REVISITING ASSESSMENT OF THE COMPETITIVE OPPORTUNITIES OF THE ENTERPRISE

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Abstract:

The formation of the enterprise's effective competitiveness management system is an urgent problem of the modern economics. A key element of the system's infrastructure is assessment of the competitive potential of the enterprise. The aim of this study was development of methods to assess the overall strategic competitive potential. The developed tools allow calculating and justifying the assessment of both overall and individual competitive potential. In the comparative analysis, which will allow more efficient use of existing resources and reserves for future planning, and as a result improving the competitive potential. It stressed that an essential element of the implementation of the strategy is to monitor and analyze the effectiveness of the targets, namely, management of resources. Taking into account the estimated value of the overall competitive potential of the enterprise it is possible to elaborate a development strategy for competitive potential.

Keywords. Competitiveness, competitive potential, multi-criteria analysis, competitive potential development strategy.

Introduction. The modern development of economic relations between entities at all levels is characterized by significant toughening of competition. Competition remains the main attribute of the market economy and it exists in both the manufacturing and commercial activities. Until now, the most urgent problem of the Russian economy is ensuring a high level of competitiveness of the country, its enterprises, as well as manufactured products.

High scientific and technological progress, inflow of investments directed to the development of production for the purpose of development and improvement of manufacturing processes leading to increased labor productivity,

decrease in costs, increase of turnover and liquidity, implementation of innovations, development of automated information technologies - are just some of the processes which enhance competition between manufacturers in the market. In this situation, the management of any enterprise for the successful development must be able not only to catch the trends of development of the target market, but also respond adequately to changes in the market situation. Therefore, the competitiveness management system, which clearly reacts to emerging tendencies in the economy, should be currently developed at the enterprise [1]. When developing any competitiveness assessment methodology in the management system one must take into account the crucial points and basic requirements for competitiveness assessment [2]:

− the results of assessment of enterprise competitiveness are largely determined by the clarity with which that assessment results can be expressed and explained;

− the reliability of final conclusions about the level of competitiveness of the enterprise depends not only on the type of function binding individual indicators, but also on the quality of the initial information. We would like to note that for efficient management of competitiveness assessment system one first need to design a system infrastructure. The composition of the main elements making up the system infrastructure and assessment indicators is presented in Figure 1 [3, p. 329]. Development of the full range of elements forming the infrastructure of the enterprise competitiveness assessment system will provide not only scientifically and methodologically grounded development plan for the enterprise, but also will create conditions for sustainable development. The figure presents the individual competitive potentials which are the backbone for integrated competitiveness potential of the enterprise. Table 1 shows major groups of indicators that provide assessment of each of the individual potentials.
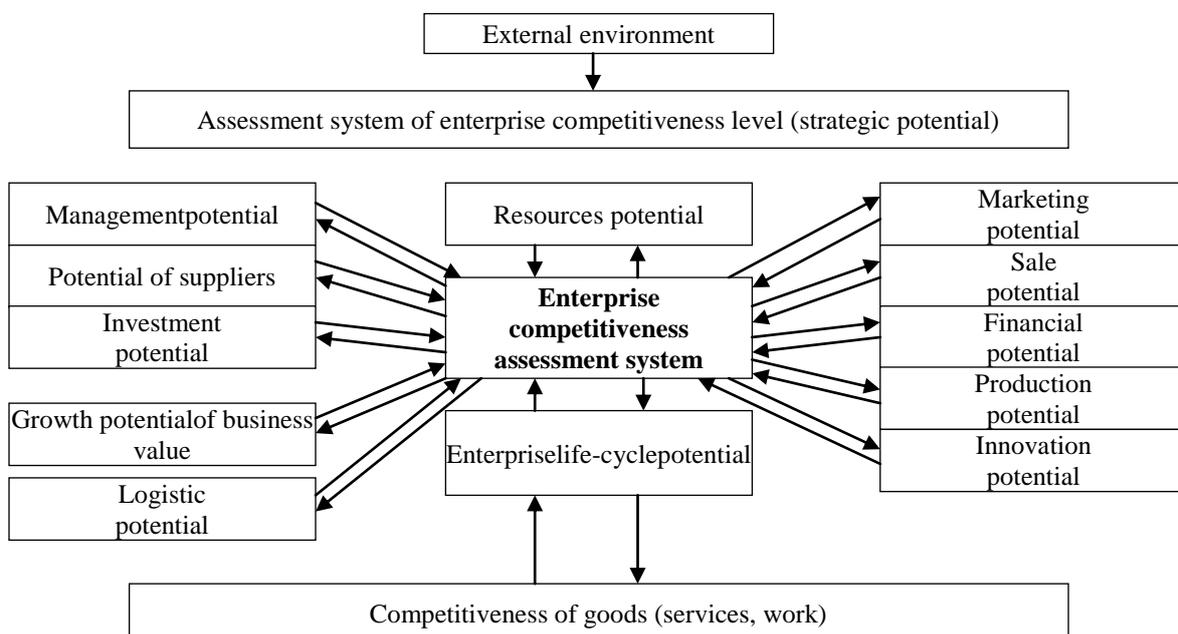

Figure 1. Infrastructure of enterprise competitive system.

Table 1. List of indicators for assessment of the competitive potential.

Potential	Description	Keyindicators
Management potential	Assessment of efficiency of enterprise management designed for the strategic development purposes	Efficiency of the attracted investments use Efficiency of equity capital use Efficiency of production space use Efficiency of working time use
Resources potential	Assessment of the efficiency of use of different types of resources by the enterprise	Efficiency of use of business assets Efficiency of use of the enterprise human resources Efficiency of use of material resources Efficiency of use of financial resources Efficiency of use of intellectual resources and R&D resources Efficiency of use of information resources, etc.
Marketingpotential	Assessment of methodology, human, material and information resources for marketing activities	Efficiency of advertising campaigns Efficiency of work with clients Efficiency of work with suppliers Efficiency of pricing policy of the enterprise Efficiency of marketing research ensuring the growth of the occupied share of the market
Sale potential	Assessment of the possibility of sale of the manufactured products in all markets	Efficiency of the manufactured products sale Efficiency of work of the distribution network Efficiency of work of the dealer network Efficiency of work with product stock
Potential of supplier	Assessment of possibility of efficient material support	Efficient inventory management Efficient pricing of supplied products Efficient management of supply quality
Financial potential	Assessment of the end results of using the enterprise finances	Assessment of financial condition of the enterprise reflecting the value of the resulting net income, liquidity of the enterprise, its financial independence
Enterprise life-cycle potential	Assessment of the objective prerequisites for the successful development	Solvency assessment Liquidity assessment Assessment of financial stability Assessment of profitability Assessment of business activity
Innovation potential	Possibility of solution of problems of scientific and technological development	Efficiency of use of investments for the implementation of innovative projects Assessment of innovative solutions efficiency
Production	Assessment of use of funds,	Efficiency of use of production capacity

Potential	Description	Keyindicators
potential	human resources and raw materials to ensure high volumes of output capacity	Assessment of the volume of production Efficiency of the formed stock of orders Assessment of the quality of products Assessment of material consumption Efficient use of working capital
Logistic potential	Assessment of the enterprise's ability to implement the logistic functions	Efficient Inventory Management Assessment of the efficiency of the delivery of supplied products, materials and raw materials Ability to deliver over and above the plan
Growth potential of business value	Assessment of ability to attract investment resources and use them effectively	Assessment of the value of borrowed funds Efficiency of the use of borrowed funds

Quantitative assessment of individual competitive potentials allows characterizing the overall strategic competitive potential of the enterprise ($\Pi_{overall}$), which can be expressed as the following function

$\Pi_{overall} = f(\Pi_j)$, where j is a type of individual competitive potential, Π_j- is numerical assessment of competitive individual potential. Dependence form, its unknowns define the methods for assessment of the strategic potential.

Development of methodology to impartially and reliably perform not only numerical estimate of individual competitive potential, but reliably estimate the overall strategic competitive potential is impossible without the use of optimization techniques.

The general scheme for the assessment methodology of strategic competitive potential of the enterprise is shown in Figure 2.

Let's consider the key points of the proposed methodology.

Properly formed analytical base for assessment of competitiveness is the guarantee of objective assessments. After all, depending on the purpose for which the enterprise competitiveness is assessed, the number of indicators included in the calculation varies considerably.

There are many approaches to the development of indicators determining the value of the competitive potential. Formation of competitive potential is intended to cover all the basic in-house processes occurring in the various functional areas of its internal environment. The result is a systematic view of the enterprise, which allows you to identify the strengths and weaknesses, and develop on this basis a comprehensive methodology for assessment of possibilities of the long-term promising development of the company [4].

In this situation, the following points [5] must be taken into account. First, the competitive potential is not constant, since it depends on not only many factors affecting it, but also depends on the market conditions. Second, the competitive potential reflects the enterprise's ability to respond quickly to rapidly changing external conditions. Third, the concept of competitive potential is considered in the conditions of crisis-free operation of the business. Fourth, in practice, a set of indicators required for calculation not only differs in the larger number, but it remains unstructured. Also, in addition to quantitative indicators the qualitative indicators are used quite often. Therefore this stage on assessment of the competitive potential is the most time-consuming and creative. As the result of monitoring the data are generated in table 2.

Due to the large number and quality variety of indicators studied for each group on the assessment of the individual potential one cannot do without methods of multi-criteria optimization, for successful implementation of which it is necessary to solve the following problems.
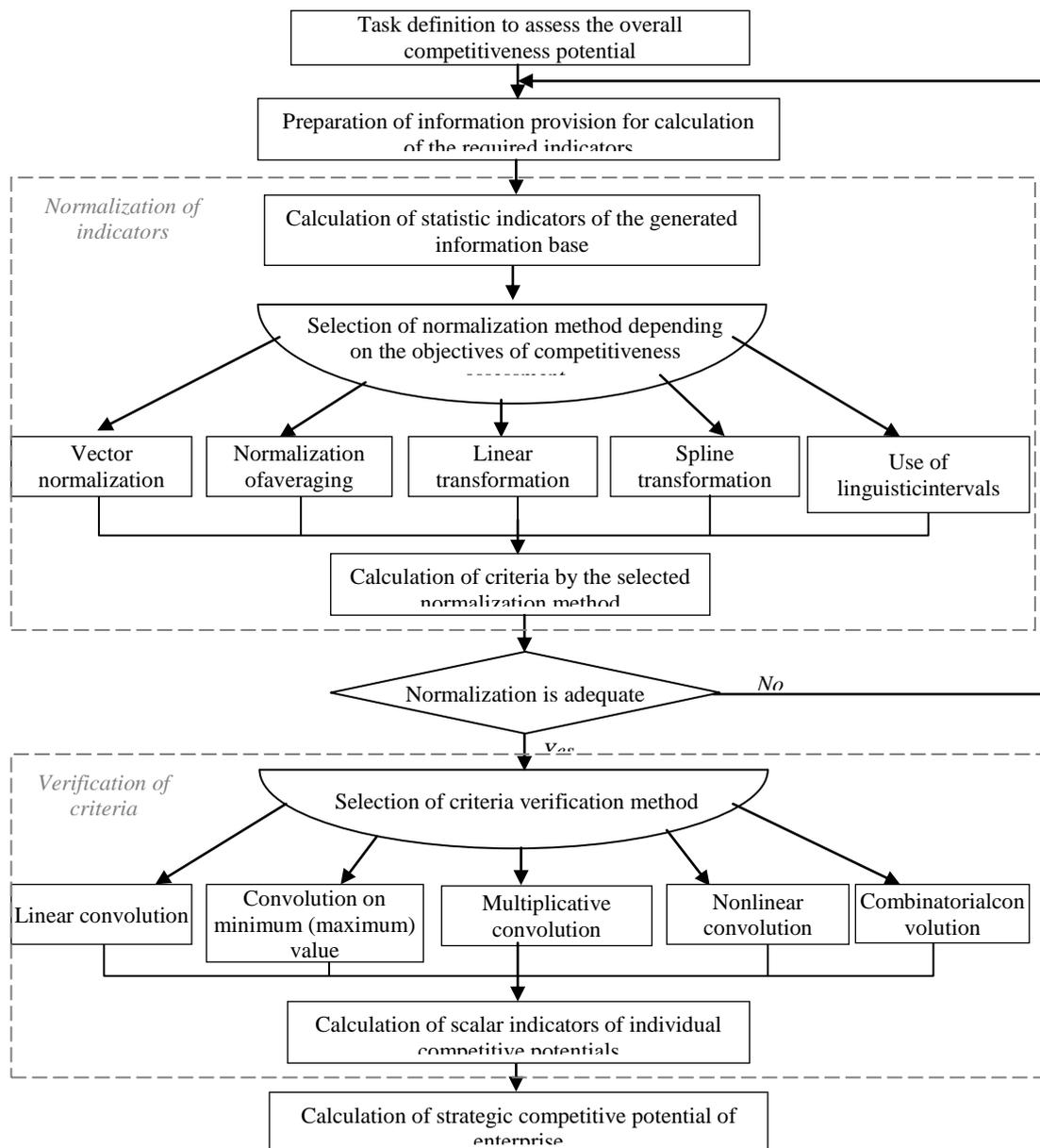

Figure 2. The general scheme of the calculation methodology of strategic competitive potential.

Table 2. Information support of calculations.

Indicator	Individual competitive potential										
	CP 1	CP 2	CP3	CP4	CP5	CP6	CP7	CP8	CP9	CP10	CP11
Indicator1											
Indicator2											
…											
Indicator*k*											
…											
Indicator*R*											
Designations:CP1 – Management potential, CP 2 – Resources potential, CP 3 – Marketing potential, CP 4 – Sale potential, CP 5 – Potential of supplier, CP 6 - Financial potential, CP 7 – Enterprise life-cycle potential, CP 8 – Innovation potential, CP 9 – Production potential, CP 10 – Logistic potential, CP 11 – Growth potential of business value											

The first problem to solve is the choice of the normalization method of assessment alternatives for each criterion. Each indicator reflecting the value of the individual competitive potential is characterized by different economic values, different measure units, and different ranges of possible values. This problem is solved by bringing them to a dimensionless form and representation of them in relative units, i.e. their normalization.

Let's dwell on the basic ratios used for each normalization method and reveal them in more detail. [6]

Vector normalization. Advantages of the method are the dimensionless nature of local criteria, the ranges depend on the functions change ranges; the values of criteria can be both positive and negative.

$$\bar{f}_k\left(X \mid K_p\right) = \frac{f_k\left(X \mid K_p\right)}{\sqrt{\sum_{p=1}^{m}\left[f_k\left(X \mid K_p\right)\right]^2}} , \qquad (1)$$

where p – is the number of indicators ($p = 1, …, m$), $f_k(X)$ –is a local optimization criterion for individual potential assessment ($k = 1, …, R$), K_p – is indicator of individual potential assessment (alternative).

Normalization of average. The values of the criteria can be either positive or negative, but the method is applicable if the average value of the individual criterion is not equal to zero.

$$\bar{f}_k\left(X \mid K_p\right) = \frac{f_k\left(X \mid K_p\right)}{f_k\left(X \mid K_p\right)_{average}} , \qquad (2)$$

where $f_k\left(X \mid K_p\right)_{average}$ – is the average value for each optimization criterion.

Linear transformation. The values of the criteria can be only of one sign, maximizing and minimizing transformation is distinguished.

$$\bar{f}_k\big(X \mid K_p\big) = \frac{f_k\big(X \mid K_p\big)}{\max\limits_{1 \le p \le m} f_k\big(X \mid K_p\big)} \text{ or } \bar{f}_k\big(X \mid K_p\big) = \frac{f_k\big(X \mid K_p\big)}{\min\limits_{1 \le p \le m} f_k\big(X \mid K_p\big)} \qquad (3)$$

where $\max\limits_{1 \le p \le m} f_k\big(X \mid K_p\big)$ – is the maximum criterion value for the alternative, $\min\limits_{1 \le p \le m} f_k\big(X \mid K_p\big)$ – is the minimum criterion value for the alternative.

There are also alternative methods of linear transformation applied subject to the objective of normalization.

Spline transformation. Transformation using different proportionality factors.

For example, proportionality factors $E_k^1 = \min\limits_{1 \le p \le m} f_k\big(X \mid K_p\big)$, $E_k^2 = \max\limits_{1 \le p \le m} f_k\big(X \mid K_p\big)$, $E_k^3 = \frac{1}{2}\big(E_k^1 + E_k^2\big)$,

$E_k^4 = \frac{1}{m} \sum\limits_{p=1}^{m} f_k\big(X \mid K_p\big)$, тогда

$$\bar{f}_k\big(X \mid K_p\big) = \begin{cases} \dfrac{f_k\big(X \mid K_p\big) - E_k^3}{E_k^3 - E_k^1}, & \text{if } f_k\big(X \mid K_p\big) \le E_k^3; \\[3mm] \dfrac{E_k^3 - f_k\big(X \mid K_p\big)}{E_k^2 - E_k^3}, & \text{if } f_k\big(X \mid K_p\big) > E_k^3. \end{cases} \qquad (4)$$

$$\bar{f}_k\big(X \mid K_p\big) = \begin{cases} \dfrac{f_k\big(X \mid K_p\big) - E_k^4}{E_k^4 - E_k^1}, & \text{if } f_k\big(X \mid K_p\big) \le E_k^4; \\[3mm] \dfrac{E_k^4 - f_k\big(X \mid K_p\big)}{E_k^2 - E_k^4}, & \text{if } f_k\big(X \mid K_p\big) > E_k^4. \end{cases} \qquad (5)$$

Use of linguistic intervals. The entire range of each criterion (D_k) is divided into certain number of linguistic intervals (d_k^l) not necessarily equal in value. Each interval is assigned a certain qualitative assessment of the resulting value (e.g., "low", "medium", "high", etc.). Within each interval for any value $f_k\big(X \mid K_p\big) \in d_k^l$ is normalized value

$$\bar{f}_k\big(X \mid K_p\big) = \rho_k^l \ \forall \ f_k\big(X \mid K_p\big) \in \big[d_k^{l-}; d_k^{l+}\big). \qquad (6)$$

The second problem is the choice of method of criteria convolution. That is selection of method based on the introduction of the utility function, which provides reduction of the multi-criteria problem of finding the value of the individual competitive potential to the one-criterion problem. After all, the objective function for assessment of the generated group of individual competitive potential is some combination of the original local criteria $f_k(X)$. We assume

that the convolution of the multipurpose indicator $\Phi(X) = \{f_1(X), \ldots, f_k(X), \ldots, f_R(X)\}$ is its transformation into a scalar component $F_p(X)$.

Let's consider various schemes of secularization for the assessment of individual competitive potentials [6].

Linear convolution of the criteria. It is the most common method of convolution. This method is lawfully applied if, under certain conditions, any set of solutions chosen is subset of the peak points set of not some non-negative coefficients.

$$F^1\left(\overline{X}^*\right) = \max\left[\sum_{k=r+1}^{R} w_k \bar{f}_k(X) - \sum_{k=1}^{r} w_k \bar{f}_k(X)\right], \qquad (6)$$

where $\bar{f}_k(X)$ - is normalized value of indicators, w_k – weight indices that determine the relative degree of importance of the individual criteria ($\sum_{k=1}^{R} w_k = 1$).

Methods of maximum (minimum) convolution. Minimum indicator provides the best deviation of the worst-case local optimality criteria from its optimum value. The disadvantage of this method is that the result of minimization criteria not always belongs to Pareto set.

$$F^2\left(\overline{X}^*\right) = \min_{X \in G}\left\{\max_{1 \le k \le r} w_k \left[\bar{f}_k(X) - \bar{f}_k^-(\overline{X}_k)\right]; \max_{r+1 \le k \le R} w_k \left[\bar{f}_k^+(\overline{X}_k) - \bar{f}_k(X)\right]\right\}; \quad (7)$$

$$F^3\left(\overline{X}^*\right) = \min_{X \in G}\left\{\max_{1 \le k \le r} w_k \frac{\bar{f}_k(X)}{\bar{f}_k^-(\overline{X}_k)}; \max_{r+1 \le k \le R} w_k \frac{\bar{f}_k^+(\overline{X}_k)}{\bar{f}_k(X)}\right\}, \qquad (8)$$

where $\bar{f}_k^-(\overline{X}_k)$-is the minimum value of the target indicator, $\bar{f}_k^+(\overline{X}_k)$ - is the maximum value of the target indicator.

Methods of multiplicative convolution. Multiplicative indicator is based on the principle of a fair relative concession, i.e. the total level of the relative decline of one or several indicators does not exceed the total level of increase of other indicators. The disadvantage of this method is multiextremality that involves computational difficulties.

$$F^4\left(\overline{X}^*\right) = \min_{X \in G}\left\{\left[\prod_{k=1}^{r} w_k \bar{f}_k(X)\right] \cdot \left[\prod_{k=r+1}^{R} w_k \frac{1}{\bar{f}_k(X)}\right]\right\}; \qquad (9)$$

$$F^5\left(\overline{X}^*\right) = \min_{X \in G} \prod_{k=1}^{R}\left[\bar{f}_k(X)\right]^{\lambda_k}; \qquad (10)$$

$$F^6\left(\overline{X}^*\right) = \min_{X \in G} \sum_{k=1}^{R} \lambda_k \cdot \ln\left[\bar{f}_k(X)\right]. \tag{11}$$

Non-linear criteria convolution. This is the addition to the methods of maximum (minimum) convolution and multiplicative convolution. It is also multiextremality task.

$$F^7\left(\overline{X}^*\right) = \min_{X \in G} \sum_{k=1}^{R} w_k \cdot \left[\bar{f}_k(X) - \bar{f}_k\left(\overline{X}_k\right)\right]^2 ; \tag{12}$$

$$F^8\left(\overline{X}^*\right) = \min_{X \in G} \sqrt[\alpha]{\sum_{k=1}^{R} (w_k)^\alpha \cdot \left|\bar{f}_k(X) - \bar{f}_k\left(\overline{X}_k\right)\right|^\alpha} . \tag{13}$$

Combinatorial convolution is the simultaneous use of multiple trade-off schemes with different weighting factors.

After calculating the scalar indicators of individual competitive potential in order to analyze and compare them the radar chart is built. Figure 3 shows a general example of chart.
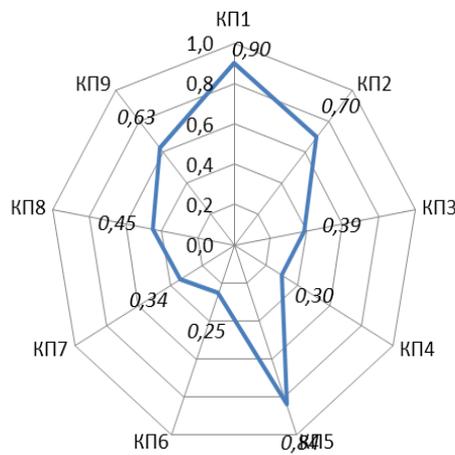

Figure 3. Example of individual competitive potentials analysis chart.

The chart not only reflects the quantitative values obtained by calculations, but also provides a comparative assessment of the factors for each selected competitive potential. Graphical representation of scalar values will allow selecting competitive potential having a larger reserve for the formation of competitive strategy. You can also determine the potential which value should be increased to enhance the competitiveness of enterprise.

The third problem is the selection of the type of function to calculate the overall strategic potential. In our view, it is possible to use a geometric average value of single scalar indicators, the geometric average provides the most correct in content averaging result. The overall competitive potential calculation can be performed using the formula:

$$\Pi_{\text{overall}} = \sqrt[n]{\prod_{j=1}^{n} \Pi_j} , \tag{14}$$

where Π_j – is individual competitive potential.

In order to assess the estimated overall strategic potential, the authors propose to use a scale which determines the development strategy of the competitive potential of the enterprise (Table 3).

Subject to the estimated value of the overall competitive potential the enterprise management shall develop a strategy of competitive potential development.

Table 3. Scale of assessment of the development strategies of competitive potential.

Ranges of values $\Pi_{overall}$	Position ofenterprise	Development Strategy
$0 \leq \Pi_{overall} \leq 0,35$	Weak	Search for internal reserves of development at the expense of favorable external conditions or due to more efficient use of internal resources
$0,35 < \Pi_{overall} \leq 0,65$	Average	Identifying of external threats and strengthening of the internal capabilities
$0,65 < \Pi_{overall} \leq 1$	High	Securing of positions occupied on the market

Figure 4 shows the scheme of formation of strategy of competitive potential development [4]
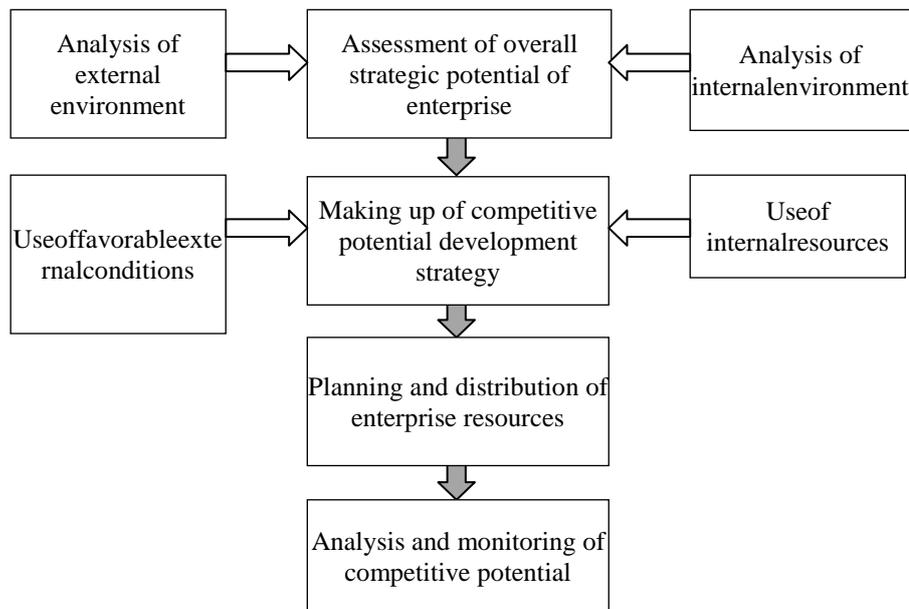

Figure 4. Scheme of formation of strategy of competitive potential development.

The study of the external environment is necessary to identify trends and circumstances impacting the main activities of the enterprise. Of course, it is necessary to analyze the market segment occupied by the enterprise, competitors' behavior, explore the technological area, and thus if possible identify future threats to the business.

The study of the internal environment will provide the strengths and weaknesses of the enterprise activities. Particular attention should be paid to the enterprise financial resources, staffing, and structure of process engineering and other.

Conclusion. Then it is necessary to assess the numerical value of the overall strategic potential, according to the methodology proposed above. Thus, one should perform a comparative analysis on each individual competitive potential both in dynamics and subject to competitors. These results will increase the efficiency of use of existing resources and reserves for future planning. An essential element is the monitoring and analysis of the efficiency of target performance, resource management, as well as provision of the necessary information for further research.

Conclusions. It should be noted that an adequate assessment of the overall competitive potential, formation of individual competitive potentials affects all activities of the enterprise.

Assessment of individual competitive potential allows to analyze all aspects of the enterprise activities and identify trends which help to detect future threats, secure position in the market, investigate the technological area.

A reasonable approach to management of all elements of competitiveness management system will allow to elaborate a strategy for development of the enterprise in the long-term period.

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