal profit" E_{om}

$$E_{0m} = \frac{\sum P_{0i}}{\sum C_{0i}} \tag{5}$$

2. New annual profit (P_{0i}) that will emerge at an *i* enterprise is determined by price index (I_p),

$$P_{oi}^{+} = Ip \cdot P_{oi} \ , \tag{6}$$

which is calculated by the formula

$$I_p = \frac{E_{om}}{E_{om}^{+}} \tag{7}$$

where sign "+ shows that a new parameter value is considered.

3. We determine new rates for the operational period of these enterprises. They are calculated based on the parameter of "amortization profitability" R_a, which is an economic acceleration that defines the change of intensity of fixed assets depreciation

$$R_{am} = \frac{\mathrm{P_{0m}}}{\mathrm{T_{pm}}} \tag{8}$$

As a hypothesis, we assume that the rate for the industry has a constant value (there are more complex calculation methods when the new value of the parameter can change as well).

Hence, an enterprise's operational period can be calculated by

$$T_{pi}^{+} = \frac{P_{0i}^{+}}{R_a} \ . \tag{9}$$

After the calculation, *the law of saving the amount of movement of an economic system* takes action: efficiency (turnover) of the conditionally closed economic system (industry) remains unchanged if the efficiency of its components (enterprises) changes.

The flaw of this wording is that the basic provisions are declared but there isn't any mechanism of its practical implementation. Therefore, most economists do not understand the way it works. Most of them simply argue that the law automatically takes action, and they have a point in this.

3 Results and Discussion

Let's consider the development options of the exogenous innovative process by the following input data (Table 3).

Based on the input data, the following should be accomplished:

1) calculating the rates of obsolescence at the first enterprise when the antimonopoly committee is taking actions;

2) examining what happens if the antimonopoly committee does not regulate the process and calculating the amount of fictitious capital.

Option 1. The antimonopoly committee takes actions (the basic methodology of calculations is outlined in [33]).

Table 3. Input data for enterprises

Parameters of enterprises	Reference	Measurement units	Enterprise	
			existing	new innovational
Initial cost of fixed assets	C_0	m	220	220
Initial value of annual income	P_0	m/y	26	38
Operational period	T_p	y	27	27

Note: m – abstract monetary unit of measurement; y – year.

1.1. By formula (5), we calculate the initial value of the industry coefficient of fixed assets efficiency (although it is more correct to call them "turnover") E_{0m}. It is worth considering the fact that initially, one enterprise was functioning, so its parameters matched the parameters in the industry. Therefore, they amounted to

$$E_{01} = E_{0m} = \frac{26\ m/y}{220\ m} = 0.118\ \ 1/m \quad (10)$$

where E_{01} and E_{0m} – turnover of the first enterprise (industry) in relation to marginal profit.

1.2. New value of the parameter will be calculated by the same formula (6)

$$E^{+}_{0m} = \frac{(26+38)\,m/y}{(220+220)\,m} = 0.145\,1/y \quad (11)$$

Conclusion 1: industry turnover of fixed assets has increased from the reference value of 0.118 to new 0.145. The existence of another innovative enterprise is the main reason for this growth. Its reference value is E_{02} = 38 : 220 = 0.173 (1/y). At first glance, it seems to be a very positive trend. Yet, according to the law of saving the amount of movement in a conditionally closed system (in this case, it is an industry), the efficiency should be constant.

1.3. We determine the price index that should be calculated by the antimonopoly committee by formula (7)

$$I_p = \frac{0.118}{0.145} = 0.8138 \quad (12)$$

This is the value by which the amount of marginal profit in the price of output should change.

1.4. We calculate new adjusted value of enterprises' marginal profit by formula (6)

$$P^{+}_{01} = 26 \cdot 0.8138 = 21.1588 \text{ m/y}, \quad (13)$$

$$P^{+}_{02} = 38 \cdot 0.8138 = 30.9244 \text{ m/y}. \quad (14)$$

Check: we should verify that industry efficiency hasn't changed

$$E_{0m} = \frac{\sum P^{+}_{0i}}{\sum C_{0i}} = \frac{(21.1588 + 30.9244)\,m/y}{(220+220)\,m} = 0.118\ 1/m$$

(15) Conclusion 2: the actions taken by the antimonopoly committee have equalized this monopoly market but the changes impact the activity parameters of individual enterprises – and, in the first place, their operational period T_p.

1.5. We determine new values of the enterprises' operational period.

First, by formula (8), we calculate the reference value of amortization profitability of the first enterprise (Fig. 2 a)

$$R_{a1} = R_{am} = \frac{26\ m/y}{27\ y} = 0.963\ m/y^2 \quad (16)$$

The operational period of an enterprise can be determined by the formula (9) because $R_a = R_{a1} = R_{am}$ = const

$$T^{+}_{p1} = \frac{21.1588\ y}{0.963\ m/y^2} = 21.972\ y, \quad (17)$$

$$T^{+}_{p2} = \frac{30.9244\ m/y}{0.963\ m/y^2} = 32.112\ y \quad (18)$$

Conclusion 3: an operational period of the first enterprise will reduce by 27 – 21.972 = 5.028 years. It is the consequence of the obsolescence of the enterprise's fixed assets. Instead, the operational period of the second enterprise will grow by the same period – 5.028 years (Fig. 2 d). Moreover, the Figure shows that the amortization profitability R_{am} in all final graphs (indicated by the dashed line) coincides with the initial value on Figure 2 a. Yet, the result can be different. Fig. 2 shows that if the commissioning time for the second enterprise t_c is getting closer to termination of the operational period of the first one T_{p1}, the decline in prices can force the first enterprise to cease its activities because, at new prices, it will

become unprofitable (shifted graph is located below the X-axis).

Option 2. The antimonopoly committee doesn't take any actions. In this case, the following processes will take place.

2.1. No changes occur at the first enterprise. Hence, no obsolescence takes place.

2.2. Efficiency of the second enterprise calculated by the formula (5) is

$$E_{02} = \frac{38\ m/y}{220\ m} = 0.173\ 1/y \qquad (19)$$

2.3. Industry efficiency will grow as well

$$E_{0m} = \frac{(26+38)\ m/y}{(220+220)\ m} = 0.14545\ 1/y \qquad (20)$$

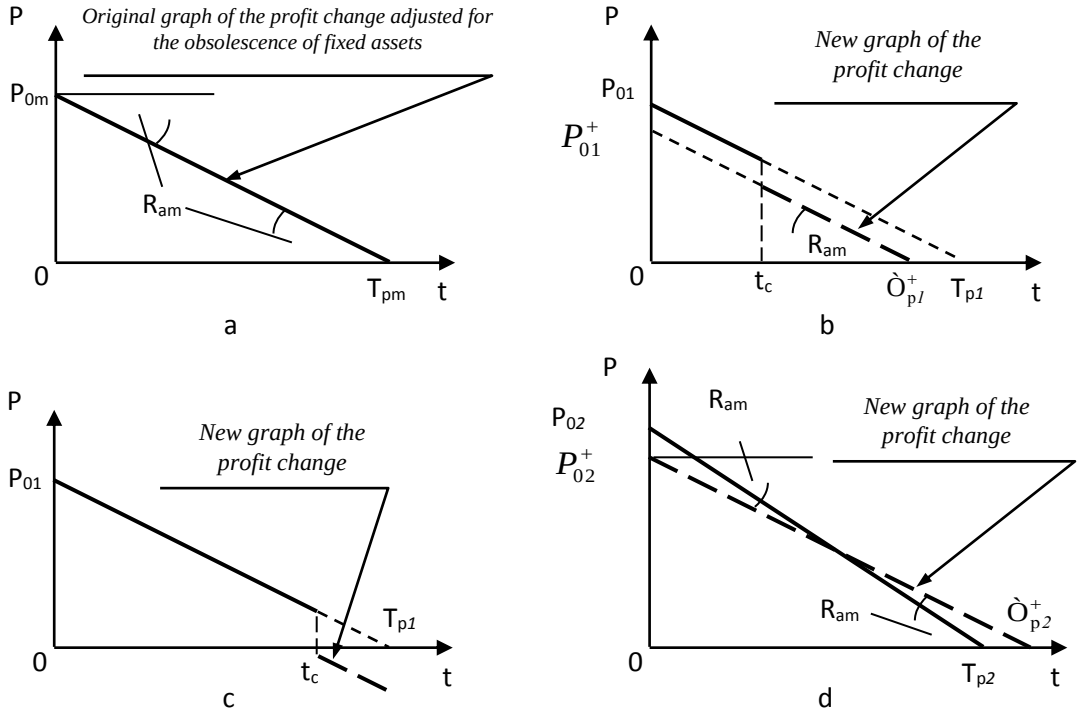

Fig. 2: Possible consequences of price regulation by the antimonopoly committee that is necessary after a new innovative enterprise starts operation, where t_c is its commissioning time

2.4. As a result, inflationary money will begin to accumulate at the enterprises in the amount of

$$P_{\inf l1} = P_{01} - P_{01}^{+} = 26 - 21.1588 = 4.8412\ m/y \qquad (21)$$

$$P_{\inf l2} = P_{02} - P_{02}^{+} = 38 - 30.9244 = 7.0756\ m/y \qquad (22)$$

Total amount of these money will be

$$P_{infl} = 4.8412 + 7.0756 = 11.9168\ \text{m/y} \qquad (23)$$

2.5. It will affect the stock market even more because the fictitious capital will begin to accumulate. If we assume that the bank interest is E% = 0.1 (10%), the capitalization of these enterprises (value of their shares) can be calculated by the traditional formula – the ratio of profit to bank interest. For these enterprises, it will be

$$C_{s1} = \frac{26}{0.1} = 260\ (m), \qquad (24)$$

$$C_{s1} = \frac{38}{0.1} = 380\ (m) \qquad (25)$$

Theoretically justified value of shares is

$$C_{s1} = \frac{21.1588}{0.1} = 211.588(m),\quad C_{s2} = \frac{30.9244}{0.1} = 309.244(m) \qquad (26)$$

So the amount of fictitious capital will be

$$C_{fict} = (260 + 380) - (211.588 + 309.244) = 119.168\ \text{m} \qquad (27)$$

The following conclusions can be made: if the current amount of fictitious capital accumulation is, for example, 10 monetary units, it substantially grows on the stock market – up to 100 monetary units; as a result, the fictitious capital, in case of its accumulation, can lead to the crisis on the stock

and financial markets – securities market and bank institutions.

4 Conclusion

Unfortunately, it has been almost impossible to carry out economic-statistical research in Ukraine since it gained independence in 1991. That's because the war with Russia started the moment the independence was declared. The first phase was the financial-economic one. Since all main banks were public and the headquarters were in Moscow, all deposits were transferred to Moscow ("stolen"), taking advantage of the fact that Ukraine's banking system wasn't fully formed. In 1992, Ukraine was forced to start using its own means of payment – karbovanets represented by the National Bank's coupon. This volatile currency and other factors caused hyperinflation that ended in 1996. The monetary reform was conducted the same year, and a new national currency was introduced – hryvnya. Canada helped Ukraine to issue its first hryvnyas. Next, there were the financial crises of 1998 and 2008 and the beginning of military operations with Russia in 2014, which grew into an active phase of the war in 2022. During the entire period of independence, Russia has never ceased its energy, political, and information provocations against Ukraine. All of the abovementioned did not contribute to its economic development.

Based on the conducted research, the following general conclusions can be made:

1) complex economic processes, including investment, can be mathematically simulated and examined only based on the formalized economic apparatus because verbal and descriptive methods used in traditional economics are inadequate;

2) innovative process constitutes a complex multidimensional economic phenomenon that can generate both positive features and negative consequences – obsolescence of existing enterprises (some of them can prematurely cease their activities) or accumulation of fictitious capital that can cause an economic crisis. As a result, the negative processes can undermine all positive achievements obtained from innovative development;

3) the interests of an enterprise and the country in general in terms of innovative development are considerably opposite – the former tries to maximize the amount of obtained excess profits by implementing innovative activities and achieve competitive advantages, while the state should control and regulate the process (decrease the amount of excess profits) because it can lead to accumulation of substantial amounts of fictitious capital and thus – to the financial crisis in the country;

4) to substantiate the methods of public control and regulation of economic profit amount (excess profit) obtained in various industries, additional research should be conducted with consideration of the following factors: industry and market features – monopoly (natural monopoly), oligopoly, competitive market, etc.; whether an industry (market) is new, starting to form and develop, or exists for a long time; methodological substantiation should be based on a unified theoretical foundation..

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