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SYSTEMATIC APPROACH TO MANAGING THE INVESTMENT PROCESS MANUFACTURING ENTERPRISE BY REDUCING THE LEVEL OF ITS ECONOMIC SECURITY FROM EXTERNAL AND INTERNAL INFLUENCES

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Системний підхід до управління інвестиційним
процесом виробничого підприємства при зниженні рівня
його економічної безпеки від зовнішніх і внутрішніх
впливів.*

Розглядається інвестиційний процес виробничого підприємства в умовах впливу на нього зовнішніх та внутрішніх збурюючих факторів. Для проведення економічно безпечного інвестиційного процесу пропонується схема управління на базі системного підходу. Для аналізу функціонування інвестиційного процесу сформована адаптивна модель управління при наявності зовнішніх та внутрішніх збурюючих впливів.

Ключові слова: інвестиційний процес; збурюючі фактори; економічна безпека; системний підхід; адаптивна модель; результуючі показники

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Системный подход к управлению инвестиционным
процессом производственного предприятия при
снижении уровня его экономической безопасности от
внешних и внутренних воздействий.*

Рассматривается инвестиционный процесс производственного предприятия в условиях воздействия на него внешних и внутренних возмущающих факторов. Для проведения экономически безопасного инвестиционного процесса предлагается схема управления на базе системного подхода.

Ключевые слова: инвестиционный процесс; возмущающие факторы; экономическая безопасность; системный подход; адаптивная модель; результирующие показатели

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Systematic approach to managing the investment process
manufacturing enterprise by reducing the level of its
economic security from external and internal influences.*

Considers the investment process manufacturing enterprise in the conditions of influence of external and internal disturbing factors. For economically safe investment process proposed control scheme on the basis of a systematic approach. To analyze the functioning of the investment process formed the adaptive management model in the presence of external and internal disturbing factors.

Keywords: investment process; disturbing factors; economic security; system approach; adaptive model; the resulting performance

The investment process is one of the core business processes of manufacturing enterprises. Like other business processes the investment process (IP) is influenced by both internal and external factors [1, 2]. The most dangerous are factors that significantly reduce the security of the investment process [3, 4]. Therefore the problem of preservation and stabilization of the investment security is quite relevant.

The aim of the article is to develop a system of management of investment process of the production enterprise, to ensure his safety.

The main part

The key and first step towards the creation of a system of management of investment process manufacturing company is measuring the level of compliance of indicators of the status of their normative values and the implementation of feedback, otherwise the evaluation of the functioning of the investment process. The solution lies at the intersection of many sciences and technologies:

- General Management Theory, system-oriented analysis;
- Management theories;
- Applied mathematics, data analysis methods;
- Quality control;
- IT-technologies;
- Psychology, physiology, sociology;
- Expert estimates.

Successful development of such a system is impossible without a systematic approach. It has found wide application in studies of management of organizations, leading commercial activities [5]. The initial position of the system approach is the availability target that is considered the most important characteristic of the organization as a complex, open, controlled, dynamic systems with purposeful action.

When you create a system of management of the investment process necessary to determine the control object (the driven part) and the subject of management (management part), and to determine the inputs and outputs of the system.

In the management of the site, it is important to know what tools and through what channels of effects can be achieved, these and other goals.

The object in the control system, which is developing, is the investment process. As the subject of management is a group of specialists who perform the corresponding functions of control in relation to the object

Investment process as a control object is subjected to different types of impacts that can be divided into external (W) and internal (V). External and internal influences at the entrance of the facility, leading to unwanted changes in the state of the object, called the disturbing action. Internal influences for the persistence of the object or purposeful change, is called the control actions (CA).

External influences form the vector W_j , where $j = 1 \div m$. To external influences include: legislative and legal support, product competitiveness of the enterprise, reliability of suppliers and customers, the ecology of the region, the socio-political environment of the region, the security of the Bank's support, etc.

Internal influences form the vector V_i , where $i = 1 \div n$. The internal influences include: the financial condition of the company, the level of technical and technological support, human resources, strategic and operational planning, socio-psychological climate of the company and others.

Control actions form a vector U_l , where $l = 1 \div k$. Control action is implemented, management decisions (MD) to compensate for internal and external influences, ensuring stable functioning of the investment process. Control actions are generated on the basis of management decisions developed in accordance with tasks or goals.

The performance of the process form a vector P_q , where $q = 1 \div b$. This level of support, timing of investment, the degree of use of resources, evaluation of intermediate results, degree of risk and security investment process. These result indicators allow to establish qualitative and quantitative characteristics for assessing the course of the investment process. In terms of stability of the investment process, these indicators are referred to as normative or target indicators (P^*_q). However, under the influence of internal and external factors, the resulting indicators of the process state change, indicating undesirable changes in the functioning of the process. It is possible to speak about such an important feature of the safety flow of the investment process.

Security investment processes includes different kinds: financial, legal, international legal, environmental, technical, technological, human, social-psychological, etc.

A possible connection between the input effects on the object and the results of such effects on the output can be shown on a parametric model (Fig. 1).

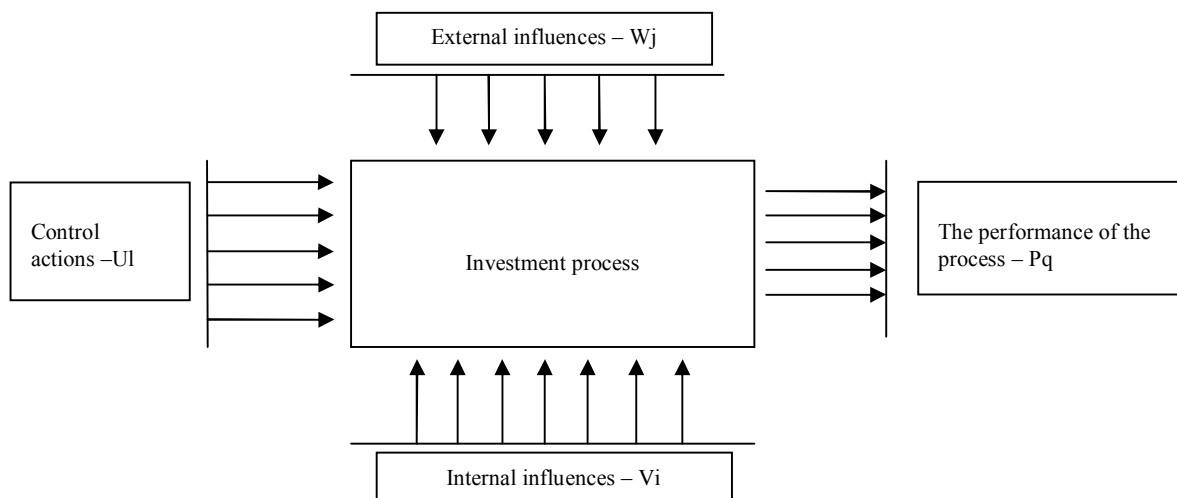


Fig. 1. A parametric model of the investment process

This model allows us to identify the channels through which the inputs affect the resultant settings. Thus it is necessary to obtain qualitative and quantitative characteristics of these channels.

Quality features allow you to classify the channels according to the degree of influence of input variables on the resulting performance.

1) Internal influences – the resulting settings on the grounds:

- low impact: pay no attention;
- significant impact: take action;
- dangerous effect: scramble.

2) External influences – the resulting settings on the grounds:

- low impact: pay no attention;
- significant impact: take action;
- dangerous effect: scramble.

3) Control action – result indicators:

- slight impact;
- sufficient impact;
- excessive impact.

Quantitative characteristics allow to identify groups of influence of input variables on the resulting performance.

- One input parameter affects a single result parameter (the scheme one-to-one).
- One input parameter affects multiple result parameters (scheme one-to-many).
- Several input parameters affects a single result parameter (schema many-to-one).
- Several input parameters affects multiple result parameters (schema many-to-many).

This characterization of channels necessary for the formation of managerial decisions. Under the influence of internal and external influences is deviation of the resulting parameters from their standard values (P_{nq}):

$$\Delta_q = P^n_q - P_q$$

where Δ_q – vector of errors of control.

The emergence of such variances demonstrates the need for the application of new control actions, under

which the vector of error of control accepts null values ($\Delta_q = 0$).

In such situations, the management of the investment process is implemented in three stages. At the first stage of the analysis goal, the study and definition of the object state, characterized by the values of the resulting indicators and managerial decision making. The resulting indices are estimated as a function of three variables:

$$P_q = f_1(V_i, W_j, U_l)$$

In the second stage the best of taken MD using certain tools (I_Z) is converted into control actions. The third stage is monitoring the implementation of decisions, evaluation of results and, if necessary, correction of management decisions [6, 7].

The process of formation MD and CA presented on Fig. 2.

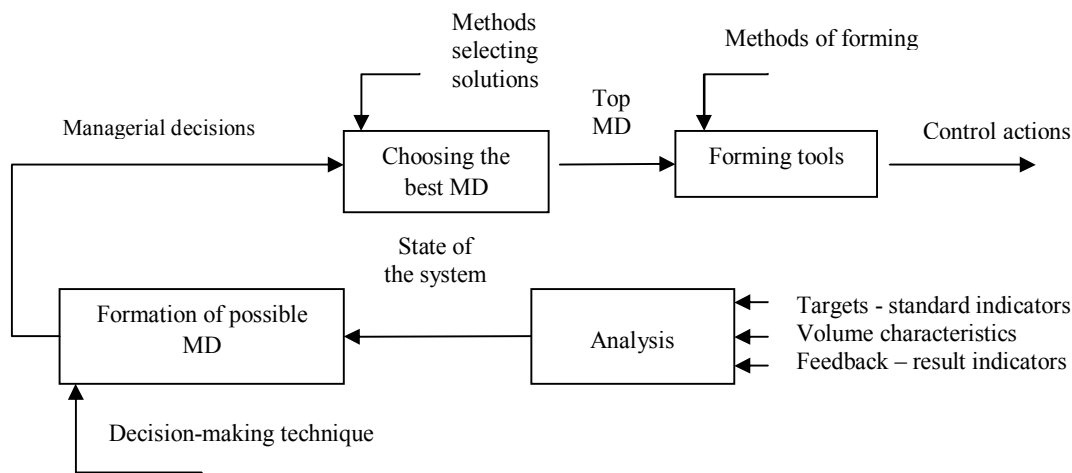


Fig. 2. Diagram of the forming of MD and CA

Stages of management of investment process can be represented as a set of procedures [8]:

- statement of purpose;
- comparison and analysis of summaries and statutory indicator (goals);
- determining the status of object and system;
- the development of alternative options for CA;
- criterion selection;
- the identification and evaluation of risks;
- choosing the best CA;
- the formation of impact tools;
- the formation of CA and their implementation;
- results control.

Scheme of management of the investment process that implements these procedures on the basis of the system approach, is presented in figure 3.

The control action is generated as a function of three variables:

$$U_1 = f_2(\Delta_q, I_Z, X_{ин}),$$

where $X_{ин}$ – characteristics of the investment process.

To assess the efficiency of functioning of system of management of the investment process it is necessary to form a system model and perform analysis based on this model. Modeling is an essential

step of any targeted activities, including research of the management of the investment process.

In some cases, modeling has several advantages compared to the study of the real object. Models is the organizational structure which displayed in the form of a block diagram, the circuit operation of the unit and even job descriptions as a model of the intended behavior of people with regard to their rights and responsibilities within the enterprise.

To the main advantages of the research of the behavior of the object with the help of model include:

- the simplicity of the experiment;
- visualization of the results;
- the ability to play the most important properties of the object;
- identifying the main factors influencing to the characteristics of the object.

When developing the model, there are four stages.

1st stage – description of the model inputs, i.e., a representation of the list of inputs of the system. For the dynamic model, the input must be a function of time.

Object management - investment process of the enterprise is characterized by three groups of inputs, as shown in Fig. 1.

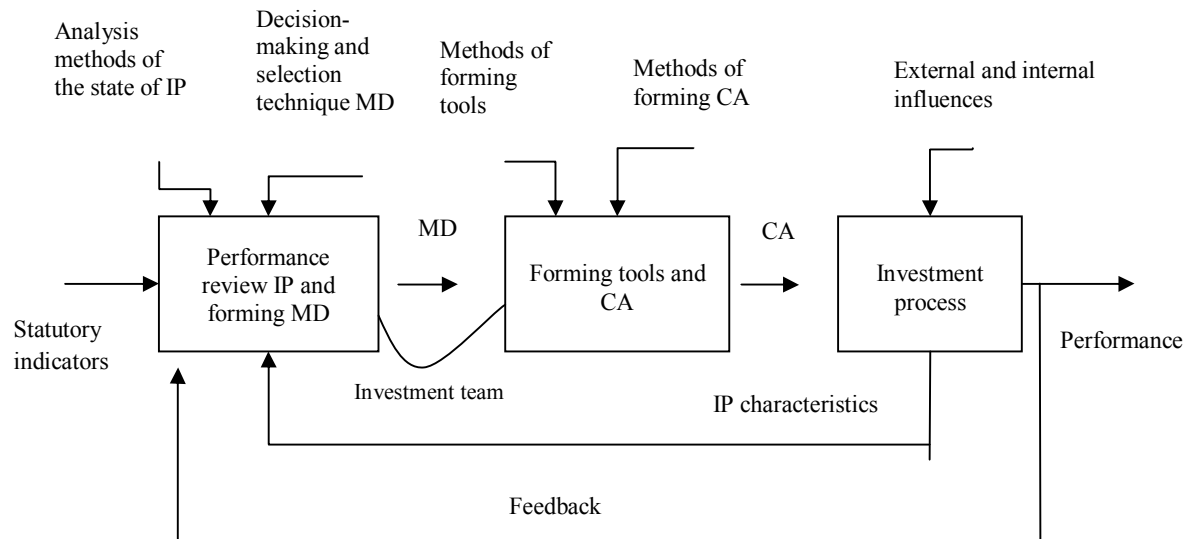


Fig. 3. Control scheme based on systematic approach

Is a vector of management actions, the vector of external effects and the vector of internal influences 2d stage – description of external influences. For this purpose, the results of PEST-analysis of external

environment factors that are affecting the enterprise [9]. External influences that are affecting the investee, are presented in table 1.

Table 1. Factors of external influence

Criterion of classification	Factor
1.1. Political factors	The stability of the political situation in the country
	Lobbying of interests of certain activities, industries or other political force
1.2 Regulatory factors	Regulatory framework regulation of economic activities in the country
	State regulation of development of the internal market
	State control over the activities of the company
1.3 Financial-economic factors national and regional level	The trend and phase of development of the world economy (recession, crisis, growth, peak)
	The volume and structure of national production and consumption, mutual consistency of volume and structure
	The competitiveness of products of domestic production
	The level of development of the internal market, economic and financial infrastructure, competition, or monopolization of markets
	Rate of inflation
	Economic activity of the population
	The investment climate
	Sectoral structure of the economy
The level of development of inter-sectoral linkages	
1.4 Demographic and sociocultural factors	Age and sex structure of the population
	The social structure of the population
	The level of education and culture of the population
	The tendency of the population towards entrepreneurial activity
	The quality of life of the population
1.5 Industry factors	The volume and structure of the consumer market
	Volume and the supply structure of consumer goods
	The state of competition in the market
	The level of shadow sector
	Provision industry qualified professionals
	Scientific and technical support for development of the market and industry
1.6 Ecological factors	The system of environmental liability at national and regional levels
	Local models which provide sustainable and environment-friendly development solutions
	The regulation of socio-economic processes in the country to solve resource and environmental problems
	State policy in the sphere of natural resource use and greening
	The use of environmentally friendly resources and energy saving technologies, with no - or low-waste closed production cycles
	Requirements of resource-ecological safety
	Environmental responsibility of enterprises
	The quality of domestic environmental equipment, technical means and technologies
The expenditure of enterprises on environment	

3d stage – description internal influences, which may be permanent and variable. Variables effects are time-varying. Internal exposure is presented in

table 2, where they reflect the strengths and weaknesses of the invested enterprise [9].

Table 2. Internal factors impact

2.1 Resource and technological factors	Material and technical base of the enterprise
	The volume and structure of capital of the company
	The resources of the enterprise and their negotiability
2.2 Organizational, social and managerial factors	Organizational and legal form of the enterprise
	Stage of the enterprise life cycle
	The overall strategy of the enterprise activity
	Organizational structure of management
	The presence of the security system of the enterprise
	Personnel qualifications
	The system of motivation of personnel of the enterprise
2.3 Financial and economic factors at the enterprise level	Compliance with internal regulatory documents with applicable laws
	The level of profitability
	The ratio of current assets and current liabilities
	The volume and structure of current assets
	Current current assets
	The balance of cash flows
	Enterprise investment policy
	Management of financial risk receivables and payables

4th stage – the compilation of the mathematical description of the model (algorithm development). At this stage are defined by mathematical procedures of

processing all types of incoming information: status of inputs, external and internal exposure.

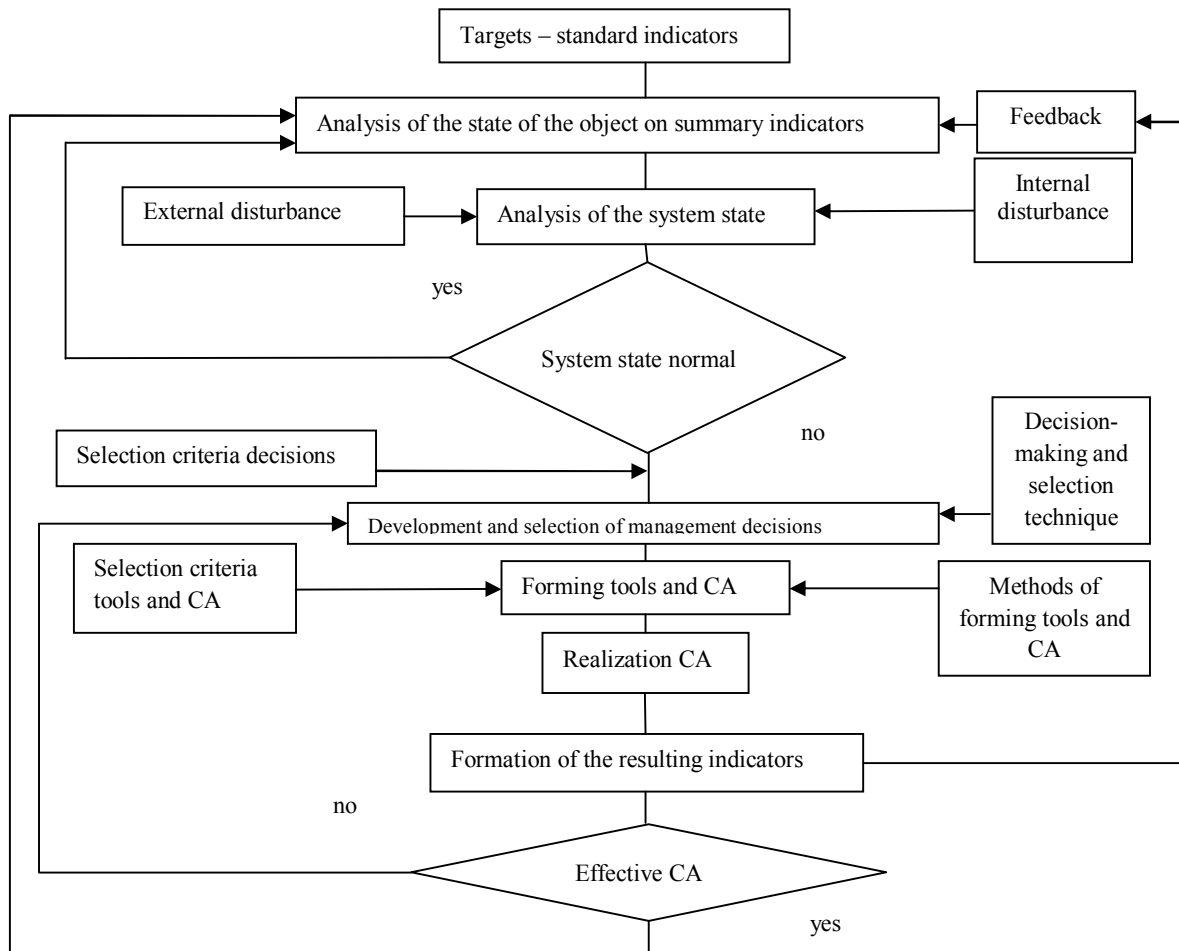


Fig. 4. The model of functioning of management system

In Fig. 4 presents the model of management of the investment process.

The proposed model allows to analyze the behavior of the system under internal and external influences on the investment process of a production company. Analysis results of the management system of the investment process allow to carry out the

proved choice of management decisions and tools for their implementation for the purpose of stabilization of the resulting indicators and the investment process.

Conclusions

Thus it is possible to ensure the safety of the investment process with different effects on it.

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