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Specifics of the Key Competences Contours for the Industrial Enterprises

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Abstract. The modern approaches of Russian and foreign authors to the formation and development of key competencies and extensive foreign experience in the application of this approach in industrial enterprises are studied. Direct application of foreign experience at Russian enterprises does not seem appropriate, so the task is -to adapt scientific developments to modern Russian conditions. Modern requirements for the formation of key competencies of an industrial enterprise sppose the forming of technical and instrumental, socio-technological and economic contour in the General control loop. The key competence suppose the synthesis of technological, organizational and managerial decisions, which allows to determine the structure of the contour of the key competence of the enterprise. The contours that make up the key competence of an industrial enterprise, are transformed, depending on the phase of development of the enterprise. The study has shown a change in the priority values of individual elements of the competence contour for different stages of development of an industrial enterprise. The results of testing for one of the 12 studied enterprises are presented: the availability of relevant competencies is determined by experts and compared with the phase of development of the enterprise and the achieved economic results of industrial enterprises.

1. Relevance of the research topic

Global competition dictates new rules for the formation of key competencies for Russian enterprises. Technological, organizational and managerial competencies of our companies must meet international standards.

The task of developing and implementing a methodological approach to the assessment and development of key competencies of industrial enterprises is relevant and significant from the standpoint of theory and practice.

The degree of development of the problem. A significant contribution to the development of the scientific concept of competitive development of the organization, taking into account the competence approach, was made by the works of domestic scientists I. B. Gurkov [1], V. S. Katkalo [2], etc., and foreign authors I. Adizes [3], E. Deming [4], etc. In their works the key provisions and factors for the successful development of the enterprise taking into account the stages of their development cycle are presented. Priority of internal factors of development of the organization gave such authors as D.

Aaker [5], F. Glasl and B. Lievegoed [6] D. Collis and C. Montgomery[7,8], E. Penrose [9], M. Hammer and J. Champy[10], K. Andrews[11]. Approach "the use and development of key competences" is reflected in the scientific works of H. Geiselhart[12], W. Chan Kim and R .Mauborgne [13],F. Glazl and B. Livehood [6] K. Prahalad and G.Hamel [14], R. Hoskisson[15], D. J. Teece[16], M. Rose and W. Dellenbach [17] , G. W. Chesborough [18].

The purpose of the research is to study the specifics of the contours of the key competencies of industrial enterprises as the basis for their successful development.

2. Methodology

As a methodological basis of this study, the concept of the life cycle of the organization is taken, and in particular, the approach of F. Glazl and B. Lievegoed , taking into account the specifics of the organization as a social engineering system , which is especially important for an industrial enterprise. The work is a continuation of the study of the influence of key competencies on the formation of competitive advantages of an industrial enterprise [19,20], etc.

In contrast to the theory of the F. Glazl and B. Lievegoed , which distinguish three organizational subsystems: cultural, technical and social, we complement the model by the economic subsystem as the basis and the result of the commercial enterprise [21]. These subsystems as the control objects are "control loop" in our model.

For an industrial enterprise it is especially important to take into account its technological competence (competition on the basis of technology is now set by Industry 4.0), so we allocate a technical and instrumental contour in the organizational model of the enterprise. Within this contour it is assumed to make operational technological decisions; socio-technological decisions (organizational decision –making-for example, to change production technology, the introduction of quality systems, etc.).); and the economic contour, involving the adoption of management decisions at the strategic level (relating to the business portfolio , financial management, etc.).

The study analyzes the transformation of the contour of the formation of the key competencies of an industrial enterprise depending on the phase of its development .

3. Results

A retrospective analysis of the factors ensuring the competitiveness of enterprises allows us to conclude that the nature of the competition of the XXI century has changed radically. The competitiveness of the enterprise and its product is a consequence of not only technological competence , but also the dynamic organizational abilities of employees , which is the essence of the competence approach.

Our definition of the key competence of the enterprise as a synthesis of technological, organizational and management decisions, allows us to determine the structure of the contour of the key competence, schematically presented in Fig.1. Intangible assets are the basis of the key competence of the enterprise within each of the three contours: at the level of the economic contour, strategic entrepreneurship is important, within the socio –technological contour– dynamic organizational abilities, at the level of the technical and instrumental contour – the initiative of employees to improve the production process , which affects the degree of success (as an example) of the concept of lean production or TQM..

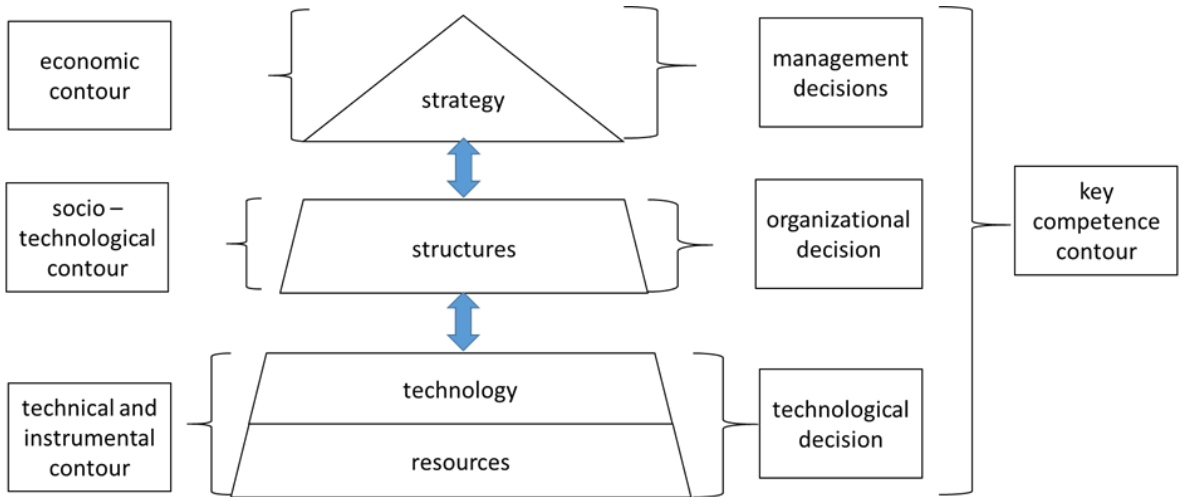

Figure 1. The structure of the core competencies of industrial enterprises.

The basis for the structure is a model of the enterprise, borrowed from the concept of "dynamic development of the company", developed by B. F. Glazl and B. Lievegoed at the end of the twentieth century. The model takes into account the elements of the enterprise, which in our study are combined into three contours, reflecting the specifics of the industrial enterprise, the analysis of competencies which should take into account the following features:

- The need for continuous investment in the development of existing production technology and the development and assimilation of new technology;
- The need to ensure adequate requirements of the market of technological competencies of personnel;
- Barriers to entry and exit in the establishment of an industrial enterprise and the associated longer and more costly period of entry and exit.

The peculiarity of the presented model is that it has a fractal structure: each contour has a self-similarity, so the key competence is a technological and organizational synthesis . Integrally mathematically the key competence of the enterprise can be represented by the formula:

$$Кк = U (Рур, Рор, Ртр) + Δ, \quad (1)$$

where P - is the result of management, organizational and technological decisions; Δ is the value that expresses the effect of non-additivity, which characterizes the emergence of a new quality as a product of synthesis - a combination of elements of the enterprise and their mutual influence. The value of Δ depends on time, in General it is practically formalizable. In a well-organized, integral system, the value Δ is always positive, in a disorganized, disjointed system, the value Δ can be negative.

Organizational skills play an important role in the formation of key competencies of enterprises - ensuring the quality of business models of organizations.

We propose to consider "organizational abilities" as a projected property of the business system to form and develop competencies that provide an increase in the competitiveness of industrial enterprises.

This interpretation of the key competence of the enterprise allows to achieve an understanding of important management aspects. First, there is a clear distinction between abilities and competencies: competencies answer the question of "what" and abilities answer the question of "how". Secondly, it is possible to use a wide range of methods and tools (from modeling of business processes and organizational routines to the formation of organizational culture) to create organizational abilities. Third, this understanding of organizational capabilities allows the company to have a sustainable competitive advantage, because the organizational abilities of the enterprise, adapting their business model, are distinctive for each organization, and they can not be copied. Fourthly, it creates a new basis for understanding the competitiveness of the organization.

Changes in the main factors of the industrial enterprise depending on the phase of development are presented in table.1 . Dark color in the table highlighted the dominant contours of each phase of development.

Table 1. Transformation of the contours that make up the core competence of the industrial enterprise, depending on the phase of development.

Phases of development (by B. F. Glazl and B. Lievegoed)	Economic contour: objectives, strategy; formation of economic instruments of activity	Socio-technological contour: structures; functions	Technical and instrumental contour: technologies, tangible asset
Pioneer phase	**Objectives - implicit, intuitive, correspond to personal life principles pioneer organizer**	Culture of power[22]	Lack of standards, variability, improvisation
Differentiation phase	Developed by experts, brought from top to bottom to employees	Culture of role[22]. Formalization, rigid management, specialization	**Standardization. Regularity. Priority of technical logic and technological preparation of production**
Integration phase	Developed on the principles of decentralization, consciously using coordinating and integrating actions. Top down targets and up from the bottom	**Culture of the task[22]. A mix of formal and informal structures. Employees - as the entrepreneurs within the organization**	Flexible management by processes within specified constraints. Optimization of available material resources for the tasks of development
Associative phase	**Expansion and development of interaction with partners; attention to coordination and adjustments**	**Culture of personality[22]. Overcoming and transparency of the organization's borders - interaction with the cultures of partner enterprises**	**End-to-end, mutually beneficial to the partners the processes are formed as a single unit. Minimization of tangible assets to match the resources and markets in which they are needed**

The tasks of the pioneer phase and the differentiation phase relate to the space of activity, focused on the technical and instrumental contours and partly on the social contour, without affecting the space of relations, which exacerbates the crisis of the development of industrial enterprises. The space of activity is significant for production and always is in the area of attention of the enterprise management. However, without taking into account the space of relations in the organization, it is impossible to move to the phase of integration: internal problems will not allow. Data of our research, Fig. 2, show the ratio of problems in the production organization that has made reengineering, a year after the automation and implementation of standards for business processes and resources.

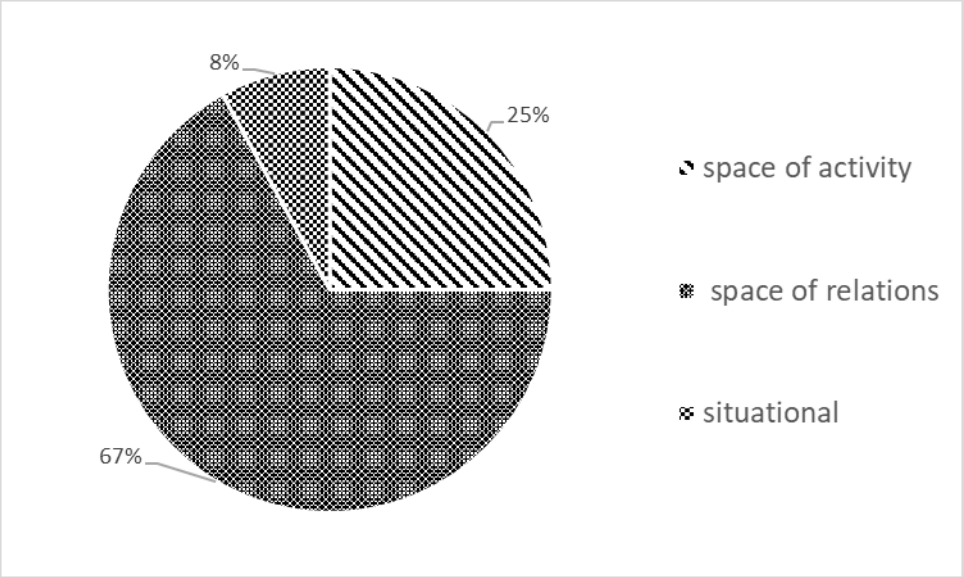

Figure 2. Problem ratio LLC "Favorit" (metallurgical production).

Below (table 2) the data of one of the 12 studied enterprises are presented, which has moved to the associative phase of development. For the analyzed enterprises, the availability of relevant competencies was determined by experts and compared both with the phase of development of the enterprise and the achieved economic results of industrial enterprises. The study has showed that it is impossible to automatically move even from the phase of differentiation to the phase of integration. A change in thinking is needed when the space of relationships is recognized as equivalent to the space of the organization. Our study showed, that in the transition to the integration phase: 1) the goals, the strategy of the enterprise are developed on the principles of decentralization; 2) organizational structures lose importance, formed a horizontal management as a team of like-minded people, where everyone takes responsibility for their area of work; 3) motivation is replaced by entrepreneurship and responsibility; 4) the control function is transformed into an analysis function, then in the associative phase – in introspection.

5. Results of testing

Table 2. LLC "SB" (civil machinery production).

	Pioneer phase	Differentiation phase	Integration phase	Associative phase
number of workplaces	8	36	240	
Number of strategic business units	1 - 5	5 - 32	32 - 50	Starting period

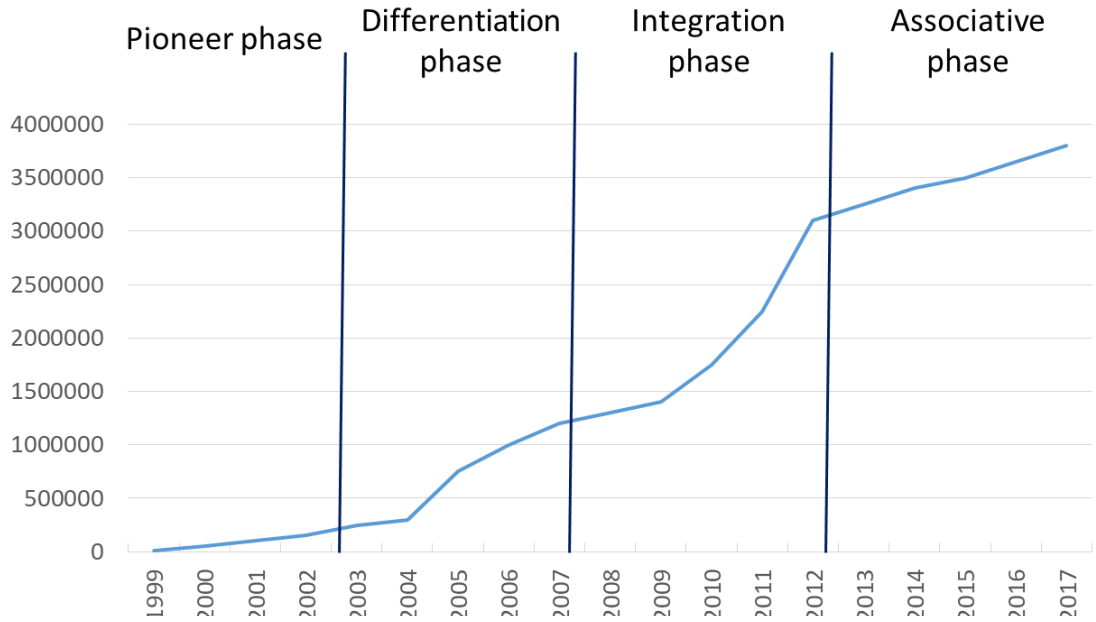

Figure 3. Dynamics of Revenue by phases of development (LLC "SB").

6. The perspectives of the research

The task of further research is to develop indicators that enable digital evaluation of each contour , and on their basis - an integral assessment of the key competence of an industrial enterprise. It will allow to give a comparative assessment of the key competence of the enterprise in dynamics and to make management decisions taking into account technological, organizational and administrative contours.

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