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Improving the methodology for selecting development projects for an industrial enterprise

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Abstract: The article describes the main elements of the methodology for selecting projects for the development of an industrial enterprise based on a combination of a resource approach and a utility methodology. The main internal indicators of the potential of an industrial enterprise are described, as well as indicators of the potential of the enterprise. On the basis of the system of indicators, a scale of criteria for expert assessment of the enterprise's ability to implement a development project has been developed. The possibility of using the technique for a real industrial enterprise is shown. The main features of the use of the resource approach in the practical activities of industrial enterprises that implement the project approach to the activity development program are considered.

Keywords: industrial enterprise, development project, resource approach, usefulness of project results.

INTRODUCTION

A distinctive feature of the use of the resource approach in the implementation of development projects is the analysis of the flow of development resources as the main object of management. This feature allows us to classify the resource approach to the field of subject management. The essence of the approach lies in the fact that the totality of the resource potential and capabilities of the enterprise, as the basis for the formation of the internal environment of the project, forms activities that are unique in their composition, capable of generating a certain effect.

In other words, each industrial enterprise has a unique resource potential that can be most effectively implemented in its own projects (Dobrova and Dobrov, 2018). The resource-based approach is quite costly, both in terms of time and resources. But at the same time, it allows not only to take into account possible resulting impacts from the outside, but also to build an effective model of project management in conditions of high risks and uncertainty due to an increased depth of assessment and control (Micán, 2020). The main methodological difference between the approaches is the subject of management: in the market - cash flow; in the resource - the flow of development resources.

METHODOLOGY

The priority areas for improving the management of an industrial enterprise development project based on the integration of the resource approach, in our opinion, are: a) definition and specification of the object of management and the project management system; b) increasing the level of reliability of the pre-implementation project assessment; c) formation of a qualitative methodology for assessing the effectiveness of the project. The implementation of the designated areas allows us to formulate an approach to the formation of a project management strategy for the development of an industrial enterprise and use a resource approach for selecting projects (Styhre, 2020).

Another possibility of using the resource approach can be the methodology for selecting development projects (Borovykh, 2018), based on two main aspects: the ability of the enterprise to implement the project, the usefulness of the project for the enterprise. The functional dependence of the choice of the project (or the possibility of its implementation) will be as follows:

$$DP = f(Ab_{com}; U_{com}), \quad (1)$$

where Ab_{com} – generalized ability of an enterprise to implement a development project at the current time;
U_{com} – generalized indicator of the usefulness of a development project for an industrial enterprise.

The ability of an enterprise is a set of internal potentials of an enterprise (production, resource, economic, intellectual, etc.), as well as the ability to use the existing capabilities of the external environment to achieve strategic development goals (Wolf and Hanisch, 2014). Being one of the main pillars of the resource concept, they objectively personify the level of competitiveness of an enterprise (Sukaatmadja et al., 2021). The total assessment of abilities can be characterized by the sum of internal potentials and capabilities of the external environment:

$$Ab_{com} = \sum(C_{in}; O_{ex}), \quad (2)$$

where C_{in} – internal potential of the enterprise;
O_{ex} – external capabilities of the enterprise;
Ab_{com} – generalized indicator of enterprise ability.
The composition of internal indicators of enterprise potential can be determined in terms of individual activities (Kinneging et al., 2019), as well as a set of strategic resources (table 1).

Table 1: Composition of internal indicators of enterprise potential

Indicator group name (X_i)	Private indicators potential (a_i)
Management model	Organizational structure; Management methods; Management style.
Personnel composition	The number of staff; Structure; Qualification.
Labor productivity	Labor intensity; Number.
Technical equipment	Technical composition; Structure; Technique quality.
Technological equipment	Technological composition; Structure; Technology quality.
Financial security	Solvency; Financial stability; Profitability.
Product potential	Nomenclature; Quality.
Scientific and technical component	Number of R&D; Number of innovative projects (introduction of innovations); Volume of innovation in product volume.
Production cost potential	The ratio of the cost of production of the enterprise to the cost of competitors' products; The ability to influence the cost.
Pricing reserves	The ratio of the price of the company's products to the price of competitors' products; The ability to influence the price.
Supply potential	Supply costs; Losses due to poor quality supplies.
Sales potential	Sales costs; Losses due to poor-quality sales.
Material use potential	Specific weight of material costs; Material utilization rate; Material efficiency.
Information security	Information costs; Losses as a result of poor quality information.
Marketing potential	Marketing costs; Losses due to poor quality marketing.

Source: developed by the author.

The theory of consumer behavior is based on the theory of marginal utility, which plays an important role in economic science (Rytikov et al., 2018). Taking into account this provision, as a rule, internal indicators of the enterprise potential are developed (Silva et al., 2019). We propose to use them in the following composition (table 2).

Table 2: Composition of internal indicators of enterprise potential

Indicator group name (Y_i)	Private indicators potential (b_i)
Regulatory capacity	The state of the regulatory framework; The quality of the regulatory framework; Enforceability of the regulatory framework.
Natural and climatic potential	Composition of natural and climatic benefits; The level of their use.
Resource potential	Resource composition; Quality; Terms of attraction.
Potential of the existing infrastructure	The composition of the objects; Quality; Terms of attraction.
Government support potential	Composition of events; Opportunities and conditions of attraction.
Logistic potential	Level of development; Infrastructure development.
Features of the competitive struggle	Number of competitors; The presence of monopolies; Competition Law Practice.
Investment attractiveness level	Investment policy quality; Investment rating; Investment volume.
Credit Institutions Potential	The size of the credit market participants; Lending terms; Availability of state support.
The level of scientific and technological development	Infrastructure development; The volume of R&D results for the reporting period.
Social development potential	Availability of social development programs; Social development indicators.
Trade potential	Development and affordable retail chains; Terms of interaction.
Integration potential of the region	Integration level; Integration conditions.
Information security level	Completeness of the information field; Quality of information; Losses from poor quality and incomplete information.
Demographic potential	The size and structure of the population.

Source: developed by the author.

Usefulness is not identical to the concept of efficiency, since it can be expressed by other evaluation criteria, one of which is efficiency (Beilin and Khomenko, 2018). The value of the internal potential of the enterprise will be determined as the arithmetic mean of the values of the potential groups:

$$U_{com} = \frac{\sum_{j=1}^{n} Z_i}{n}. \quad (3)$$

To determine the final assessment of the company's ability to implement the project and the usefulness of this project, it is necessary to single out the resulting internal and external groups of indicators, which will be expertly assessed on the basis of a special scale (table 3).

Table 3: Scale of criteria for expert assessment of enterprise capabilities

Expert review	The level of economic potential of the enterprise
1	Low
2	Unsatisfactory
3	Satisfactory
4	Good
5	High

Source: built by the author.

The final analysis of the dependence of the choice of the development project $DP = f(Ab_{com}; U_{com})$ can be graphically visualized in the form of two coordinate matrices that determine the final position of the project in terms of the potential for its implementation and effective utility (Figure 1).

Using the given matrix, it is possible to compare various development projects planned by the enterprise for implementation, and select those that can bring the greatest positive effect with the least costs and risks for implementation (Raad et al., 2020).

Source: generated by the author.

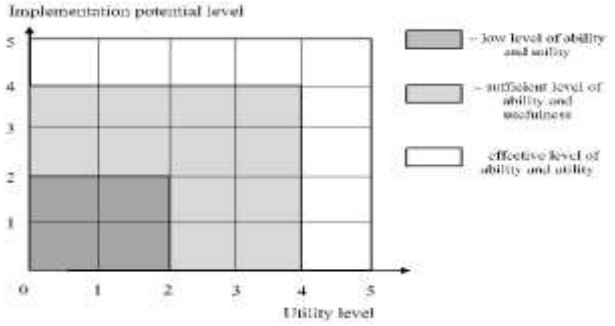

Figure 1: Graphical interpretation of the assessment of the capabilities of the enterprise

RESULTS

Let's consider the situation of choosing the most priority development project. The company's management uses the proposed methodology for assessing projects based on a combination of resource and market approaches. For this, the current ability of the enterprise to implement each of the proposed projects is assessed, as well as their potential usefulness for development.

The experts in the assessment were representatives of the company's management, as well as representatives of customers and middle managers responsible for the implementation of the production process. Potential projects were assessed in several stages.

At the first stage, a criterion system for the analysis of utility groups and abilities was formed, which met the requirements and interests of "Industrial Enterprise" LLC (table 4).

Table 4: Register of proposals for the development of the enterprise LLC "Industrial Enterprise"

№	Direction name	Description of projects
1.	Commissioning of new production facilities.	a) Construction of new production areas (>100 m^2) with the installation of standard equipment and machines; b) Construction of new production areas (<100 m^2) with the installation of new technological equipment and machines; c) Redevelopment of existing production areas and additional purchase of additional standard equipment and machines; d) Rental of production space (> 100 m^2) with the installation of standard equipment and machines;

		e) Rent of production areas (<100 m^2) with the installation of new technological equipment and machines.
2.	Renovation/modernization of fixed assets (acquisition, reconstruction).	a) Upgrading existing equipment to improve performance; b) Replacing old equipment.
3.	Conquering new sales markets B2B / B2C.	a) Development and commissioning of a new product line, civilian focus; b) Improving the quality of products due to the qualification growth of employees, updating the pool of contractors, reducing the cost of production.

Source: summarized by the author.

Taking into account the above features of the activities of "Industrial Enterprise" LLC, the following groups of utility and abilities were selected as criteria for assessing the future model (table 5). For example, to assess the impact of projects on the future activities of the enterprise, indicators of internal potential were analyzed. Since one of the important tasks of the development project was to increase the impact on the market, indicators of external potential were considered.

Table 5: Criteria system for assessing development projects of LLC "Industrial Enterprise"

Internal potential		External potential		Utility	
X_i	a_{ij}	Y_i	b_{ij}	Z_i	c_{ij}
Personnel composition	The number of staff; Qualification.	Resource potential	Resource composition; Quality; Terms of attraction.	Commercial efficiency.	Net discounted income; Payback period.
Technical equipment	Technical composition; Structure; Technique quality.	Government support potential	Composition of events; Opportunities and conditions of attraction.	Innovativeness.	Compliance of the project with the priority directions of the innovative strategy for the development of an industrial enterprise; Technological level of the project; Economic expediency.
Technological equipment	Technological composition; Structure; Technology quality.	Credit Institutions Potential	The size of the credit market participants; Credit conditions; Availability of state support.	Competitiveness	The possibility of commercializing the proposed results; Competitive advantage level results.
Financial provision	Solvency; Financial stability; Profitability.			Scalability	The total amount of attracted resources; Structure of attracted resources; Terms of implementation; The level of influence on the main activity.
Supply potential	Supply costs; Losses due to poor quality supplies.				

Source: author development.

Based on the selected evaluation criteria, the management staff of the enterprise, as well as specialists responsible for the implementation of development projects, formed an expert opinion on each of the nine submitted proposals. A point score for each criterion allows you to calculate the overall usefulness of each project and the enterprise's ability to implement it. The final calculation data for comparing projects are shown in Table 6.

Table 6: The final score for the usefulness of the project and the ability of the enterprise to implement it

Project number	Ability to implement the project (Ab_{com})/points	The usefulness of the project for the enterprise (U_{com})/points
1_a	2,772	2,604
1_b	2,928	**4,083**
1_c	3,1	2,625
1_d	2,75	2,75
1_e	2,733	3,208
2_a	2,65	2,625
2_b	2,656	3,0625
3_a	2,767	2,25
3_b	**3,117**	2,292

The table shows that project 1_b ((construction of new production areas (<100 m^2) with the installation of new technological equipment and machine tools) can bring the greatest utility to the enterprise. This is due to the fact that this development project has not only the highest profitability, but also a potentially high capitalization of the assets being created. The enterprise shows the greatest readiness in terms of resource potential in project 3_b (improving product quality due to the qualification growth of employees, updating the pool of contractors, reducing production costs). Here it is logical to assume that the implementation of such project activities is not costly in nature and may well be implemented on our own. To make a final decision, we will apply the resulting results to the matrix of the ratio of utility and abilities. At the same time, the management of the enterprise and design experts established threshold values: ability – 2,8; utility - 3 (figure 2).

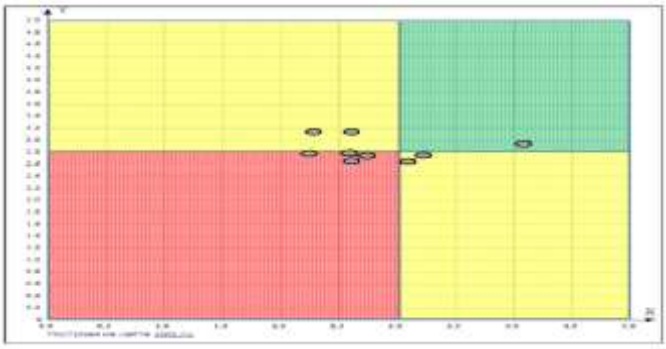

Figure 2: Matrix for assessing the usefulness of a development project and the ability of an industrial enterprise to implement it

CONCLUSION

Analyzing the graphical model formed on the basis of the calculated scores, we can conclude that only one of the projects under consideration 1_b was in the priority implementation area - the construction of new production areas (<100 m^2) with the installation of new technological equipment and machine tools. Four of the proposals under consideration have fallen into the border zone and may be considered for further implementation in the future. The rest of the projects at this stage of the development of the enterprise are not subject to implementation due to insufficient resources or low utility.

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