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On the management of an industrial enterprise based on potential indicators

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Abstract

The article is devoted to the consideration of potential indicators as tools of operational and strategic management. Within the framework of operational management, it is necessary to maintain the achieved level of development, and strategic management should be aimed at developing the capabilities of the enterprise, its potential. The operational and strategic parameters of ensuring the competitiveness of the enterprise are identified. To build the indicators of potential, strategic structures of the enterprise have been formed, showing a quantitative representation of the economic, technological and organisational structures of the enterprise (in the form of grouped costs in a certain way). Based on the use of strategic structures, the actual and target values of the enterprise's potential as criteria for assessing the level of development in economic, technological and organisational terms are formed. The use of strategic structures makes it possible to carry out operational balancing of the company's expenses when the actual costs exceed the planned level, as well as to change the company's structure during the transition to the manufacture of new products or for the purposes of crisis management.

Keywords: competitiveness, strategic structures, enterprise potential, cost balancing, operational management, strategic management, restructuring.

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基于潜力指标管理工业企业

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摘要

这篇文章讨论了潜力指标作为业务和战略管理工具的。实行业务管理需要保持已实现的发展水平，而且战略管理的目的是发展企业的能力和潜力。作者确定了企业竞争力的操作和战略参数。为了建立潜力指标，成立了战略企业结构：企业的经济、技术和组织结构的定量表示 （以某种方式分组的费用）。基于战略结构的应用，生成了企业潜力的实际值和目标值，作为评估经济、技术和组织发展水平的标准。当实际成本超过目标水平时，使用战略结构可以对企业成本进行业务平衡。而且在引进新产品或进行危机管理时，也有助于公司的重组。

关键词：竞争力、战略结构、企业潜力、成本平衡、业务管理、战略管理、结构调整。

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Introduction

Managing an industrial company involves the processes of operation and development.

Functioning is the cyclical repetition of the same actions, the quality of which is determined by the stability of the rhythm. In this process it is necessary to maintain the level of development achieved earlier during the implementation of the previous cycle of strategic management.

The development of an enterprise, which is an object of strategic management, involves reaching a new level, which provides opportunities for more successful functioning [Katkalo, 2011; Novikov, 2023]. The need for development is due to changes in the external environment of the organisation, which can lead to a decrease in the efficiency of functioning processes, profits and, potentially, bankruptcy [Novikov, Ivankovich, 2016]. A special place in management is occupied by anti-crisis management, which includes a way out of an already existing crisis, overcoming unprofitability. A necessary condition for the survival of an enterprise is the presence of profit, therefore, faced with the impossibility of increasing the volume of production or rapid diversification; the enterprise pursues a policy of cost reduction, which in turn contributes to a decrease in the level of development achieved by the enterprise, but ensures its survival.

In order to manage the development process and regulate the functioning of the enterprise, quantitative assessments of the level of development are necessary. It seems that the indicators of the industrial potential of the enterprise, estimated on the basis of the cost shares of an operating enterprise, can be considered as such.

Based on product parameters, target values of potential indicators (cost shares of current or planned products) can be formed. It is a management task to ensure that the actual values meet the target values.

In the context of anti-crisis management, potential indicators can also serve as benchmarks for a company and allow it to choose a more appropriate option from a long-term perspective. The present article considers these questions. The study aims to develop indicators of the company's potential and to examine the possibilities of using these indicators in operational and strategic management.

The following tasks were set in the work:

- Study of parameters of competitiveness of enterprises in the short and long term;
- Development of potential indicators of enterprises;
- Consideration of the issue of using potential indicators for cost balancing in the framework of operational management, as well as for managing the structure of the enterprise in the framework of planning the release of new products.

The methodology of this study consists in the application of methods of aggregation of enterprise resources, mathematical modelling, as well as general scientific methods of analysis and synthesis.

1. Parameters of enterprise competitiveness

When assessing the parameters of enterprise competitiveness, the author of the study made the following methodological assumptions:

- - External setting of the enterprise management channels, since it is the effectiveness of the interaction of the enterprise with the external environment that determines the profitability or unprofitability of economic activity, the economic feasibility of the existence of the enterprise as such;
- Differences in operational and strategic parameters of management (the former are related to current activities, functioning of the enterprise, the latter - to development of the enterprise, selection and practical implementation of one of the alternative strategic options). The functioning of the enterprise is characterised by a certain repetition of actions, the stability of the rhythm. Development processes lead to the actual destruction of the established order, but should contribute to the increase of the efficiency of the enterprise's exchange processes with the external environment, operational efficiency, entry into new markets, release of new and updated products, etc;
- The possibility of assessing the level of development based on the ratio of cost components. In the course of development, the company goes a long way, and progressive development is characterised by an increase in the quality and knowledge intensity of products, a gradual transition to mechanised and automated means of production, with a corresponding complication of management, equipment used and an increase in the importance of production preparation structures;
- Dependence of production on the industrial environment, requirements for manufactured products, applied industrial technologies, market capacity and the cost level determined by the price of the product formed on the market. In some cases, enterprises have structural inadequacies or redundancies, which contribute to an increase in production costs and the duration of the production cycle, while possibly reducing the level of product quality. In other words, the real problem is the choice of ‘structural standards’ of enterprises that provide the necessary and sufficient level of development of the production infrastructure for the production of certain types of products. It seems that this problem can be solved on the basis of the development of potential indicators, determined both on the basis of the actual ratio of the costs of the enterprise, and on the basis of the requirements for the ratio of the costs of manufactured and planned products. The requirement that the actual values of the enterprise's potential indicators correspond to the similar parameters determined by the product is a possible condition for ensuring the minimalism and

sufficiency of the enterprise's structure. Structural redundancy leads to the gradual degradation of a part of production capacities and other resources of enterprises [Lorenz, 1994; Eisenhardt, Martin, 2000]. Structural insufficiency results the impossibility of producing certain types of products and degradation of technologies [Novikov, 2017b].

The competitiveness management of the enterprise can be considered from the operational and strategic perspectives [Novikov, 2017a]. From the short-term perspective (functioning of the enterprise on the basis of available resources and production technologies), it is necessary to ensure that the enterprise's products meet the requirements of the market environment - the price of the product, its sales volume and the required level of quality (Table 1).

Table 1

Market and incompany parameters

Market variables	Enterprise management options	
	Operating	Strategic
Price	Unit cost	The structure of enterprise resources
Sales volume	Production output	Production organisation
Quality	Technological accuracy (validity) of the product	Production technology

Source: [Novikov, 2010; 2012].

Compliance with the market price is ensured by achieving a cost level at which the enterprise can make a profit (the market price is higher than the cost of the product). To ensure the sale of products, it is necessary to ensure that the potential sales volume is equal to the production volume (the actual productivity of the production processes must be equal to the planned one). As for product quality, shown in [Novikov, 2017b], in the short term (on the basis of existing technologies) it is possible to ensure only the technological accuracy or suitability of products, since the current technology determines the maximum level of product quality corresponding to a good product. It is impossible to improve the quality of products without significant changes in technological processes.

In the case of a transition to the production of new goods, operational parameters lose their relevance due to spatial and temporal limitations and focus on the current products manufactured by the company. This is where strategic parameters come into play: the structure of the enterprise's resources (their orientation towards the past, present or future), the organisation of production (it determines the maximum volume of production that can potentially be supplied) and the production technology, which should ensure the formation of all consumer characteristics of the future type of products.

Thus, from the point of view of strategic management we can speak about three management channels - resource, organisational and technological, on the basis of which the strategic structures of an enterprise can be formed as a tool of strategic management.

2. Development of enterprise potential indicators

2.1. Creation of strategic structures

Every industrial company is characterised by qualitative and quantitative security. At the same time, qualitative security is marked by the main function of the enterprise, its profile, composition and interconnections of individual components. Quantitative security is formed on the basis of the proportions of individual parts of the enterprise.

The main purpose of quantitative structures is to determine the limits (or, in other words, boundary conditions) of the existence of qualitative ones, i.e. the restructuring of the quantitative structures of production systems is both a prerequisite and a condition for production restructuring at a qualitative level. It is also possible to speak of the different role of structures in the existence of the company, that is, its hierarchical organisation.

Thus, from the point of view of development and introduction into production of new types of goods, the key role belongs to production technology, the improvement of which makes it possible to simulate the formation of all consumer properties of future products, after which they obtain quantitative certainty and organisation of production with the level of product costs. On the contrary, in a crisis situation, the priority is given to the resource structure, the adjustment of which allows the enterprise to reach the break-even level of economic activity and prevent bankruptcy.

The management of a company takes place by influencing a given structure through its qualitative or quantitative change. In other words, management is restructuring, purposeful restructuring, which can be operational, strategic or related to the level of individual technological operations (current management).

Enterprise resource management, technology management and production organisation management are inseparable parts of management, where a change in one of the parameters inevitably affects the others. Thus, all these channels of strategic management have a common cost (resource) base in the form of the company's total costs. In other words, to form quantitative strategic structures, the costs of a company are grouped according to resource, technological and organisational characteristics (Table 2)[1].

[1] In general, the grouping (aggregation) of costs as a management tool is widely used. It is widely known that costs are divided into conditionally fixed and conditionally variable, direct and indirect, a certain form of grouping of costs and income of an enterprise is a balance sheet, etc.

Table 2

Composition of strategic structures of an industrial enterprise

Strategic framework	Elements of a strategic framework	Element characteristics
Resource (economic), R = R1 + R2 + R3	Resources of the past, R1	Depreciation of fixed assets, illiquid assets with their maintenance costs, etc.
	Resources of the present, R2	Cost of raw materials, materials, semi-finished products and other direct costs.
	Future-oriented resources, R3	Pre-production costs, R&D, marketing, etc.
Technological (functional), F = F1 + F2 + F3	Pre-production resources, F1	Organisational structure of production engineering
	Main production resources, F2	
	Resources of the auxiliary and service industries, F3	
Organisational (organisational and managerial), O = O1 + O2 + O3	Enterprise management resources, O1	Enterprise management structure
	Production management resources, O2	
	Pre-production management resources, O3	
R = F = O	Balance ratio characterising the integrity of the company and the interdependence of strategic structures*	

* The formation of elements of strategic structures on the basis of cost components depends on the specifics of enterprises, their industry affiliation and is not considered separately in this paper.

Strategic structures are formed from the costs of the enterprise according to a special methodology. This can be based on the cost aggregation approach presented in Table 3, developed for one of the largest shipbuilding enterprises in the Russian Federation.

In order to make the strategic structures of a company dynamic, it is necessary to use a specific management accounting system. The consideration of this issue is beyond the scope of this study.

2.2. Indicators of enterprise potential

In order to manage the development of an enterprise on the basis of quantitative strategic structures, the following systems of indicators are considered in this paper:

- Current potential indicators, which are an assessment of the achieved level of development of the enterprise in economic, technological, organisational and managerial terms;
- Target indicators of the potential, formed on the basis of the parameters of the new products to be launched, representing an assessment of the required level of development of the enterprise, which should be achieved as a result of adapting the structure of the enterprise to new products.

Current potential indicators

The potential of the enterprise is a characteristic that reflects the current production capabilities of the enterprise and its ability to grow in the future. In accordance with the elementary composition of the quantitative strategic structures presented above, potential indicators can be formed. They characterise the level of development of the enterprise in three main aspects - economic, functional and organisational and managerial (Table 4).

As mentioned above (Paragraph 1), the author of this study, when developing potential indicators, assumed the main progressive direction of production development, which corresponds to a gradual increase in the knowledge intensity of products, the complication and automation of production equipment, the increasing role of production preparation structures, R&D, marketing, management, and so on. From an economic point of view, these changes are reflected in the change of the cost ratios, which correspond to those capacity indicators shown in Table 4.

Unfortunately, in some cases, the need to solve the problems of survival has forced companies to sacrifice their future, and instead of an increase, a decrease in scientific and industrial potential can be observed[2].

[2] Thus, in the 1990s, many domestic enterprises, especially those linked to the military-industrial complex, accepted any random orders in order to fill production capacities and personnel, not always paying attention to industrial degradation, as they were faced with the problem of unprofitability. According to the author of this study, when planning alternative development options, it is necessary to take into account the currently achieved scientific, production and human potential of enterprises, trying to make the best use of it in the present and in the future.

Table 3
An example of forming the elements of strategic structures

Potential component	Names of strategic structure elements	Aggregate composition
Resource (economic), R = R1 + R2 + R3	Expenses relating to prior years, R1 = R11 + R12 + R13 + + R14 + R15	R11 – Depreciation of the fixed production assets
		R12 – expenses for the maintenance and operation of the fixed production assets involved in the production process
		R13 – depreciation of fixed production assets that are not involved in the production process
		R14 – inventories with maintenance costs (capitalised portion of technology costs)
		R15 – work in progress with maintenance costs (capitalised part of work in progress)
	Current expenses, R2 = R21 + R22 + R23 + + R24 + R25	R21 – wages of main production workers with accruals
		R22 – the cost of raw materials, materials, semi-finished products, components with less inventory
		R23 – energy costs for technological purposes
		R24 – the cost of low-value, fast-wearing items and tools
		R25 – cost of work in progress (less the capitalised portion, i.e. illiquid assets)
	Forward-looking spendings, R3 = R31 + + R32 + R33 + R34 + R35	R31 – long-term production preparation costs
		R32 – Costs of management and operational preparation of production (R32 = R32пп + R32оп + R32во)
		R33 – Cost of supplies and services (R33 = R33вп + R33обп)
		R34 – the cost of paying for the work of contractors and installation supervision organisations
		R35 – other structural costs
Functional, F = F1 + F2 + F3	Pre-production resources, F1	F1 = R31 + R32пп
	Main production resources, F2	F2 = R1 + R2 + R32оп + R34 + R35
	Resources of the auxiliary and service industries, F3	F3 = R32во + R33
Organisational and managerial, O = O1 + O2 + O3	Enterprise Management Resources, O1	O1 = R34 + R35
	Production management resources, O2	O2 = R1 + R2 + R32оп + R32во + R33
	Pre-production management resources, O3	O3 = R31 + R32пп

Table 4
The indicators of enterprisepotential

Strategic framework	Potential indicator	Purpose of the indicator
Economic	PE = R / R2	Characterises the level of economic development of the enterprise, i.e. the formation of the required (in terms of market price and profit) level of production costs
Functional	PF = F / F2	Characterises the level of technological development of the enterprise
Organisational and managerial	PO = O / O2	Characterises the level of organisational development of the enterprise

Table 5
Correlation of production proportions with market requirements for new products

Strategic framework	New product parameter name	Formula for calculating the parameters of new products	Purpose of the parameter
Economic	The required value of the resource potential of the enterprise (or a separate type of production)	FE = (r1 + r2 + r3) / r2	Determining the prospects for the economic structure of the enterprise
Functional	The required value of the functional potential of the enterprise (or production)	FF = (f1 + f2 + f3) / f2	Determining the prospects for the ratio or proportions of the functional structure of the enterprise
Organisational and managerial	The required value of the organizational and managerial potential of the enterprise (or production)	FO = (o1+o2+o3) / o2	Determining the prospects for the organisational structure of the enterprise

In the process of progressive development of production, the level of knowledge intensity of products increases, which contributes to the increase in the accuracy class of equipment and its significant increase in price. The share of production preparation and management costs increases. The structures of auxiliary and service industries are becoming more complex. The design of future products and their input, research and marketing deserves more attention. The role of intangible production factors is growing. At the same time, the share of primary production in the cost structure is decreasing, and the share of raw materials and consumables in the cost structure is decreasing. All these changes are reflected in the formulas for calculating the potential, in which the share of the parameters R2, F2 and O2 in the cost structure should decrease over time, leading to an increase in the values of the PE, PF and PO indicators.

These indicators are dimensionless values, they can be used for analysis, comparison of alternative options for production development. Potential indicators can be used as an additional criterion for selecting alternative investment projects, where the best options should correspond to the growth of parameters PE, PF and PO. However, the main purpose of these indicators is different: they must link the current state of the company with the parameters of future products. In other words, for the development of the enterprise it is necessary to have a certain standard in the form of parameters of the future product, which should become the basis for the structural restructuring of the enterprise.

Target values of business potential indicators

In order to calculate the planned (reference) values of indicators of economic, functional and organisational and managerial potential, we will use the following relations.

If the expected price of a production unit is equal to P, and the profit share in this price is planned at the level Pr_{proc}, then the maximum possible cost of a production unit C_{max} is equal to the value

$$C_{max} = P (1 – Pr_{proc}). \quad (1)$$

If we then divide the cost of a unit of production, C_{max} according to the purpose of the structural components of the strategic structures, we obtain the following specific ratios of the strategic structures:

$$C_{max} = r1 + r2 + r3 = r, \quad (2)$$

$$C_{max} = f1 + f2 + f3 = f, \quad (3)$$

$$C_{max} = o1 + o2 + o3 = o. \quad (4)$$

Here r1, r2 and r3 are the specific parameters corresponding to the elements of the economic structure (Table 2); f1, f2 and f3are the specific elements of the elements of the functional structure; o1, o2 and o3, by analogy, correspond to the organisational and managerial structure.

Dividing expressions (2), (3) and (4) by r2, f2 and o2 respectively, we obtain the so-called planned or required values of potential indicators for all strategic structures (Table 5). The reference values of the potential indicators (FE, FF and FO), corresponding to the parameters of future production, are calculated per unit of output, but their relative nature allows us to correlate on this basis the parameters of the target product and the structural proportions of the projected (or reformed) production[3].

The condition for full compliance of production parameters with the requirements of new or long-lived products is equality of actual and required (forecast) values of potential indicators, i.e PE = FE, PF = FF, PO = FO[4].

[3] The calculation of specific cost values for the elements of the strategic structures (r1, r2, r3, f1, f2, f3, o1, o2, o3) and the corresponding reference values of the potential indicators FE, FE and FO can be associated with certain difficulties, which, however, in the opinion of the author, are quite solvable: First of all, any calculations for new products will always be approximate, i.e. high initial accuracy is not required, the company has the opportunity to adjust its structure more precisely in the future; at the same time, a part of the cost parameters of future products can be calculated on the basis of the previous experience of the company's operation and related trends of changes in unit costs of products; in a number of industries, a part of the information (the cost of raw materials, materials, energy, labour costs, etc.) in monetary terms is not available. In a number of industries, some of the information (the cost of raw materials, materials, energy, labour, etc. per unit of output) can be obtained in monetary terms from the design and technical specifications of a new product.

[4] These figures are not the only ones to be considered when designing a new production line, as there are various production technology options to be considered.

After determining the current and future state of the enterprise in terms of the ratio of structural proportions of production and products, the calculation of the necessary structural changes is carried out, which consists in varying the share of certain elements in the composition of strategic structures.

Within the framework of operational management, the balance of costs according to the target and actual values of potential indicators can be carried out by operational means (in particular, based on the implementation of projects for the development of the production system, methods of the theory of constraints, Six Sigma, business process reengineering, etc.) if the discrepancy between planned and actual costs does not exceed 3-5%.

Strategic management, carried out as part of anti-crisis management or in preparation for the launch of new products, involves more serious measures. They lead to a balance of potential indicators, since here we are talking about the functional insufficiency or redundancy of existing production structures to solve future strategic tasks: we can talk about the replacement of technological equipment, changes in production technology and the structure of departments, the composition and qualifications of specialists, etc. Another possible area of application of potential indicators is anti-crisis management, where solving the problem of minimalism and sufficiency of the enterprise structure for current production tasks is one of the most important conditions for the survival of the enterprise.

The calculation of the actual potential indicators (Table 4) can be carried out on the basis of the creation in the enterprise of an appropriate system of strategic management accounting, which allows us to group the costs according to the criteria presented in this study. As for the target level of the values of the potential indicators (Table 5), during the development of new products most of the cost components become fixed, but at the same time they can undergo certain changes. In other words, the structure of the company must be dynamic, and adaptation to new and planned types of products can take place continuously, including on the basis of operational cost adjustments using the methods and tools of Lean Manufacturing, Six Sigma, Business Process Reengineering and other available tools for application of approaches.

Conclusion

Thus, in this study indicators of the enterprise's potential (actual and target) were developed. On the one hand, they make it possible to assess the level of development of an enterprise from the economic, technological and organisational point of view. On the other hand, they determine the prospects of development of an enterprise in terms of mastering opportunities for launching new products or implementing anti-crisis management.

Potential indicators are based on the use of quantitative strategic structures, which are a quantitative form of presentation of the company's economy, technology and production organisation.

Potential indicators are a tool for operational cost accounting, which allows you to set targets for the economic impact of measures to improve work and business processes, and also to introduce targets for adjusting enterprise costs after qualitative determination of the updated structure of production technology. It is also possible to use potential indicators for the comparative assessment of alternative options for the development of the company and for anti-crisis management.

Based on the use of strategic structures and potential indicators, it is possible, in principle, to develop tools for adapting the enterprise to the manufactured products, creating an updated structure to meet the requirements of current or planned types of products, ensuring structural minimalism and sufficiency of the enterprise structure for solving current and future management problems. These changes should contribute to the gradual restructuring of management theory based on the resource approach and the development of the dynamic capabilities of the enterprise.

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