EXPRESS-ANALYSIS OF INDUSTRIAL ENTERPRISES TAKING INTO ACCOUNT CONCERTED PREFERENCES OF PARTICIPANTS OF THEIR INVESTMENT DECISIONS

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The paper considers new approaches to solving the problem of taking investment decisions, coordinated by methods of active expertise, by express-analysis of innovation resources of industrial enterprises and modeling of preferences of participants of taking investment decisions.

Last years stable economic growth in the Russian economy and prospects of economic growth in the future is joined significantly with increasing investment activity in industrial enterprises by producers.

Nowadays in the economy of the Russian Federation there is a difficult situation, when tasks of supporting of high rates of economic growth, diversification of production and increasing of competitiveness of native goods, have not been fortified by dynamic of investment. Now there is required long-term, stable rates of growth of investment in base capital, outrunning the dynamics of Gross Domestic Product in order to not only repair the stock in economy, but also to generally modernize, it providing better opportunities of output of competitive native products. At the same time, as shown over the last few years, inertial development of this process did not give expected results. To overcome of inertia it is necessary and obvious economic policy to actively stimulate the investment process and business to achieve the aim, supported by proven scientific methods.

This article considers new approaches to solving the problem of taking investment decisions, coordinated by a method of active expertise, based on express-analysis of innovative resources of industrial enterprises with linear production functions and modeling of preferences of participants for taking investment decisions, the results of which are agreed on by methods of active expertise.

Inductive approach to construction and the use by industrial enterprises of production functions in tasks of preinvestment economic analysis is more preferable in modern conditions. It is explained that procedures of inductive performance of production functions use technological functions of real production, which are directly interested in investment changes, which touch the most significant aspects.

Preinvestment analysis of industrial enterprises[1], emanated from inductive approach and is based on approximated extravagant functions, despite being accompanied by errors, is able to cover more users, if there are suitable mathematics (algorithmic) provided. Algorithmic bases of this express-analysis can be oriented to a simple model of approximated production function with next generalization to more difficult cases.

Function of total expenses $C(Q)$ in linear form (this function is production function in back form), built for investment resource, is shown on fig. 1.

It is suggested that for every economic resource ϑ_j from majority θ is realized a semi linear approximation of its function of expenses and in interval $[Q_{min}, Q_{max}]$ and it continious and have linear form

$$C = a_0 + a_1 Q .$$

Other sphere of linearity with other parameters is situated left of this interval, i.e. this interval will accept the last in a semi linear performance of production function, on which as the rule is decided the problems of optimization.

As figure 1 show, gradient angle α of function joined with coefficient of propor-

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Fig. 1. **Function of total expenses $C(Q)$ and production function $I(Q)$ for investment resource in back form**

tionality a_1 (its limit value) by correlation $a_1 = tg\alpha$.

There is suggested a covering of expenses through investment capital I, by substitute we can realize the transition from function of total expenses $C(Q)$ to one-factor production function in back form $I(Q)$ for factor of investment climate I, integrated the other economic resources in money. After transformation of linear function (1): , we can consider its as one-factor production function in direct form with coefficient of proportionality $1/a = tg\beta = 1/tg\alpha$ in interval $[Q_{\min}, Q_{\max}]$, where addmitedly found optimal decision (I_{opt}) with error $Q_c^{'} - Q_c$.

Linear representation of production function allows us effectively, with little expense, to specify a majority of tasks, models, pertained to investigate by means of express-analysis. In this case it is noticed that the aim of this investigation is the estimation of preinvestment state of considering production and search of ways of achievement to a sufficient level of investment attractiveness. This circumstance leads to an understanding of practicability of identification of these ways and classification of investment models, pertaining to an investigation according to the specifics of express-analysis.

Investment development of that or other production should be joined with internal and external circumstances as shown on figure 2.

Internal circumstances r_1 suggested the change of production, shown through production function:

а) displacement of working point to side of increasing ($У$) production volume that was justified in case of its profitability, existing of enough demand and opportunity to expansion;

б) expansion ($Р$) sphere of enough values of production volume by influence of increasing demand, required because of the existence of «narrow places» in the enterprise, moving away of high border of production function;

в) increasing of limit productivity (low profitability) on the basis of innovation (I), by increasing (for production function in back form) or deacreasing (production function in direct form) inclination of linear sphere.

External circumstances r_2 and r_3 influence development of production function by 2 factors: price of base product $Ц_п$ on the product market P_Q and resource price P_I, in this case the resource price of investment capital on finance market $Ц_р$. Dynamics of these factors is essential by substantiation of investment attractiveness.

Then we give the scheme of classification of investment models of express-analysis (figure 2). Table 1 suggests numeration of models and variants of mnemonic equivalents, opened in their optimal features. By this symbol V mean fluctuating of parameter of classification, but $\overline{V}$ is permanent. Number of model is formed as it shown down: r_1 – first figure, r_2 r_3 – sec-

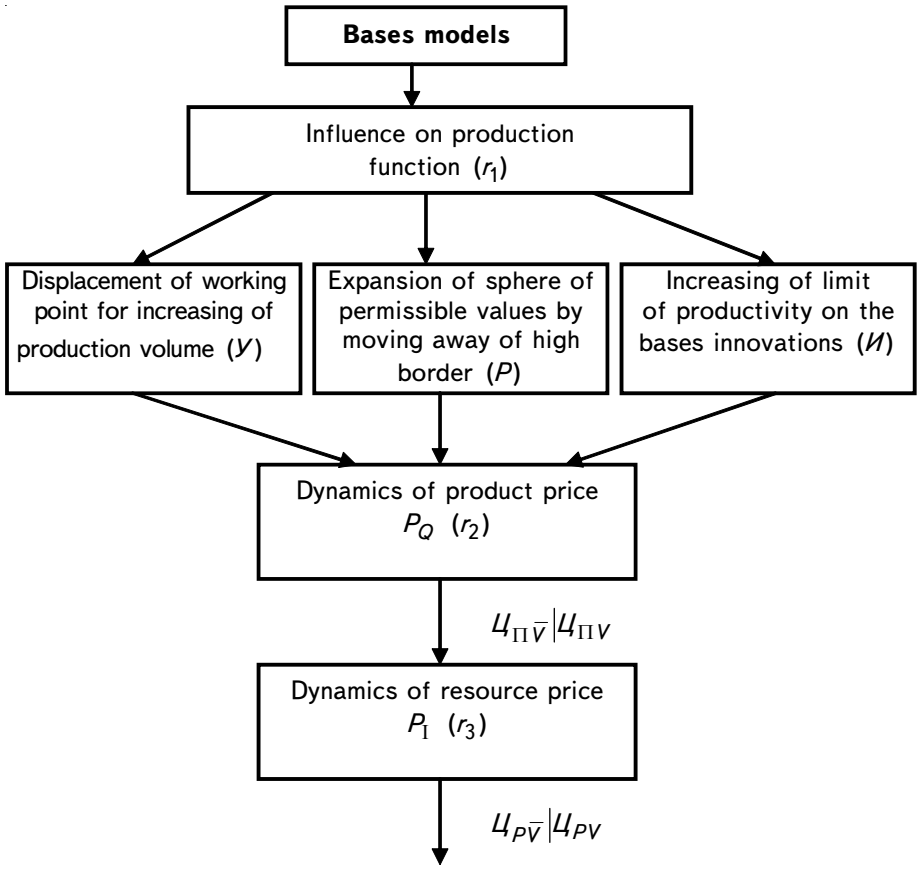

Fig. 2. **Classification of base models of express-analysis**

ond, getting from two-digit dyadic figure, transferred to decimal system.

There is effectually the separation of 5 base models - M_{10}, M_{11}, M_{12}, M_{20}, M_{30}, which are different to the consideration of one single factor from 5 in this express-analysis for rationalization of program of investigation of models of table 1 Further given experience can be spread systematically to other models.

Results of investigation of base models can be used for express-analysis of expanding structure of models of combined appointment as composition from bases.

We can say that base models are realized by the identification (model M10) and transformation (other models) of indexes of quality of investing object according to assignment. It permits us to suggest the practicability of use

Table 1

Classification of base models of express-analysis

Number of models	r_1			r_2		r_3		Mnemonic parity
	Y	**P**	**И**	$Ц_{\Pi\bar{V}}$	$Ц_{\Pi V}$	$Ц_{P\bar{V}}$	$Ц_{PV}$	
M_{10}	1	-	-	0		0		$Y\ Ц_{\Pi\bar{V}} Ц_{P\bar{V}}$
M_{11}	1	-	-	0			1	$Y\ Ц_{\Pi\bar{V}} Ц_{PV}$
M_{12}	1				1	0		$Y\ Ц_{\Pi V} Ц_{P\bar{V}}$
M_{20}	-	2	-	0		0		$P\ Ц_{\Pi\bar{V}} Ц_{P\bar{V}}$
M_{21}	-	2	-	0			1	$P\ Ц_{\Pi\bar{V}} Ц_{PV}$
M_{22}	-	2	-		1	0		$P\ Ц_{\Pi V} Ц_{P\bar{V}}$
M_{30}	-	-	3	0		0		$И\ Ц_{\Pi\bar{V}} Ц_{P\bar{V}}$
M_{31}	-	-	3	0			1	$И\ Ц_{\Pi\bar{V}} Ц_{PV}$
M_{32}	-	-	3		1	0		$И\ Ц_{\Pi V} Ц_{P\bar{V}}$

of functional approach in the task of expansion of structure of type models. The main idea of this approach is a formalization of descriptions of station, way of behavior and choice of way of behavior of difficult system.

The task of expansion of base models of express-analysis to type situations of preinvestment investigation of enterprises was solved, but it is necessary to notice that fact of the existence of economic objects investigation models does not guarantee getting investment decisions.

Efforts of all interested people in relation to solving co-coordinated investment decisions must be concentrated in development of model of preferences[2].

The task of the coordination in general cases of different interests of participants of solving investment decisions it is suggested to decide on the basis of procedure of active expertise, traditionally elected as mean of protection from manipulation by expert data.

Suggest:

N — members of consultant committee solving coordinated investment decisions;

M — majority of variants of investment decisions;

K — quantity of private criteria of estimation of majority of variants of solving investment decisions in scale [1,4];

$_n(\ _1, \dots, \ _{|K|})$ — model of preferences n-th member of consultant committee, that cause the estimations $(\ _1, \dots, \ _{m})$;

It is suggested 2 technologies of solving decisions for calculation of the more preferable variant of investments. First technology is suggested for getting the majority of qualitative estimations S_m^n of all variants of investment projects $m = \overline{1, M}$, in accordance with model of preferences $_n(\ _1, \dots, \ _{|K|})$. In next stage for every variant of investment by method of active expertise is established conformal estimation $S_{согл}^m$. Coordinated decision will choose the investment variant, coordinated estimation of which will be most.

If we have the inequality of voices of members of consultant committee that task is decided by method of active expertise, i.e. separate members of consultant committee corresponds to the appropriate quantity of simple members with equal judgment.

For a case, where $N = 5$, $M = 3$ in certain example of preference of experts was formed in table 2 on the basis of the model of their preferences. Conformal estimations of these variants, allocated in the last column of this table was calculated by method of active expertise by use of special program (figures 3-5).

This technology can be referred to the category of disposable, i.e. all experts took part in the procedure of solving each invest decision.

Second technology is suggested for the development of the majority of the range of parameters of abstract investment projects, covering all spheres of definition of this investment direction. In our next example this majority was got by increasing the number of projects to 7 (table 2).

Majority of coordinated estimations (right column of table 2) is the model of coordinated preference of experts, as in this model it is suggested to consider the model of preference

Table 2

Results of formation of coordinating estimations, decisions and preferences of experts

Objects	Experts					Coordinating
	1	2	3	4	5	
1	2,3	2,4	2,2	2,7	2,1	2,3
2	2,5	2,2	2,1	1,8	2,4	2,2
3	1,9	2,8	2,5	1,7	2,8	2,5
4	1,8	1,4	1,6	1,3	1,6	1,6
5	2,8	3,1	2,9	3,3	3,2	2,9
6	3,4	3,1	3,3	2,9	3,6	3,1
7	3,8	3,4	3,5	3,9	3,7	3,4
СКО	0,87	0,30	0,26	1,30	0,77	

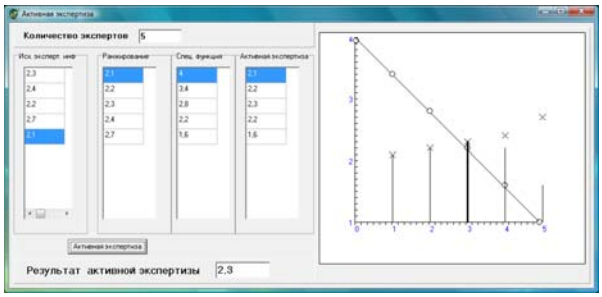

Fig. 3. **Coordinating of estimations of first investment variant**

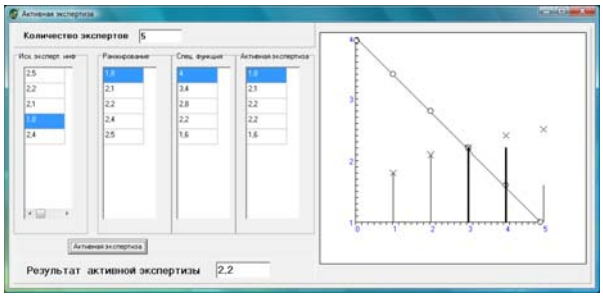

Fig. 4. **Coordinating of estimations of second investment variant**

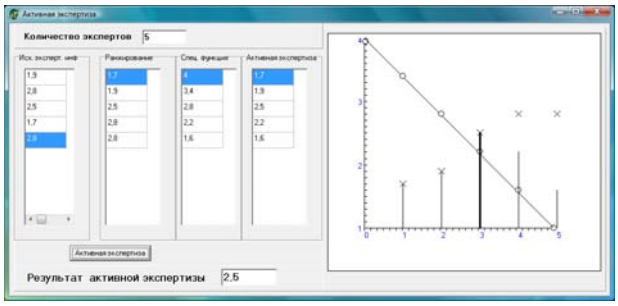

Fig. 5. **Coordinating of estimations of third investment variant**

of expert, for example for criteria of mean-square deviation.

$$\sqrt{\qquad (\qquad\qquad) \ .}$$

As coordinated model of preference is accepted the preference of expert with index $\overline{n}$: $F^{согл} = F_{\overline{n}}$, to which corresponds the minimum CKO: $\overline{n} \quad Ind \min_{N} CKO_n$. In our example initial coordinated model of preferences corresponds to the model of preference of third expert.

It is noticed, that technology of modeling of preferences together with supporting the solution of decisions provided the justification, transparency and documentation of this difficult, in many spheres contradictory process and consequently this technology posses quality that required in modern conditions.

Though, suggesting approaches to solving the problem of decreasing inertia in the development of investment process on the basis of using express-analysis of investment resources of industrial enterprises with the help of linear production function and models of preferences of participants of solving of investment decisions permits improvement of the dynamics of investment activity of industrial enterprises.

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