

"End-to-end" Management of Business Processes in the Conditions of Formation of Production Systems of the Full Life Cycle

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Abstract-Management of business processes of industrial enterprises is paid close attention, because the effectiveness of their organization depends on the further development of their production systems. Due to the high variability of the external and internal environment of enterprises, the emphasis should be made on continuous, high-performance management, which permeates all stages and stages, processes and procedures of enterprise development.

There is a need to manage "end-to-end" business processes, "end-to-end" management, which requires the development of appropriate methodological support.

The implementation of "end-to-end" management is necessary in production systems that create a technically complex finished product to meet the needs of society and determine the level of economic development. A special role is assigned to the production systems of the full life cycle, providing both the actual production and pre - and post-production stages of product circulation, up to its disposal.

Keywords-"End-to-end" management, business processes, production system

I. INTRODUCTION

The problem of implementation of continuous, effective management in production systems of the full life cycle penetrating all stages and stages, processes and procedures of development of the company, identification and improvement of business processes on the basis of application of modern information technologies becomes actual. There is a need not just to manage "end-to-end" business processes, but to "end-to-end" manage the development of business processes of production systems of the full life cycle. Thus, the relevance of "end-to-end" management of business processes of production systems of the full life cycle, the need for its methodological support is not in doubt.

Questions of the origin and formation "end-to-end" control of attention in the works of such researchers, as E. Deming [1], J. Juran [2], and L. Kantorovich [3], M. Porter [4], W. Taylor, A. Feigenbaum, W. Shewhart and etc. The study of reengineering of business processes dedicated to the works of Smith H., Finger P. [5], Hammer M., Champy J. [6], Vertakova Yu., Plotnikov V. [7], Robson M., Rother M. etc.

Features of the organization of production, development strategy of industrial enterprises is reflected in the works of Risin I. E., Tradescape Yu [8], Sevryukova L. , Kryzhanovskaya O. [9], Polozhentseva Yu., Klevtsova M. G. [10] etc.

Despite the significant contribution of foreign and Russian scientists, the issues of methodological support of "end-to-end" management of business processes of production systems of the full life cycle are not fully investigated and require further study.

II. MATERIALS AND METHODS

The implementation of the process approach to enterprise management allowed us to identify two main practical aspects of its application – "segmentation" and management of "end-to-end" business processes. The most important factors in choosing the method of "segmentation" are its "transparency", binding to the existing structure, ease of documentation. The choice of the "end-to-end" business process management approach was determined by the need to improve the efficiency of the company at the cross-functional level.

At the same time, in the course of the study, universal principles of selection of "end-to-end" processes devoid of subjectivity were not revealed. Companies implementing the process approach are invited to focus on the description and regulation of business processes of structural units. On this basis, the organization will have real opportunities to move not only to matrix management, but also to "end-to-end" business process management.

Unified interpretations of the concept of "end-to-end" management of business processes do not exist. "End-to-end" management is used in relation to material flows, supplies, logistics, is considered in the context of quality management, separate tasks and resources, product life cycle, products, etc. In connection with the above, we researched the historical aspects of the development of this category in Economics.

One of the first ideas of "end-to-end" management rather than "end-to-end" business processes, in our opinion, proved Kantorovich L. V. in the theory of linear programming [3]. M.

Porter's [4] value chain is essentially the development of L. V. Kantorovich's approach. This author considered the sequence of actions of an enterprise aimed at transforming resources into a final service or product. At the same time, the activity of the production system is considered not as a sequence of business processes at the pre-production, production and post-production stages, but as the organization and management of interconnected series-parallel business processes of these stages, taking into account the introduction of information technologies. Such management of communications and business processes of industrial enterprises of a full life cycle can become a source of competitive advantage.

To ensure competitiveness, enterprises of various industries are forced to constantly master the rapid launch of new products that meet customer requirements. To reduce the time to market a new product and thereby improve the efficiency of its activities, manufacturing enterprises can use

the technology of product life cycle management and information system as a tool for the implementation of technology.

A new level of organizational solutions in the field of enterprise management, implementing in its activities the design, manufacture and maintenance of products, requires the reorganization of the management system on the basis of continuous ("end-to-end") information interface processes throughout the life cycle of the product-from design to disposal. In order to eliminate bottlenecks "end-to-end" management of business processes of the production system is necessary, which presupposes the effective organization of business processes at the pre-production, production and post-production stages in order to effectively influence the input processes, optimize production and obtain the planned output indicators, taking into account the principles and technologies of automated management of the full life cycle of the production system.

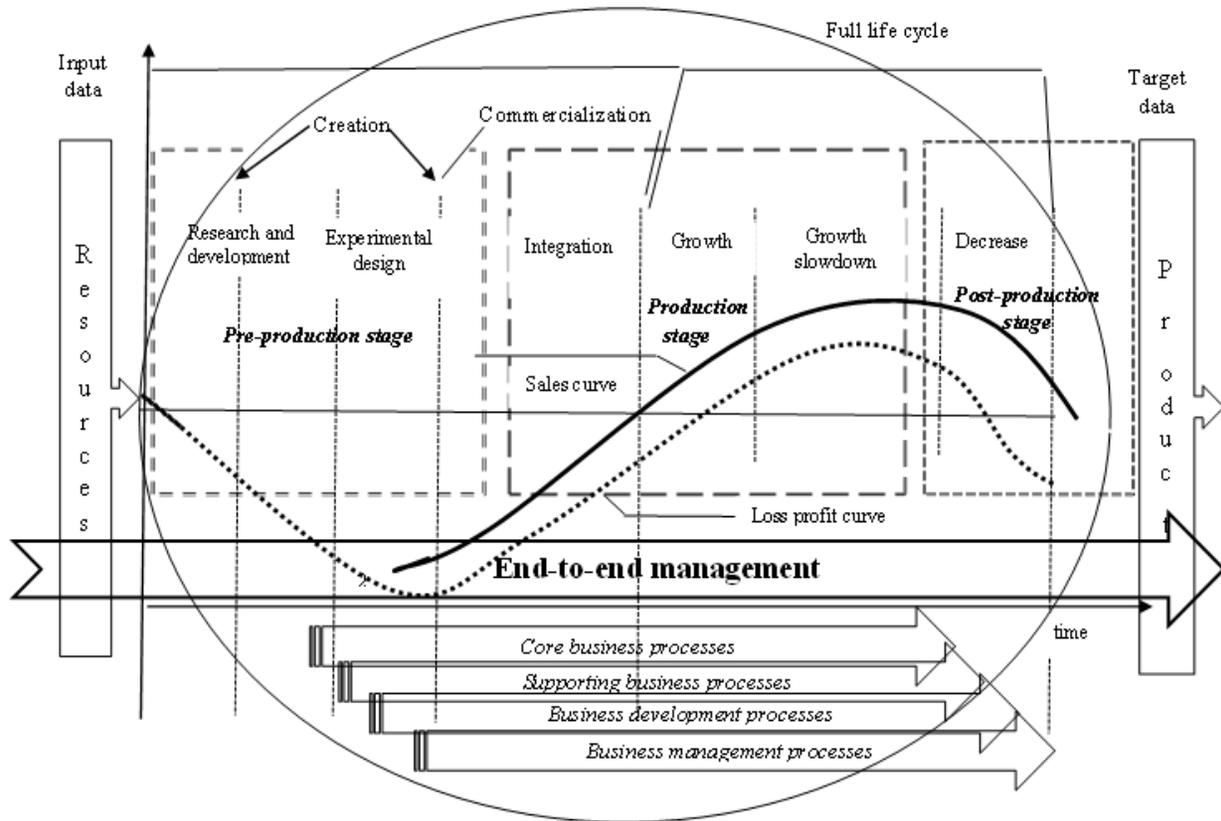


Figure 1. The essence of "end-to-end" management of business processes of enterprises in the formation of production systems of full life cycle

Note: *Compiled by authors

The introduction of the life cycle management system of the production system predetermined the formation and the need for "end-to-end" management of business processes of production systems (refer with Fig. 1), based on the principles and technologies of automated life cycle management of the production system, but differs not only in the use of reengineering technology of business processes,

but also in the assessment of the importance and problem of business processes, the specifics of modeling and evaluation of the effectiveness of their organization for the implementation and promotion of industrial products not only in priority industries for the state (defense, energy industries, etc.), where there is an active implementation of the system of management of the full life cycle of the product,

the result of the transition to which is the implementation of end-to-end design, technological and commercial cycles, from the idea of the product to its operation and disposal, but also in industries for which there is no direct state support, forced to adapt to the development in conditions of sanctions restrictions.

At the same time, forecasting the results of the industrial enterprise should take into account the relationship of groups of business processes and be based on the use of econometric models, which allows to take into account qualitative changes in the organization of business processes and their expected impact on the results of the industrial enterprise.

Evaluation of the effectiveness of organization's business processes allows to identify areas of their reengineering, which will ensure the elimination of "bottlenecks" (problem) in the production through the use of the most effective business process modeling technology. Evaluation of the effectiveness of organization's business processes should be carried out taking into account the use of tools "end-to-end" management of production systems of the full life cycle, which includes an expanded set of adequate to modern conditions of management tools to assess not only the strategic position of the organization as a whole, but also covers all stages of the full life cycle of the production system.

Analysis of the practice of "end-to-end" management on the example of enterprises in China and Russia,

implementing the full life cycle of the product, presented in the thesis, proves the effectiveness of the introduction of "end-to-end" management in enterprises of the full life cycle. Evaluation of the effectiveness of business processes should be continuous, integrated into the system of "end-to-end" management, based on continuous monitoring of changes, monitoring of business processes of production systems of the full life cycle.

Taking into account the above circumstances, forecasting the results of the industrial enterprise (in particular – financial) as an element of assessing the effectiveness of the organization of business processes should be carried out not only on the basis of building an effective from the point of view of reengineering the business model of the organization, but also should constantly update the results of the forecast in an automated mode, taking into account the automatic update of the initial data-input parameters, that is, the business model should be adaptive, trainable. This requires appropriate software and analytical tools.

Due to the fact that the evaluation of the effectiveness of business processes is an automated process of continuous monitoring of changes, it is necessary to use an effective software and analytical product. The conducted research allows us to assert that a unified approach to the choice of software and analytical tools of business processes of the enterprise is not developed. At the same time, to select a software and analytical product, it is necessary to be guided by both cost and performance characteristics.

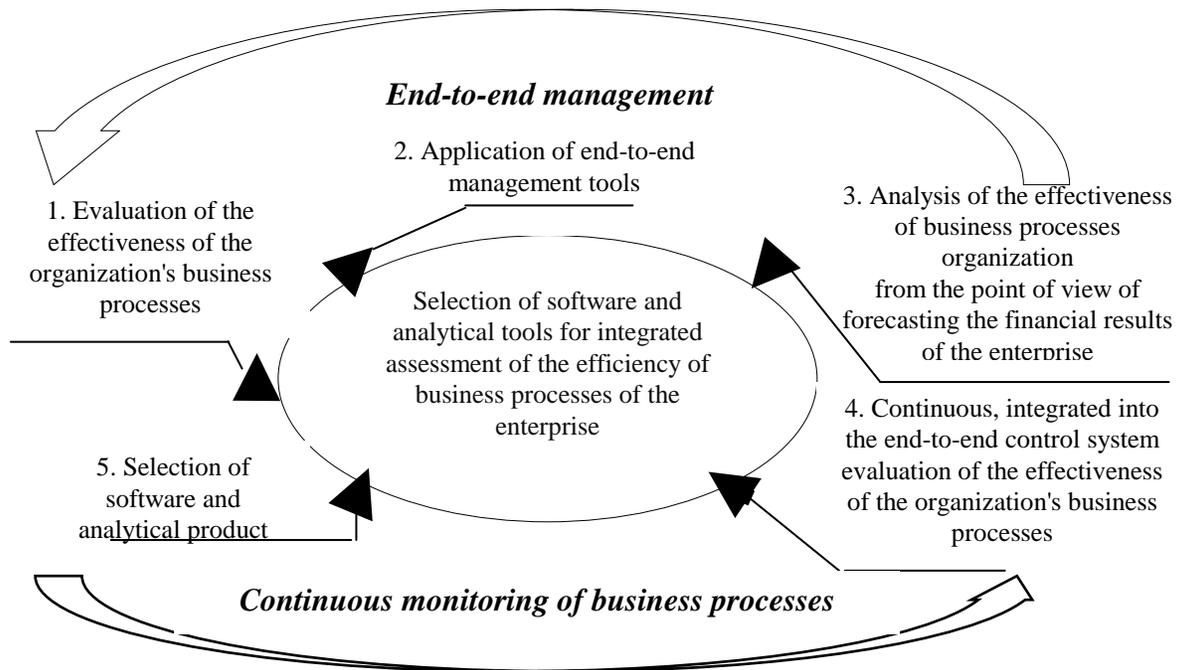


Figure 2. Selection of software and analytical tools integrated assessment of the effectiveness of business processes enterprises

Note: *Compiled by authors

The proposed approach to the choice of software and analytical tools for integrated assessment of the effectiveness of the organization of business processes of the enterprise (refer with Fig. 2) it is versatile and can be used in the selection of various software products. The validation of the approach we carried out for those most popular at present and promising future software products, as BusinessStudio, DeductorStudio, BizagiModeler, BPwin, Gretl.

Comparison of software products was carried out on the basis of finding a comparative assessment of the importance

of such cost and performance characteristics of the software and analytical tool as reliability and security; quality of support; functionality; price; user-friendliness of the interface. The importance of the criteria was assessed by pairwise comparisons of each factor based on the application of the hierarchy analysis (HA) method. The results of the priority analysis in the selection of the software product are presented in table 1.

TABLE 1. PRIORITIES FOR THE SELECTION OF SOFTWARE AND ANALYTICAL TOOLS FOR INTEGRATED ASSESSMENT OF THE EFFECTIVENESS OF ORGANIZATION'S BUSINESS PROCESSES BY THE HIERARCHY ANALYSIS

	A1	A2	A3	A4	A5	Priority vector
Priority vector	0,265	0,252	0,291	0,064	0,129	
BusinessStudio	0,215	0,389	0,292	0,273	0,159	0,277
DeductorStudio	0,256	0,173	0,307	0,397	0,237	0,358
BizagiModeler	0,307	0,242	0,184	0,154	0,123	0,267
BPwin	0,138	0,136	0,087	0,068	0,081	0,111
Gretl	0,082	0,058	0,128	0,105	0,399	0,069

Note: *Compiled by authors

where A1-reliability and security; A2-quality of support; A3-functionality; A4-price; A5 - convenience of the interface

According to the calculations, it can be concluded that the most priority is the software product DeductorStudio, because its priority factor by the hierarchy analysis is 0.358. Based on the data presented in the table, it can be seen that the software product DeductorStudio received the highest rating, as it has the best quality of support and tools for working with neural networks.

III. CONCLUSION

The problem of effective development of industrial enterprises is relevant in modern economic conditions. A competent combination of the regulatory role of the state, intellectual resources and effective business operation based on the "growth points" will ensure the competitiveness of Russian companies in the world markets not only in raw materials, but also in those industries in which the state can develop real competitive advantages (for example, aviation and space technology, multimedia, energy, instrumentation, etc.).

Entering the global market and the role of the state on it depends on whether the country will have a product adequate for a technological breakthrough, as well as a strong economy based on intellectual leadership. In this regard, there is a need to develop production systems of enterprises that implement the full life cycle of the product.

The main purpose of the implementation of the system of managing full lifecycle for industrial enterprises is the creation of an integrated system, incorporating and integrating into a single information space the main stages of the life cycle and production of products such as pre-production (marketing research; development work, etc.), production (material and technical supply; preparation of

production; production) and post-production stage (control and test; packaging and storage; realization and distribution; installation and operation; technical assistance and after-sales service; product modernization; customer feedback), which is "end-to-end" management.

Thus, "end-to-end" management of business processes development of enterprises in the conditions of formation of production systems of the full life cycle permeates the pre-production, production and post-production stages. At the same time, special attention should be paid to the production stage, at which the creation of the final product takes place, the quality of which will determine the post-production and pre-production processes. That is why building effective business processes at the production stage is a priority.

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