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MODELING OF BUSINESS PROCESSES IN COMPANY MANAGEMENT

MODELAGEM DE PROCESSOS DE NEGÓCIO NA GESTÃO DA EMPRESA

MODELIZACIÓN DE PROCESOS DE NEGOCIO EN LA GESTIÓN DE EMPRESAS

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ABSTRACT
The authors investigated the issues of optimizing the business processes of manufacturing companies in this article. The following methods were chosen: methods of cognition, retrospective and documentary analysis, as well as synthesis, generalization, and systematization. The authors described the concept of business processes, their types, and functions. The main attention was paid to the sequence of measures taken by manufacturing companies to optimize business processes presented in the form of a management algorithm. It was found that optimizing the business processes of a manufacturing company is a complex task that requires modeling business processes, highlighting their problematic aspects, reengineering, and subsequent control.

Keywords: model, risk, risk management, business processes, management decisions.

RESUMO
Os autores investigaram neste artigo as questões de otimização dos processos de negócios das empresas manufatureiras. Foram escolhidos os seguintes métodos: métodos de cognição, análise retrospectiva e documental, bem como síntese, generalização e sistematização. Os autores descreveram o conceito de processos de negócios, seus tipos e funções. A atenção principal foi dada à sequência de medidas tomadas pelas empresas manufatureiras para otimizar os processos de negócios apresentados na forma de um algoritmo de gestão. Constatou-se que otimizar os processos de negócios de uma empresa manufatureira é uma tarefa complexa que requer modelagem de processos de negócios, destacando seus aspectos problemáticos, reengenharia e posterior controle.

Palavras-chave: modelo, risco, gestão de risco, processos de negócios, decisões gerenciais.

RESUMEN
Los autores investigaron los problemas de optimización de los procesos comerciales de las empresas manufactureras en este artículo. Se eligieron los siguientes métodos: métodos de cognición, análisis retrospectivo y documental, así como síntesis, generalización y sistematización. Los autores describieron el concepto de procesos de negocio, sus tipos y funciones. Se prestó la atención principal a la secuencia de medidas tomadas por las empresas manufactureras para optimizar los procesos comerciales presentados en forma de algoritmo de gestión. Se encontró que optimizar los procesos de negocio de una empresa manufacturera es una tarea compleja que requiere modelar los procesos de negocio, resaltar sus aspectos problemáticos, reingeniería y posterior control.

Palabras clave: modelo, riesgo, gestión de riesgos, procesos de negocio, decisiones gerenciales.

1. INTRODUCTION

Modeling the activities of any company is impossible without modeling business processes, which are an important part of the business management of manufacturing companies. They are characterized by the increased complexity of business processes due to the technical and technological specifics of production, but other areas of activity of manufacturing companies (financial, marketing, etc.) in manufacturing companies are usually very large-scale and are implemented based on a variety of different business processes. The activity of any manufacturing company can be represented as a set of business processes. Thus, the management of enterprise activities can be based on a process approach, in which the object of management will be just business processes (Kardanskaya, 2008; Khokhlov, 2003; Rostova, 2013).

A process approach to the business management of manufacturing companies is more appropriate than a functional one, since it allows optimizing operational activities, identifying strategic development priorities, and dividing areas of responsibility for production results at each stage of the life cycle of products being created. In the case of using the process approach, horizontal connections between the divisions of the production company are strengthened, employees are responsible for business processes.

An important characteristic of business processes as an object of optimization is their typology. The following classification of types of business processes is most often described (Figure 1).

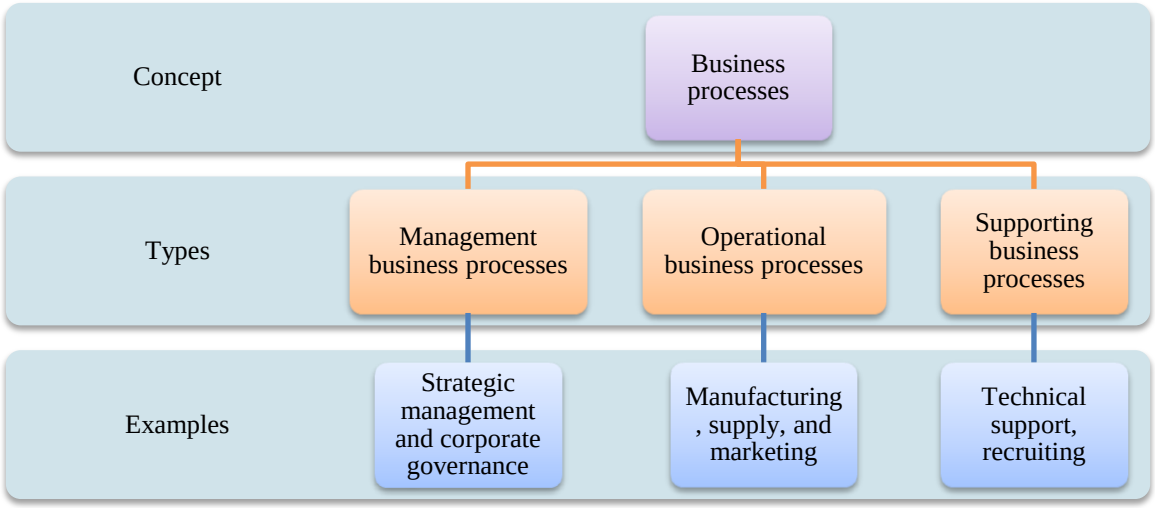

Figure 1. Classification of business processes (Pobegailo, 2017, p. 38)

The main business processes of enterprises are divided into managerial, operational, and supporting. Control of all functional subsystems of a company is carried out through managerial business processes at the level of corporate governance and strategic management (Baldin, Vorobev, 2004; Eddous, Stanfield, 2012; Vlasov, Shimko, 2013).

Operational business processes are related to the main activity of an economic entity. In the case of a manufacturing company, these are directly the processes of production. Such business processes are the most complex, requiring careful control since the quality of products and customer satisfaction of the manufacturing company depend on their condition.

Supporting business processes accompany operational ones and solve those tasks that are not directly related to production activities. For example, they cover accounting, marketing, human resource management (Kravchenko, Dragunova, Kirillov, 2020; Maslevich, 2021).

There is another classification of business processes that differentiates them by source attributes. Business processes are divided into inter-organizational, cross-functional, and interpersonal business processes within this classification. The first type implies those business processes that occur in cooperation between different companies – they, one way or another, interact in a market environment, create partnerships. The second type is business

processes concentrated within a production company, but covering several functional divisions at once. The third type of business process symbolizes the personal work tasks of groups of personnel or even individual employees as part of a particular division of a production company (Volkov, 2018, p. 56).

Another important characteristic of the business processes of manufacturing companies are their functional features:

- complexity (all business processes of a manufacturing company are interconnected and presented in a complex);
- the cycle of operation (business processes are repeated in a company's activities, often according to formalized rules);
- systemic isolation (business processes cover the entire line of activity – from the purchase of raw materials to the sale of finished products of a manufacturing company);
- purposefulness (business processes solve certain tasks, have a specific target orientation);
- cross-functionality (business processes reflect certain functions that are divided into actions and procedures);
- measurability (a company can monitor business processes due to evaluation parameters that allow measuring the state, quality, dynamics of business processes);
- boundaries (business processes have inputs and outputs indicating their boundaries);
- controllability (business processes can act as objects of management and be amenable to managerial influence) (Olovkova, Dmitrieva, Koptelova, 2019, p. 113).

The purpose of the work is to identify the patterns that determine the features of risk assessment in business as the main element contributing to the achievement of economic security of the organization, as well as to conduct a comparative analysis of methods of assessment and management of innovation and investment risks.

2. LITERATURE REVIEW

Business processes are an important part of the business management of manufacturing companies. They are characterized by the increased complexity of business processes due to the technical and technological specifics of production, but other areas of

activity of manufacturing companies (financial, marketing, etc.) are usually very large-scale and are implemented based on a variety of different businesses processes.

It is necessary to characterize the essence of business processes before considering the features of modeling the activities of manufacturing companies.

The following definitions of a business process as a scientific category are presented in the literature:

- "a business process is a set of functions organized in a certain sequence that ultimately benefit an internal or external customer" (Kirchmer, 2017, p. 12);
- "a business process is a series of actions taking place within a company that lead to the achievement of a certain goal" (Drucker, 2017, p. 9);
- "a business process is a formal representation of several related actions that are performed in a certain order to achieve a clear goal" (Kumar, 2018, p. 24).

3. METHODS

In our opinion, the optimization of business processes of a manufacturing company is a complex process that requires a manufacturing company to carry out comprehensive research and improvement of business processes. We identified factors affecting the optimization of business processes for manufacturing companies (Avdiiskii, 2012; Morrow et al., 2007; Edersheim, 2020):

- manufacturing companies strive for comprehensive cost reduction, the identification of which is most productive if the production activity is modeled in the form of business processes;
- manufacturing companies have business processes related to both people (employees) and machines, mechanisms, equipment, which increases their variability, complexity and requires a lot of attention from management personnel;
- most often, manufacturing companies are large business entities, and like any large business, they face difficulties in identifying all the details of management processes in a multi-level organizational structure, a large number of divisions, etc – it is the concept of business processes in this case that can become an effective tool for improving the financial and economic activities of manufacturing companies (Kosov et al., 2016).

Based on the identified factors, we described the process of optimizing the business processes of a manufacturing company as follows (Figure 2).

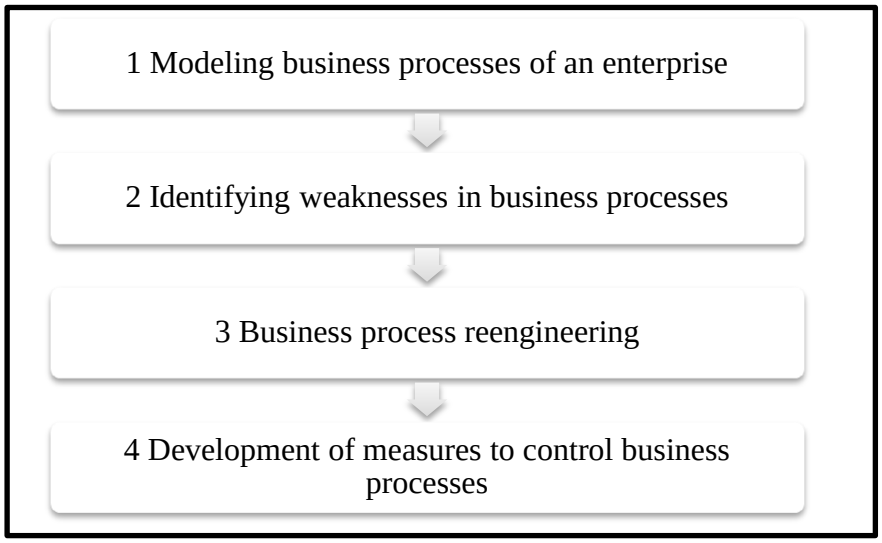

Figure 2. Stages of optimization of business processes of a manufacturing company
Source: research informations

In our research, we analyzed in detail each of the hollowed-out stages in 2019-2021, examining the experience of 30 manufacturing companies located in the Moscow region (Russia). The data obtained are presented in a generalized form. We highlighted the distinctive characteristics of the activities of manufacturing companies identified during the study on the optimization of business processes at each stage.

In our research, we analyzed in detail each of the hollowed-out stages in 2019-2021, examining the experience of 30 manufacturing companies located in the Moscow region (Russia). The data obtained are presented in a generalized form. We highlighted the distinctive characteristics of the activities of manufacturing companies identified during the study on the optimization of business processes at each stage.

4. RESULTS

As a result of our research, we concluded that a company's management needs to model business processes at the first stage. It is important to do this so that the specialists involved in the optimization of business processes have a clear idea of their structure, content, and functional purpose. For these purposes, enterprises use special methods of structural analysis and design of business processes, which, in turn, rely on different languages and

notations of business process modeling. Mainly this refers to three approaches to business process modeling – functional, process, and mental.

With the functional approach to business process modeling, the inputs and outputs of business processes were analyzed, where the inputs are the resources that a company has, and the outputs are the desired results of business processes.

With the process approach, the emphasis was not on the desired results of business processes, but on the requirements for actions that lead to such results. In the process approach, an important role was played by the description of the sequence of business processes, the construction of their internal decompositions, and the assessment of the quality of incoming resources.

The mental approach to business process modeling was the most accessible for the managers of the production companies we analyzed and did not require the presence of specialists familiar with complex business process design notations. The mental description of business processes operates not with functions and processes, but with interrelated categories – these are the categories that describe the business process. Interrelated categories are displayed as mental maps. They reflect the main ideas, the direction of business processes, their relationship with each other. The simplicity of the mental approach does not allow reflecting all the important details and characteristics of business processes, and therefore this approach is suitable only for small and medium-sized manufacturing companies – for large productions, mental maps are not enough to optimize business processes (Shapkin, Shapkin, 2013; Foss, 2007).

A comparison of the three approaches to business process modeling is shown in Table 1.

Table 1

Comparison of approaches to the creation and description of business processes (Olovkova, Dmitrieva, Koptelova, 2019, p. 94)

Approach	Functional	Process	Mental
At the core	Function	Process	Concepts
Result	Description of the desired results of the business process	Description of the business process sequence	Description of business process areas
Complexity	High	High	Average
Automatization	Possible	Possible	Complicated

Source: research data

As a result of the study, the most developed notations designed for modeling business processes are IDEF0, IDEF3, DFD, EPC, BPMN, and UML. Their characteristics are presented in Table 2.

Table 2

Comparison of notations for business process modeling (Olovkova, Dmitrieva, Koptelova, 2019, p. 98)

Description criteria (presence in notations)	IDEF0	IDEF3	DFD	EPC	BPMN	UML
Process, operation	■	■	■	■	■	■
Single input and output resources	■		■	■		
Vectors of input and output resources						
Composition of the process (decomposition)	■	■	■	■	■	■
Conditions for starting the process		■		■	■	■
Process execution tools	■		■	■	■	
Branching and merging processes		■		■	■	■
Asynchronous and synchronous processes		■		■	■	
Representation of elements of the external environment			■	■	■	■
Element of the organizational structure	■		■	■	■	■
Event		■		■	■	■
Script element	■	■	■	■	■	■
Sequence of actions		■		■	■	■
Resource flow	■		■	■		
Document flow element	■	■	■	■	■	■
Dynamic simulation of script execution					■	
Object-oriented architecture description						■

Source: research data

At the second stage of optimization of business processes, we identified their weaknesses – those aspects of the functioning of business processes that hinder their effective implementation. We concluded that the shortcomings of business processes should repeat their structure – a company should separately highlight the problems of managerial, operational, and supporting business processes. Production processes are the most problematic for production business processes due to the increased complexity of production activities.

The problems of business processes can be described in the form of qualitative or quantitative measurements, in the form of risk profiles (Shapkin, Shapkin, 2013; Edersheim,

2020). A company should choose the approach to describing the problems of business processes that best corresponds to the specifics of production activities. It is important to understand that a once-conducted assessment of business process problems cannot be used constantly – new problems regularly appear, and those that were identified during the analysis will turn out to be irrelevant in the future. Therefore, such an analysis should be carried out regularly by manufacturing companies.

The third stage seems to be the most ambitious – within the framework of this stage, reengineering of business processes was carried out, based on the identified problems of the business processes of the production enterprise. Business process reengineering in this study is understood as a fundamental rethinking and radical redesign of business processes to achieve significant improvements in critical, modern measures of productivity, such as costs, quality, service and speed" (Reshetnikova, 2019, p. 4).

Reengineering involves focusing on the needs of "business process customers", i.e. those persons inside or outside the enterprise who are recipients of the results of the business processes of the enterprise.

We found that the approaches to reengineering differ in the studied enterprises, depending on what problems of the business processes of the manufacturing enterprise were identified as a result of their modeling (Figure 3).

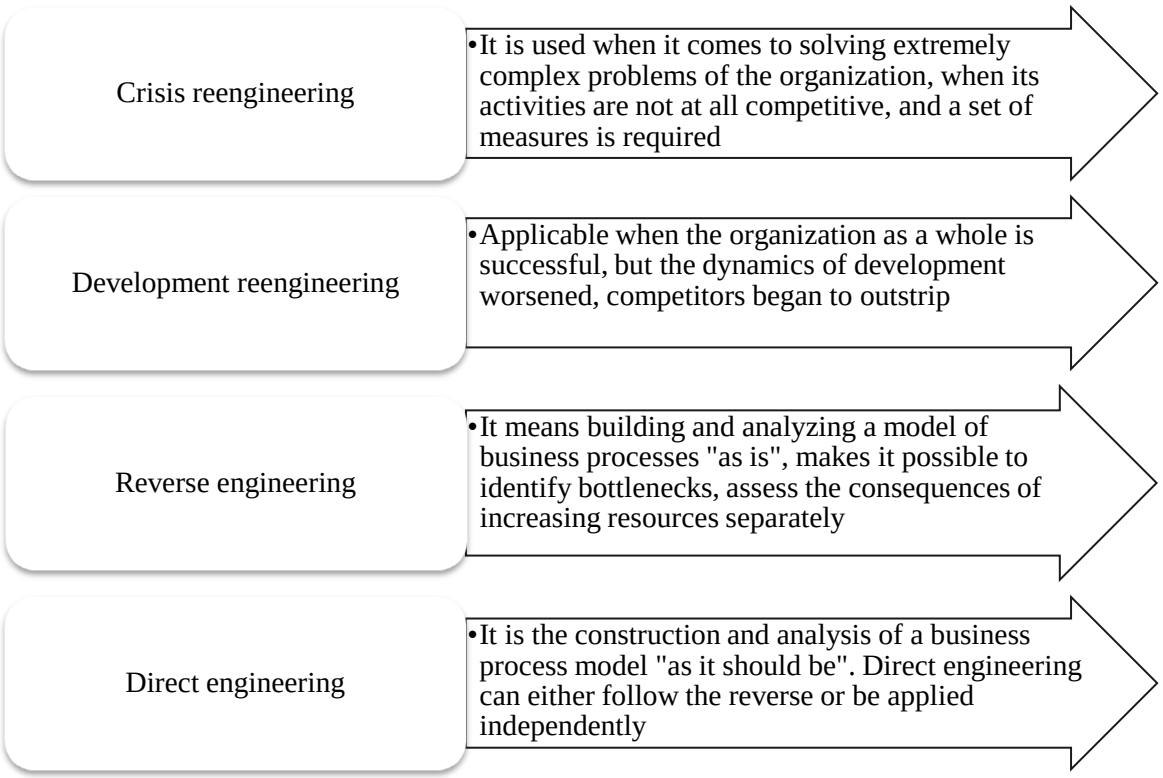

Figure 3. Approaches to the reengineering of manufacturing companies (Olovkova, Dmitrieva, Koptelova, 2019, 46)

The management of companies develops measures for their further control and improvement at the fourth stage, after the reengineering of business processes:

- The target values of business processes that should be achieved in the short, medium, and long term are determined;
- Business process control tools and persons responsible for control are distinguished from among the competent employees of the production enterprise;
- The regulations for the control of business processes are being formed – specific deadlines for the implementation of control measures (possibly in the form of a schedule).

5. DISCUSSION

Optimization of business processes of a manufacturing company requires, first of all, modeling of business processes – their structural and meaningful description, based on which specialists of a manufacturing company can identify problematic aspects of business processes. Considering such problematic aspects, business process reengineering measures are

selected, plans and projects of optimization measures are formed. After the implementation of measures to optimize business processes, their subsequent control is organized to further improve business processes and prevent the emergence of new problems.

Modeling a company's activities is impossible without modeling business processes, which are an important part of the business management of manufacturing companies. They are characterized by the increased complexity of business processes due to the technical and technological specifics of production, but other areas of activity of manufacturing companies in manufacturing companies are usually very large-scale and are implemented based on a variety of different business processes.

The optimization of business processes of a manufacturing company is a complex process that requires a manufacturing company to carry out comprehensive research and improvement of business processes. Manufacturing companies need to optimize business processes due to the following factors.

6. CONCLUSION

Using a variety of models for decision-making is a reliable and effective method. With a competent choice of the software model and product, it is possible not only to accurately assess the work of the enterprise and its development prospects but also choose the best strategies to achieve goals.

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