
Enterprise Development Factors' Control

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Abstract:

The relevance of the topic is determined by the fact that the problem of controlling the factors of enterprise development remains understudied and needs theoretical research and practical testing.

The main methods of the research are: empirical; experimental and theoretical methods. The article describes a mechanism by which not only the enterprise lagging behind the leaders is assessed, but also their achievements in the research-engineering, organizational, and other areas. The analysis of these deliverables allows developing alternatives how to use the leaders' achievements in enterprises.

High-quality and objective information about achievements is essential for professionals to make better decisions, so the implementation of the controlling mechanism for enterprise development factors is of great practical importance, firstly, for assessing the condition of the enterprise, and secondly, for the elaboration of the enterprise development plans.

The research results have been tested in a number of enterprises, and received a positive feedback.

Keywords: *Enterprise Potential, Competitiveness, Expert Assessment, Analysis, Information*

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1. Introduction

Increasing the competitiveness is a key task of an enterprise, requiring not only the modernization and commissioning of new facilities, but also the formation of an innovative policy, based on an assessment of its own achievements in comparison with the achievements of the best enterprises in the research-engineering, technological, environmental, financial, marketing, and other areas. In this regard, it requires developing a controlling mechanism that would take into account the experience and the achievements of the best enterprises (Pavlenkov, 2009; Savitskaya, 2013; Simons, 2000; Breckova, 2016; Epifanova *et al.*, 2015; Havlíček *et al.*, 2013).

The proposed mechanism will give the opportunity, taking into consideration the experience and the achievements of leader enterprises, to improve the control of enterprise development factors, to ensure its efficient operation in the operational and the prospective period, and to increase its competitiveness.

Today, many of the issues related to the control of enterprise development factors remain insufficiently developed. This problem remains understudied in the national and foreign literature and requires theoretical and practical application. The external environment has a strong influence on the operation of an enterprise. Environmental factors do not only influence, but can also create a variety of problematic situations for an enterprise (Kaplan, 2000; Coricelli, 1998; Kolchanova and Kolchanova, 2016; Setyawan *et al.*, 2014; Theriou, 2015; Theriou *et al.*, 2014).

Early detection and consideration of changes in the external environment is the most important task of the enterprise management. The effectiveness of solving these tasks consists in the ability to identify hazards and achievements of other enterprises and in due course to prevent them or to use them for the purposes of its development. A control mechanism for enterprise development factors, which does not only allow identifying hazards, but also assessing the achievements of other enterprises, on the basis of which introducing changes in certain areas of the enterprise development, has been elaborated.

2. Research Methods

An enterprise operates in the market economy environment, so its performance indicators should be compared with those of the best enterprises. Such indicators characterize the economic, technical, organizational, managerial, and other areas of activity (Savitskaya, 2013; Trifonov, 2013; Charles, 1992). To solve these problems, a control mechanism for enterprise factors development has been proposed.

2.1. The Choice of Indicators

1. Definition of indicators: The enterprise performance is evaluated with a multitude of indicators ($i = 1, 2, \dots, n$). To make an expert assessment of the indicators, an expert commission of the enterprise is appointed, using, for example, the following influence indicator rating gradation: 5-determinant; 4-essential; 3-average; 2-weak; 1-minor; 0-none (Orlov, 2004). The enterprise can also use other gradations to rate the indicators. The result of the expert assessment is the matrix A , whose elements a_{ij} are the grade allotted by an expert.

According to the formula (1), the grade F_i of each indicator is determined:

$$F_i = \sum_{j=1}^m a_{ij}/m, \quad (1)$$

where i is the index of an indicator ($i = 1, 2, \dots, n$);

j is the index of an expert ($j = 1, 2, \dots, m$).

2. Ranking: According to the formula (1), the values of the indicators have been determined, which are then arranged in ascending order. The result is a ranked set of indicators

$$\{F\} = F_1, F_2, \dots, F_n. \quad (2)$$

3. Defining a set of indicators: In practice, the comparison and evaluation of a large number of indicators does not always produce the desired results because of the analysis complexity, so the expert commission selects the most significant indicators. These enterprise indicators in the process of comparing them with those of other enterprises allow for the detection of deviations, their analysis, and working out of necessary measures for its development (Savitskaya, 2013; Charles, 1992; Pavlenkov, 2007).

4. Comparative analysis: To carry out a comparative analysis, a database of quantitative values of indicators for the whole enterprise is formed $\{F^c\}$.

2.2. The Selection of Objects

In the market economy conditions, all businesses are susceptible to changes in the internal and external environment. The susceptibility cause to a large extent is that businesses do not give enough attention to evaluation of changes in the external factors and mechanisms of controlling them. To penetrate the market and to ensure high competitiveness, enterprises tend to need to create their own products, spending formidable resources. However, as global experience confirms, one can benefit from the experiences and achievements of other businesses, leader enterprises (Falko, 2007; Petty, 1999).

The selection of objects with the best quantitative and qualitative indicators can serve as a basis for further updating of one's development targets.

1. Definition of criteria: To select objects for comparison, a set of criteria $\{R\}$ is formed. To determine the directions of the enterprise development, it is necessary to identify problem areas, disadvantages, critical development factors that pertain to different areas. Statistical information is used to determine the list of critical development factors, for example: second-rate products; substandard materials; low profitability of production; low staffing levels; low investment attractiveness, and others (Pavlenkov, 2009; Savitskaya, 2013; Kaplan, 2000; Pavlenkov, 2012). It is important to note that in addition to the critical development factors, the enterprise management can include challenging targets in this list as well (to increase the market share by 40% within a certain period; to master manufacture of new products, which would exceed the best world solutions, throughout a year; to increase the enterprise's profitability as much as 2- 3 times, etc.).

2. List of comparison objects: A list of objects is formed out of enterprises (immediate competitors, regional, sectoral, and global competitors, enterprises occupying a large market share, etc.). The list is different for each enterprise and largely depends on its competitive position in the market. While drawing up the list of objects, one is to consider the main indicators of their performance (targets, trends, technology, finance, management, etc.). Thus, the list of objects $\{K\}$ for selection is drawn up, which is being constantly refined.

3. Evaluation of an object: To make an expert assessment, an expert commission is appointed, which evaluates enterprises with regard to the enterprise weight importance, using the formula:

$$a_k = \sum_{i=1}^n \sum_{j=1}^m a_{kij}, \quad (3)$$

where a_{kij} is the expert assessment j ($j = 1, 2, \dots, m$), of the i -th indicator ($i = 1, 2, \dots, n$), of the k -th object $k \in \{K\}$.

4. Ranking the objects: The values a_k are ranked by descending weights (importance), and a list $\{K^C\}$ of comparison objects is drawn up. Experience has proven that the list of enterprises $\{K^C\}$ should not exceed four to five enterprises, since with a larger number of enterprises, obtaining timely and quality information from these objects is hindered.

2.3. Information Gathering

1. Collection of data: Data collection on each object in the set $\{K^C\}$ is carried out, and a values array FS^k of the indicators is formed:

$$FS^k = F_1^k, F_2^k, \dots, F_n^k. \quad (4)$$

2. Gathering from internet sources: Online resources allow generating a values array FI^k of the indicators on some objects:

$$FI^k = F_1^k, F_2^k, \dots, F_n^k. \quad (5)$$

3. Gathering from published sources: The published sources can be: reports of authorities and enterprises; articles; analytics; publications; statistics, and others. These data allow generating a values array FO^k of the indicators on some objects:

$$FO^k = F_1^k, F_2^k, \dots, F_n^k. \quad (6)$$

4. Gathering from rating agencies: Rating agencies data allow generating a values array FR^k of the indicators on some objects:

$$FR^k = F_1^k, F_2^k, \dots, F_n^k. \quad (7)$$

5. Gathering from other sources: Other sources are the information received by arrangement between the objects. This information allows, as a result of gathering and processing, generating a values array FP^k of the indicators on some objects:

$$FP^k = F_1^k, F_2^k, \dots, F_n^k. \quad (8)$$

6. Database: From the data collected about the objects $FS^k, FI^k, FO^k, FR^k, FP^k$ an information base is drawn up:

$$F^k = \{FS^k, FI^k, FO^k, FR^k, FP^k\}, \quad k = 1, 2, \dots, K. \quad (9)$$

2.4. Comparing the Indicators

The information collected about the objects is analyzed by various services of the enterprise in order to identify information that can be used to improve its performance and make recommendations on utilizing the experience of other enterprises. The managers in charge of comparing the indicators may be faced with the fact that the previously planned development measures cannot be put into effect for certain reasons, so it is necessary to analyze these reasons. Let us consider the sequence of carrying out a comparative analysis.

1. In the information base, a values array of the enterprise indicators $\{F^C\}$ is formed, which have been defined as a result of the expert assessment, and the quantitative values have been obtained on the basis of its planned, reported, and statistical data.

2. In the information base, an array of $\{K^C\}$ comparison objects is formed, which are used for the comparative analysis.

3. An object of comparison k from the multitude K^C is taken. Initially, to carry out the comparative analysis, the first object is taken, i.e. $k=1$.

4. An indicator F_i^k from the array $\{F^k\}$ is taken (at the first step, $i=1$).

5. An indicator F_i from the array $\{F^C\}$ is taken (at the first step, $i=1$).

6. The deviation calculation is made:

$$\Delta F_i^k = F_i - F_i^k \quad (10)$$

7. An array of deviations $\{\Delta F^k\}$ for each enterprise is created k ($k=1,2,\dots, K^C$).

8. If deviations have been defined for the all the indicators of the enterprise k , then go to paragraph 9; otherwise, the next indicator is taken, and then go to paragraph 4.

9. If deviations have been determined for all the enterprises $\{K^C\}$, then go to paragraph 2.5 (assessing the indicators). Otherwise, another enterprise is taken; then go to paragraph 4.

2.5. Assessing the Indicators

An effective use of other enterprises' achievements does not always make it possible to solve one's own problems. Thus, a 'blind' utilization of someone's experience will unlikely to produce a good result. The use of someone's experience should be approached systematically, and, most importantly, one should be able to adapt the results in the enterprise. In addition, it is necessary to analyze possible costs of introducing alterations and the profit the enterprise will receive from their implementation. One should also avoid the situation when research has been undertaken, the results have been analyzed, but the management lacks determination to fulfill them. In this case, the cost and effort invested to study the objects of comparison are meaningless.

Analysis and evaluation of the research results are needed, as this makes it possible to determine the effectiveness of and the need for further research and improvements in the enterprise. It is important to note here that a systematic approach to the research ensures elaborating a model of continuous improvement and development of all the spheres of activity in the enterprise (Falko, 2007; Pavlenkov, 2012; 2015).

Hereinafter, let us consider the sequence of evaluating the performance indicators and decision-making.

1. In paragraph 2.4. 'Comparison of indicators', the array of deviations $\{\Delta F^k\}$ has been formed on all the indicators and the objects of comparison ($k=1,2,\dots, K^C$; $i=1,2,\dots, n$).

2. In accordance with the economic content of an indicator, the minimum or maximum value ΔF_i^e among the values ΔF_i^k is defined according to the formula:

$$\Delta F_i^e = \max(\min_k) \Delta F_i^k. \quad (11)$$

3. The analysis of values ΔF_i^e is carried out. According to the analysis findings, managers can develop a number of alternative options for the use of other enterprises' achievements in the enterprise (Falko, 2007; Pavlenkov, 2004; Prasanna, 1993). These options are discussed, coordinated, and submitted to the executive management, who shall take a decision on introducing alterations on this indicator by the amount (volume) (ΔF_i^p) . On the basis of the changes coordinated in terms of all the indicators, an array of coordinated changes $\{\Delta F^p\}$ across the enterprise is formed. In terms of the changes included in the array, related measures should be developed.

4. Action Plan. Measures to be included in the plan should be aimed at solving specific problems, obtaining tangible results. For each measure, a document is to be produced including the following sections: a concept; an implementation technology; a plan.

- Concept: The concept describes the principles, objectives, and courses of the enterprise development, as well as the goals and objectives of a measure.
- Technology: This section describes basic methods of solutions and mechanisms for obtaining the desired results, as well as the delineation of tasks for different services.
- Plan: In this section, the deadlines and budgets for the measures are set. The plan is linked to the development strategy and can include a number of measures aimed at implementing the coordinated changes.

5. Adjustment of plans. The developed plan in general is aimed at increasing competitiveness through changes in the current and prospective development plans. The adopted changes require the adjustment of the approved plans and the enterprise operation objectives. That is the way the mechanism of considering and evaluating the external factors of the enterprise development is implemented in whole. The mechanism implementation, based on a number of principles allows developing measures to ensure the enterprise development, using the experience and achievements of other enterprises.

- The principle of consistency: This principle means that the indicator change affects the state of the enterprise as a whole.
- The principle of comprehensiveness: The indicators affecting a particular process must be studied comprehensively.
- The principle of functional orientation: The effective development of the enterprise is supported by the system, which controls the indicators

characterizing the functions: planning, accounting and control, coordination and regulation.

- The principle of specificity: The enterprise development control system includes indicators that take into account the sectoral, regional, and local specifics.
- The principle of hierarchy: The analysis and assessment of the indicators is made based on their ranking: there are aggregated, summarizing indicators, regulatory ones, and others.
- Principle of information application: The control mechanism must operate with the source information that is available in the existing forms and statistical reporting.
- The principle of comparability: In the process of the mechanism implementation, the indicators should be comparable in terms of their characteristics, methods of preparation, units of measurement, forms and methods of calculation.
- The principle of continuity: In the process of obtaining new data, it is necessary to adjust the indicators.

The developed mechanism to control the enterprise development factors allows giving scientific credence to the system of external factors change level measurement system.

3. Practical Results

This mechanism has been tested in an industrial enterprise (PI). To test the results of the research, a commission of experts was appointed, that, out of a common set of thirty one enterprises, included four leader enterprises in the list of objects for comparison (PL-1, PL-2, PL-3, and PL-4). The comparative analysis was made on a number of indicators: the R&D expenditure (Figure 1), the cost of staff training (Figure 2), the implementation of new equipment (Figure 3).

Figure 1. The R&D expenditure (as a percentage of the cost value)

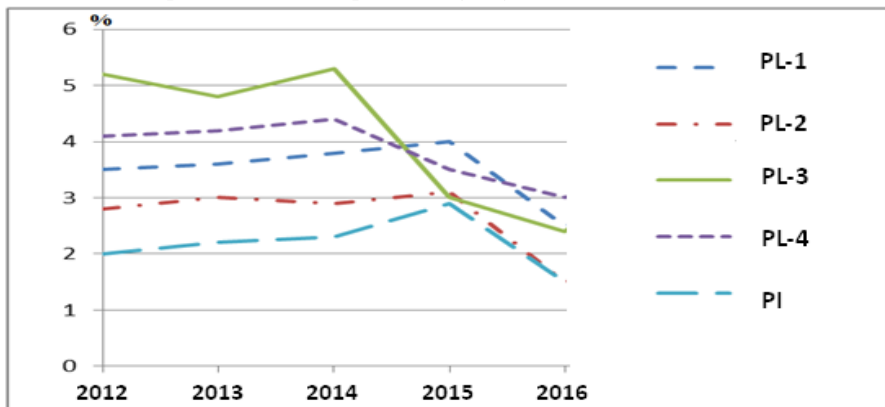
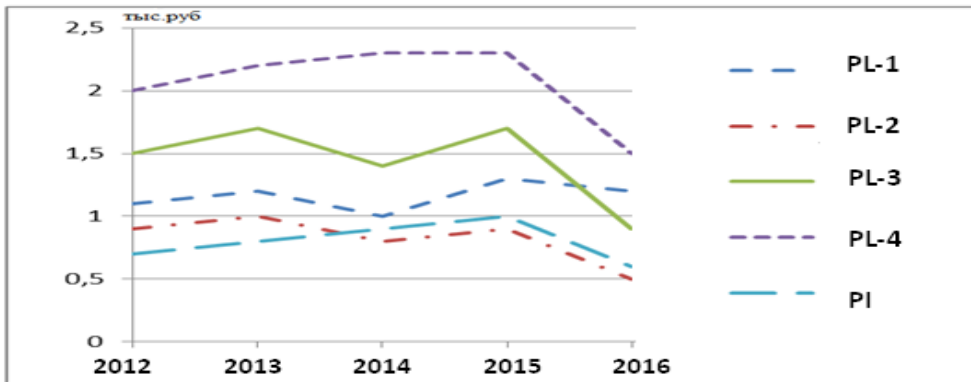
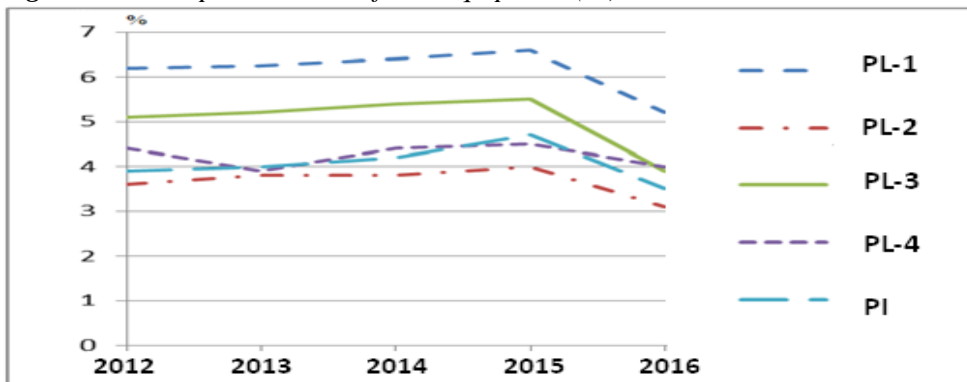


Figure 2. The cost of staff training**Figure 3.** The implementation of new equipment (%)

The results of the comparative analysis have shown that the leader enterprises until 2015 were scaling up the R&D expenditure, the personnel training and development expenses, whose growth rates were higher than in the enterprise under examination. However, in terms of the equipment upgrade level, it is only the first enterprise that is ahead of the one in question. Taking into account the comparative analysis results, proposals have been drafted to adjust the development plans.

4. Discussion

Practical implementation of the enterprise development factors control mechanism requires a significant amount of information from external sources, which is associated with the complexities of its 'lawful' acquisition. Setting up a monitoring service for the mechanism information support becomes an important task of the enterprise.

5. Conclusion

A control mechanism for enterprise development factors has been elaborated. Empirical and theoretical methods, as well as experimental methods have been used to implement the mechanism.

The proposed mechanism will give the opportunity, using the achievements and the experience of leader enterprises, to improve the enterprise management system, to enhance its efficiency and competitiveness in the operational and the prospective period.

The results of the study have been tested on the actual data of industrial enterprises, and proposals for introducing changes into the development plan have been drafted.

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