

TOPICAL ISSUES OF INFLUENCE OF "CONTRACTION REENGINEERING" ON STRUCTURE OF BUSINESS MANAGEMENT

Andrei A. Datsyk , Kazan Federal University
Svetlana I. Grudina, Kazan Federal University
Sofja G. Avdonina, Kazan Federal University
Alla I. Podgornaya, Kazan Federal University

ABSTRACT

Introduction: *This paper is devoted to actual problems of the influence of "contraction reengineering" on enterprises management structure in modern changing environment conditions. The question is a radical rethinking of the existing business management structure and revealing of the competitive potential for existing management structure of enterprises in the conditions of transformation and uncertainty.*

Methods: *In the study we have used methods of financial and economic analysis, a wide range of methodologies of strategic management and financial management, some methods of innovation management, methods of strategy management diagnosis, and innovative methods of business reengineering.*

Results: *"Contraction reengineering" tools are presented in terms of innovative development of the enterprise as the necessary condition for quality transformation. The authors have revealed the main directions of evaluation of changes and risk reduction, justified the choice of the growth rate of enterprise development, and considered an enterprise reengineering management model.*

Discussion: *The paper analyses the approach of M. Hammer that had been developed in the early 90s of XX century and resulted in a broad scientific discussion and that is relevant to the present. The approach of modern Russian scientists on the business process management problem is considered in detail. The authors share the opinion of the economist I.T. Balabanov in matters of dynamics of engineering business processes. We have studied the definitions of engineering, reengineering, introduced the author's definition of "contraction" engineering, and "expansion" engineering.*

Final Report: *Some conclusions formulated can be used in enterprise management to select the most effective methods in terms of the implementation of the key success factors.*

Key Words: *"Contraction Reengineering", Reengineering Of Business Processes, Industrial Engineering, Development Management, Competitiveness, Innovation Enterprise, Cost Management*

INTRODUCTION

The aim of the paper is theoretical and methodological study of topical issues on influence of "contraction reengineering" on company management structure. Under present conditions, virtually every enterprise undergoes to a greater or lesser degree a phase of the up-to-date need in reengineering as a radical re-evaluation of its competitive advantages. This phase

will be marked by us as a "contraction reengineering", i.e. a process aimed at revealing viable, cost-creating mechanisms which perfectly meet the requirements of the legislation. As practice shows, the consequence of this trend is the restructuring of all activities, involving the previously unused resources in order to survive, preserving market position or further sustainable development taking into account the changing environment. As a result of the "contraction reengineering", consequences of external and internal turbulent factors impact (Bagautdinova N.G., Safiullin L.N., 2014, p.55) are harmonized that allows the company not only to survive but also to develop.

In the ideal econometric model, the development of a company, its financial and economic efficiency with all the positive externalities tends to infinity. This is possible in the conditions of stable external and internal environments, the balance of constant and variable factors, and stagnation of changes that is realizable only in the theoretical model (Shigabieva A.M., Safiullin L.N., Mazitov V.M., Saipullaev U.A., 2014, p.388-391). Up-to-dating of "contraction reengineering" is a signal that it comes a restrictive phase in this direction of the development, or "contraction phase". The contraction phase replaces the "expansion phase" of processes deployment and their in-depth introduction, with errors and permissible admissions. On this basis, we should recognize that for any definition of the development process it always has a limit. And the most proven and effective methods of management and development are replaced by innovative, "breakthrough" ways which in the period of adaptation may be evaluated even as provocative to some extent. (A.I. Podgornaya, S.I. Grudina, S.G. Avdonina, 2015, p.519) As approaching the "contraction" phase, to the limit, revenues and sales fall, costs rise, the impact of competition increases. During this period, the "contraction reengineering" is relevant when one competitor approaches to the limit of its development, and other competitors explore alternative processes with a higher limit on the basis of previous experience and the integration of new knowledge.

METHODS

We have used methods of financial and economic analysis, methods of strategic management, innovation management methods, methods of management diagnostics, methods of business reengineering as a tools. We used scientific methods such as analysis and synthesis, systematic approach to the study of the external and internal environments of enterprises, socio-economic phenomena and processes, as well as methods of forming generalized criteria and operating rates for enterprises of various spheres of activity.

RESULTS AND DISCUSSION

Let's consider theoretical preconditions of origin of reengineering. Category "Engineering" has originated from the term close to "technics", "technical art" and may take in some cases the meaning of the word "design". "The business engineering should be understood as the system of methods and techniques used to create a business that meets the goals set by the organization". The studied category may include a number of components. For example procedures for re-engineering of business processes, ratio analysis which allows measuring the effectiveness of investments in the facility and its profitability, as well as innovative style in the process design. In general terms, reengineering expresses restructuring or reorganization of the enterprise on stream (Kabaale, E., Kituyi, G.M., 2015, p.80). Terminology of reengineering was

introduced into scientific use by the American scientist M. Hammer in the early 90-ies of XX century. It should be noted that Russian scientists define the term slightly differently: "Business reengineering is a fundamental change in the existing management structure and production of a company based, as well as in engineering, on the interaction of the selected processes". Therefore, the concept of re-engineering is derived from engineering processes and expresses designing or replacement of the current management and production structure of the company and its business as a whole. I.T. Balabanov considered engineering "as a certain form of exports of services (transfer of knowledge, technology and experience) from the country of origin to the country of the customer". It was theorized that re-engineering contains complex innovative researches for preparation of a feasibility study, a broad set of project documents as well as the development of recommendations on organization of production and management, equipment operation and sales of finished products to an end user (Nadarajah, D., Kadir, 2015, p. 522-53).

For further analysis let's identify six quality characteristics of engineering:

1. By the form of delivery, it is a service to enterprises operating in the sphere of material production rendered on a commercial basis;
2. By its content, it is a wide range of services related to the implementation of a project including the phase of improving the business process;
3. By its objectives, it is bringing high-tech research development to the production stage;
4. By its sectoral focus, it concerns industry, construction, agriculture, etc.
5. By the form of performance, it is "contraction"engineering
6. By the area of implementation, it is "expansion" engineering

Based on the above structure we can formulate a feature of re-engineering as a service. It lies within the principles of urgency, availability at a fee, and availability of innovative and technological component of a process. It is based on a set of services for the design, construction, acquisition, commissioning and trial operation of the facilities. The purpose may vary depending on the technology and the riskiness of the project. Activities of engineering (reengineering) companies are an important factor in the implementation of advanced scientific achievements. Such spectral scope of developmental reengineering modulations aimed at expanding involves time length and recurrence of implementation and also heterogeneity of the project execution structure requiring qualitative control and organization. (Cherukupalli, P., 2015, p. 40) For the purposes of research we differentiate the recurrence stages implemented in engineering: project definition stage (high technology research), project development, post-project stage, recommendations.

Table 1
DESCRIPTION OF THE COMPLETE CYCLE OF ENGINEERING SERVICES IN ACCORDANCE
WITH QUALITATIVE ORIENTATION OF THE STAGE

№	Engineering stage	Description of the engineering cycle stage	Qualitative orientation of the stage
1.	Project definition stage (high technology research)	Preliminary study of marketing feasibility of the project, the technical possibility of its implementation	Expansion
2.	Project development	Preparation of project documentation, general layouts, schemes, working drawings, etc.	Contraction
3.	Post-project stage	Preparation of orders on supplying equipment, engineering and construction works, supervision of equipment manufacturing and the progress of civil and erection works	Expansion
4.	Recommendations	Recommendation services for operation of the facility after its commissioning and sale of finished products.	Contraction

It is clear from Table 1 that consulting component of engineering is not its characteristic feature since this type of business services is primarily a way to implement large-scale industrial projects and a method of introduction of scientific and technological achievements into practical activity of enterprises. Broad scientific discussion is caused by debates on the role of engineering firms in the social reproduction of high-tech innovative products. We share the view that the companies of this spectrum of services can initiate activities on many projects for the implementation of technological programs and processes (A. Podgornaya, S.Grudina, 2015, p.1074). In addition to the above-mentioned, the efficiency of this kind of companies and organizations is a key factor in the introduction of innovative technologies in the social production.

Table 2
COMPARATIVE CHARACTERISTICS OF DIRECT AND REVERSE ENGINEERING

Direct engineering (extension)	Reverse engineering (contraction)
Development of models of new business processes: • An ideal model which can be achieved in the long term and to which it is necessary to be aimed. • A real model which can be achieved in the long term taking into account availability of resources.	A study of existing business processes: • Formulation of business process engineering tasks, as the project develops, is coordinated in accordance with the changing external environment. • Initially formulated targets can be adjusted according to a study of the existing business processes organization system. • concepts of business processes are constructed allowing to understand the essence of the business process as a whole and to identify areas of reorganization

So, the result of the transformation of the forms and directions of engineering into the required factor of production was the allocation in a separate kind of business of specific services of scientific and technical nature aimed at bringing the scientific achievements to production factors. Statistics show that the demand for services of engineering firms grows, the number of companies of this kind increase, and the competition between them becomes tougher. (Radosevic, M., Pasula, M., Berber, N., Nebojsa, N., Nerandzic, B., 2015, p. 71). A similar trend is observed in Russia. Practice shows that innovative and large firms in the process of industrial

production "expansion", it is more effective for many companies to engage engineering firms rather than to risk the valuable resources, to spend time and money on staff development.

The changes which have been developed in the environment directly affect the relevance and effectiveness of application of an organizational structure.

There has been stated a trend on transition from a vertical hierarchy to horizontal integration enhanced by matrix and project management structures. This is especially relevant for innovative enterprises, enterprises with a flexible development strategy (An, J.-W., Zhang, Z.-Q., 2015, p. 1611). A timely transition to the most effective structure of enterprise management largely determines its success and viability.

Objectification of changes related to business process reengineering and management structure are presented in Table 3.

Table 3
THE PRINCIPLES OF BUSINESS MANAGEMENT IN THE EVENTS OF "EXPANSION" AND "CONTRACTION" RE-ENGINEERING

Management principle	"Expansion reengineering"	"Contraction reengineering"
Access to information is restricted.	Distributed databases. Free access to information.	Information may appear simultaneously in those places where it is needed.
The choice between centralization and decentralization.	The use of telecommunication networks	The ability to take advantage situationally of both centralization and decentralization.
The work is done in the office.	Wireless connectivity and performance of work "at home".	Employees can send and receive information from the place where they are.
The need for face to face meetings to resolve issues.	Interactive video access, Teleconferences.	Better, more effective contact with a potential buyer.
Only experts can perform complex work	Creating and using expert systems.	The experts work can be performed by an expert on general issues. Improvement of skills of employees.
All decisions are made by chiefs.	Use of decision support systems (Access to databases and data repositories, analysis and modeling tools).	Decision-making becomes a part of work of each employee. The growth of the responsibility of every employee.
The need to keep track of the object.	Barcoding is carried out automatically.	The objects inform promptly about their whereabouts on their own.

Let's consider the innovative approach to building a system of aggregated models for decision-making in reengineering management (Rrezaie, K., Ostadi, B., Samadi, H., Mohammadi, M., Nazari-Shirkouhi, S., 2015, p. 61). It is grounded on an open base model of the organization life and the model of the intermediate developing enterprise state with a change correction mechanism providing the enterprise re-engineering by its adapting to the most likely changeable environment in the course of planned reforms. Upon that, the basic model is transformed with a smaller number of variables or constraints.

The generalized model of change management in the course of enterprise reengineering represents the requirements of the system and financial analysis theory to this process, outlines business dimensions to provide managers with tools allowing to consider changes in the process of reengineering in the enterprise within the frameworks of a single process taking into account the state of the external environment of the enterprise, and with a focus on the relationships, interdependences and interaction of the various aspects of its operation in this environment (Annamalai, C., Ramayah, T., 2015, p. 185).

According to our research, from the point of view of the system theory the enterprise re-engineering process can be represented as a transformation of a business process (Hess, T., Schuller, D., 2015, p. 252). Suppose a business process B_1 (which has a certain effect $E_1 = \{r_{1j}\}$ providing an opportunity of implementation to a number of results $r_{11}, r_{12}, \dots, r_{1j}$ ($R_1 = \{r_{1j}\}$) satisfying to a number of needs $n_{11}, n_{12}, \dots, n_{1j}$ ($N_1 = \{n_{1j}\}$) with a specific quality $q_{11}, q_{12}, \dots, q_{1j}$ for each realization r_{1j}) in the business process B_2 , with the corresponding feature on the effect E_2 (characterized by its set of results and quality requirements). In this case the aggregate assessment of the quality $Q_{E1} = \{q_{1j}\}$ and $Q_{E2} = \{q_{2i}\}$ in the implementation of the needs $N_1 = \{n_{1j}\}$ and $N_2 = \{n_{2i}\}$ acts as an assessment of the effect (quality) of business processes B_1 and B_2 .

In the case where R_1 and R_2 are the same as the potential quality of business processes B_1 and B_2 , management of the enterprise reengineering can be represented as:

$$B_1 : Q_1 \equiv Q_{E1}, E_1 \equiv R_1 \rightarrow B_2 : Q_2 \equiv Q_{E2}, E_2 \equiv R_2.$$

It should be noted that upon the enterprise restructuring the new need $N_2 = \{n_{2i}\}$ is the development of aggregate need $N_1 = \{n_{1j}\}$ from where it follows that N_1 and N_2 are subsets of some universal set N determining the status of this species of needs.

RESULTS

This fact allows the following conclusions to generate for building a number of aggregated models of business processes reengineering at enterprises:

1. An existing business process B_1 , its elements, links and structure should be used in the capacity of a mean for building the business process B_2 (a new enterprise in the process of its re-engineering) for the implementation of the need N_2 .
2. During creation of a new business process (B_2) it is required to review the composition and reform virtually every element and the business process B_1 in the evaluation of their usefulness in the new business process (B_2) in view of involvement of new components in the business process B_2 (being not elements of B_1) and placing them in the appropriate relationship with other elements and processes of the business process B_2 .
3. As a result of changes in the business process B_1 there is formed an intermediate developed business process B_{12} , constant monitoring of which (at the level of experimental functional quality evaluation Q_{12} by separate implementations R_2 and also a complete quality assessment Q_2) makes it possible to assess the adequacy of conducted transformation of the enterprise in terms of its transfer to a new level of functioning.

The specified factors cause emergence of engineering services as a special market product and determine their further development (Ryashchenko, V.P., 2015, p. 143).

Engineering market is a specific market segment of innovations. In this market not a tangible product is sold, and the individual (not having analogues at the time of conclusion of the

contract) service which performance is associated with high technical risk. Therefore, the customer acquires the right to use scientific and technological potential of the developer (engineering company) and its sub-contractors only with pay for the end result. (Ryashchenko, V.P., 2015, p. 125) Re-engineering and business engineering both for the "expansion" phase, and for the "contraction" phase are a complementary spectrum of models what can be characterized as the rationalization of business algorithms reproducing costs.

CONCLUSIONS

Based on the above-mentioned, it is relevant to separate the two phases of reengineering: "expansion reengineering" and "contraction reengineering". M. Hammer and J. Ciampi, the founders of business process reengineering, underlined an unconditional need to conduct engineering of companies in the case of the influence of separate and cumulative actions of the so-called three "C" (Customers, Competition, Changes), which influence formation of new external environment and make increasingly clear that the companies started to operate in an initial environment, cannot effectively work in another, substantially changed external environment (Leshchuk, V., Polinkevych, O., Ishchuk, L., 2015, p. 57). In our opinion, the problem should be solved using the target management tools in the case of "contraction reengineering" and "expansion reengineering" and differentiation of factors on impact to the planned processes.

SUMMARY

Thus, innovative activity in the industry and other basic sectors of the economy is no longer conceived without the participation of specialized engineering companies. We also note that upon the implementation of technically sophisticated, multi-level projects, engineering firms perform dominant mission not only as guides of the achievements of scientific research, but also as managing and coordinating centers systematically integrating the work of all participants and ensuring the achievement of quantitative and qualitative parameters of growth what is reflected positively in the growth of the company's value.

In the case of application of "contraction reengineering" in enterprise management new business processes model must be such as to be able in the future to move to the ideal model. Thus, the "contraction re-engineering" on the basis of modeling of business processes allows the most effective options to select in terms of the implementation of the key success factors and to use them in business management.

ACKNOWLEDGEMENTS

The work is performed according to the Russian Government Program of Competitive Growth of Kazan Federal University.

REFERENCES

- A. Podgornaya, S.Grudina (2015). Self-Developing Systems in the Conditions of Anti-Recessionary Management. *Procedia Economics and Finance* 23, 1074–1078.

- A.I. Podgornaya, S.I. Grudina, S.G. Avdonina. (2015). An Enterprise Flexible Development. *Procedia Economics and Finance*, 24, 519–522. International Conference on Applied Economics (ICOAE), 2-4 July 2015, Kazan, Russia.
- An, J.-W., Zhang, Z.-Q. Study on process reengineering of medium and small coal machine manufacture enterprise. 19th International Conference on Industrial Engineering and Engineering Management: Assistive Technology of Industrial Engineering, 1611-1622.
- Annamalai, C., Ramayah, T. Reengineering for enterprise resource planning (ERP) systems implementation: An empirical analysis of assessing critical success factors (CSFs) of manufacturing organizations// Information Systems Reengineering for Modern Business Systems: ERP, Supply Chain and E-Commerce Management Solutions pp. 185-200.
- Bagautdinova N.G., Safiullin L.N. (2014). Institutionalization of Firm Environment in Conditions of Growing Turbulence. *Mediterranean Journal of Social Sciences*, 5(12), 55-58.
- Cherukupalli, P., Raghu Reddy (2015). Reengineering enterprise wide legacy BFSI systems - Industrial case study. ACM International Conference Proceeding Series, 18-20-February-2015, 40-49.
- Hess, T., Schuller, D. Business process reengineering a sustained trend? An analysis about the practice in major German companies. *Business Enterprise, Process, and Technology Management: Models and Applications*, 252-264.
- Kabaale, E., Kituyi, G.M. (2015). A theoretical framework for requirements engineering and process improvement in small and medium software companies. *Business Process Management Journal* 21(1), 80-99.
- Leshchuk, V., Polinkevych, O., Ishchuk, L. (2015). Strategy of engineering enterprises' business process management in reengineering and redesign. *Economic Annals-XXI*, 1-2 (1), 57-61.
- Nadarajah, D., Kadir, S.L.S.A. (2015). A review of the importance of business process management in achieving sustainable competitive advantage. *TQM Journal*, 26(5), 522-531.
- Radosevic, M., Pasula, M., Berber, N., Nebojsa, N., Nerandzic, B. Reengineering of supply chain process in production systems-a case study [Gamybos sistemij tiekimo grandinës proceso pertvarkymo tyrimas]. *Engineering Economics* 24(1), 71-80.
- Rrezaie, K., Ostadi, B., Samadi, H., Mohammadi, M., Nazari-Shirkouhi, S. Learning organisations, strategic deployment and change management strategy for enhancing successful implementation of BPR projects. *International Journal of Business Innovation and Research* 7(1), 61-83.
- Ryashchenko, V.P. Directions for optimization of enterprise's business processes. *Actual Problems of Economics* 136 (10), 143-150.
- Ryashchenko, V.P. Reengineering of business processes management at an enterprise. *Actual Problems of Economics* 13 (9), 125-130.
- Shigabieva A.M., Safiullin L.N., Mazitov V.M., Saipullaev U.A. (2014). Some methodological foundation of an innovation theory. *Life Science Journal*, 11(6), SPEC. ISSUE. C, 388-391.