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# **BUSINESS PROCESS OPTIMIZATION BASED ON LOGISTICS CONCEPTS AND TECHNOLOGIES**

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## **ABSTRACT**

*The main aspects of business process optimization based on logistics concepts and technologies are considered in the article. The analysis showed a high level of interest in this area of research. It is shown that the business processes of the enterprise can be represented as a continuous chain of operations. To ensure the integrity of the business model, it is important to create an appropriate enterprise ecosystem. The application of approaches to the management of logistics chains to optimize business processes of the enterprise is substantiated. To do this, it is proposed to consider sequential operations as an end-to-end process, which is appropriate to manage end-to-end logistics technologies. It is proposed to use business process templates that contain its description, the sequence of stages of execution and instructions for the execution of each stage (sequence of actions, duration of each action and necessary*

resources). It is proposed to apply the model of enterprise architecture to understand the current situation, diagnose problems, focus on designing changes that are needed to improve the business model of the enterprise through the improvement of business processes.

*Modeling the integration of functions / processes is the basis for building information architecture and application systems architecture for business process modernization. On the basis of such models of information and data models graphic templates of separate business processes in the information are created. These templates are the basis for the reorganization of business processes and the construction of new application systems, the nature of the interaction of individual processes, information exchange with contractors. An algorithm for the implementation of end-to-end logistics during the optimization of business processes of the enterprise is proposed.*

**Key words:** business processes, enterprise, logistics, enterprise architecture, business process template, business process optimization

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## 1. INTRODUCTION

### 1.1. Relevance of the Topic and Problem Statement

Optimization of business processes of the enterprise in the conditions of digital transformation and informatization of business fully corresponds to the principles of customer orientation.

Business processes mutually coordinate the results of activities, business goals and relationships with customers and other participants in the ecosystem of the enterprise. Optimization of business processes in the context of their transformation is one of the areas of management, which aims to form the integrity of the business model of the enterprise.

The main strategic areas for improving business processes of the enterprise are: Business process management (BPM), Business process reengineering (BPR), and Business process innovation (BPI) (Anand et al, 2013).

In conditions of uncertainty and riskiness of the business environment, the optimization of business processes becomes a tool to increase the competitiveness of the enterprise, strengthening its market position (Keramati et al, 2011). The integrity of the business environment of the enterprise is ensured by the integration of business processes, which is based on Supply chain management (SCM) (Priyanka Saroha, 2013). That is, the basis of optimization of business processes of the enterprise are tools and principles of logistics. There are the following main dominants in modern logistics: informatization, efficiency of business processes and operations, quality of service, and promotion of technical modernization (Zengwenet al,2019).

Research of the main directions of scientific research on the improvement of business processes has shown the actualization of the issues of business process analysis. There are the following areas of business process analysis: the level of business process, internal economic level and internal organizational level (Žemgulienėend Valukonis, 2018). According to international standards ISO 9000, the process is defined as a stable purposeful set of

interconnected activities, which according to a certain technology converts inputs into outputs that are of value to the consumer (Quality Management Systems, 2015).

The process helps in managing the operations of the enterprise. Business processes that characterize operating activities reflect the value chain of the enterprise. Business management processes include information processing, control, coordination and communication, which regulates the overall operation of the system (Mooney et al, 1996).

Considering the business process as an object of management, it is important to distinguish its attributes, which are its description and regulation: owner, input, processes, output, resource, regulations, management influences, business process provider, consumer (client), interface (interaction). Attributes define the resource environment, basic characteristics, features and parameters of business processes. On such grounds, a decision is made to influence the business process. According to the levels of transformational changes, there are three options for influencing the business process: improvement, optimization and reengineering.

In the framework of this study, the following problematic issues are identified:

- identify basic logistics concepts and technologies for business process optimization;
- develop a business process optimization model.

## **2. THEORETICAL SECTION**

### **2.1. Analysis of Logistics Concepts and Technologies in Business Process Optimization**

The organization and analysis of business processes of the enterprise is carried out on the basis of business models that combine all activities and resources of the enterprise, business rules and other features of the processes. Business model (process model) is a formalized description of business processes, enterprises (Irtysheva, Minakova, 2015).

The business model includes organizational, methodological and informational components for:

- timely diagnosis of enterprise problems;
- formation of the purposes of the enterprise, their coordination with the purposes of divisions;
- strategy development;
- building goal-oriented organizational structures;
- creation of appropriate working conditions and mechanisms for motivating employees with additional responsibilities;
- formation of business rules and business procedures to reduce costs;
- rational distribution responsibilities, their coordination and synchronization;
- formation of communications with consumers;
- automation of business processes of the enterprise.

Figure 1 shows a diagram of the business process and management as a holistic system that connects all business processes of the enterprise into a network.



**Figure 1** Business process management scheme of the enterprise

1 - *Process model of the enterprise in the value chain*: the operator (business process) transformation of inputs of the company into valuable outputs for the consumer - the results of activities. The model is usually shown and positioned in the external environment.

2 - *Root model of business processes*: shows the first (root) level of detail of the process model, groups processes by selected features - the main, managerial, supporting, development.

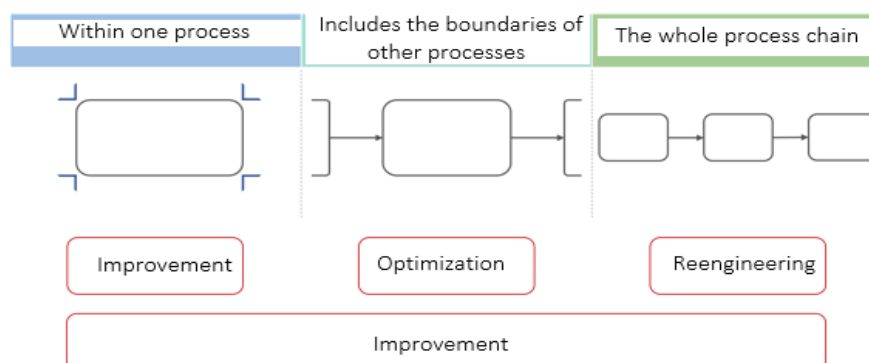
3 - *Process network*: a group of processes (from models 2-4) with connected inputs and outputs. Depending on the accepted notation of the simulation, the flow arrows connecting the processes may reflect the transfer of action and result, energy flows, material flows, information flows, financial flows and may contain a different set of attributes-characteristics of operators.

The business processes of the enterprise can be represented as a continuous chain of operations. To ensure the integrity of the business model, it is important to create an appropriate enterprise ecosystem.

Supply Chain Management (SCM) is a business concept for the management of logistics chains, which are the result of integrating key business processes from the end user, covering all suppliers of goods, services and information that add value to consumers and other stakeholders (Bharadwaj et al, 2010). SCM is a logistical coordination to streamline various logistics operations and the rules for their execution.

Logistics chain management can be characterized as the optimization of business processes both within the organization and at the inter-organizational level, ensuring the purposeful movement of flow processes in logistics systems.

The scheme of improvement of business processes of the enterprise on depth of transformational changes (improvement, optimization, reengineering) is presented in figure 2.



**Figure 2** The scheme of improvement of business processes of the enterprise

As can be seen from the diagram, there are 3 levels of improvement of business processes of the enterprise:

- improvement - enhancement of local business processes, the goal is not specified in the monetary / time dimension, the risks are minimal, the changes affect to the operational level;
- optimization - deeper reorganization changes (at the level of organizational culture), which occur from the bottom up, carry significant risks, the necessary investment, because the optimization of business processes requires target costs;
- reengineering - revolutionary changes (at the level of organizational structure), which create new business processes and in fact there is a reload at all levels.

It is believed that logistics chain management is the integration of eight key business processes (Svitlana Bondarenko et al, 2018):

- 1) customer relationship management;
- 2) customer service;
- 3) demand management;
- 4) order execution management;
- 5) support of production processes;
- 6) supply management;
- 7) management of product development and its bringing to commercial use;
- 8) management of rotating material flows.

In the process of managing logistics chains there are 5 stages: planning, procurement, production, sales, after-sales service (service). Participants in the logistics chain interact with each other by levels of communication: managed, unmanaged, tracked, third-party to the logistics chain (Gengatharen at Standing, 2005).

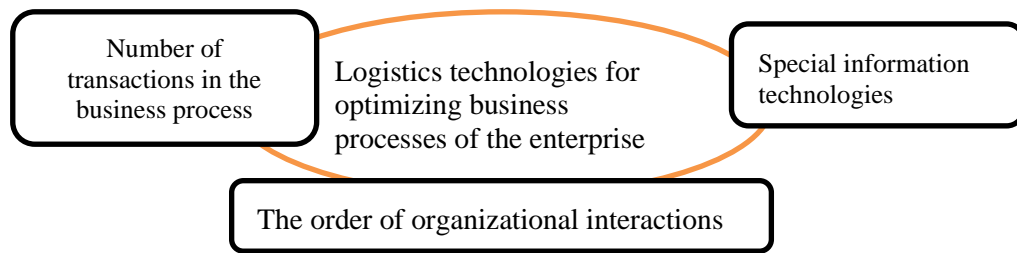
Thus, there is a complication of relations not only with customers and suppliers, but also with other stakeholders. Within the framework of this paradigm of economics, the object of management is expanding beyond individual logistics chains.

Modern enterprise information systems of the ERP class (Enterprise Resource Planning System) are based on the logistics model and principles of logistics chains. Therefore, for the modernization of corporate information systems, business processes are evaluated for compliance with this logistics model. If there are discrepancies, then the optimization of business processes.

### 3. METHODOLOGY

The methodological basis of this study there - are scientific works of scientists on the study of business process management. To achieve the defined goal and objectives, a system of general scientific and special methods was used, namely: system-functional approaches to research and clarification of the essence of process management and business process, analysis of theories of business process improvement. Methods of structural and logical analysis made it possible to create templates for end-to-end logistics and project implementation to optimize business processes of the enterprise; to substantiate the algorithm of realization of end-to-end logistics in the course of optimization of business processes of the enterprise. The methodology of enterprise architecture has become the basis for objectification and concretization of the concept that forms the basis of logistics theories of organization and management approaches to optimize business processes of the enterprise.

The logistical approach in the optimization of business processes of the enterprise is presented in the form of a diagram in Figure 3.



**Figure 3** Directions of optimization of business processes of the enterprise with the use of logistics technologies

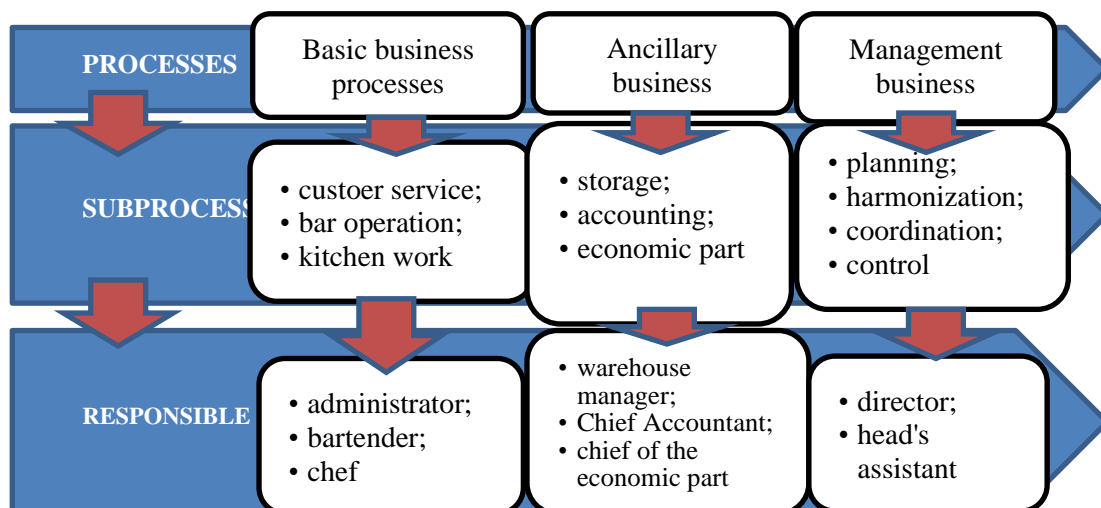
For example, the directions of optimization of business processes of a chain restaurant were considered. In the course of hypothetical research the main problems of business process implementation were revealed, possible directions of business process optimization on the basis of logistic approaches were suggested.

#### 4. ANALYSIS OF RESULTS

##### 4.1. Optimization of Business Processes of the Enterprise on the Basis of Creation of Templates of through Logistics

The study is conducted on the example of a network of restaurants. The business processes of the restaurant can be divided into two main types. The first type of business process involves product creation. To do this, the restaurant forms production business processes that need to be managed. To ensure these business processes, there are relevant industry standards related to product quality and consumer safety.

The second type of business process is related to the provision of services. There are industry standards and rules, as well as the rules of a particular enterprise. Thus, business processes, in essence, are a set of rules, a set of algorithms, standards. The result of the enterprise is a consequence of the quality of processing and implementation of standards in its activities. The decomposition of the main business processes of the restaurant is presented in Figure 4.



**Figure 4** Decomposition of restaurant business processes

For chain-type restaurants, most business processes are formalized and standardized. This avoids the repetition of the same mistakes in the establishments of the network.

The organizational structure of the restaurant chain includes the management company. One of the divisions of the network is the department of the chief technologist, whose tasks are: development of new dishes, development of a new menu, training of the production manager and chefs of restaurants, quality control of kitchen products, etc. The restaurant has a menu in the form of a colorful newspaper, which includes color photos of dishes, their prices, bar, desserts. According to the restaurant's marketing policy, the menu is updated once a quarter. That is, a new menu-newspaper is published quarterly. This measure is important and systematic, but as experience shows, there are always some problems in its implementation:

- terms of coordination of the menu composition and issue of the menu-newspaper;
- design discrepancies in the concept-cover-photography chain;
- possible errors of various nature: from inaccuracy in prices to inconsistency of a photo of actually made dishes;
- inconsistency of printing quality, etc.

The causes of these problems are:

- failure of employees to understand their functional responsibilities and role in the process;
- non-regulation of management functions of planning and control in processes;
- non-formation of specific requirements for the results of specific operations and deadlines for their implementation;
- asynchronous chaotic nature of interaction between employees;
- uncertainty about the person responsible for performing a specific operation and for the quality of the final result (newspaper menu) and deadlines.

It is proposed to consider this type of activity to create a menu-newspaper in the form of a through process. In order for the menu-newspaper to be formed, printed and delivered to the restaurants of the network in time and with proper quality, managers, employees of restaurants, external suppliers and partners must take part in the process. It is important to choose the owner of this business process.

The owner of this business process could be the chief technologist. His responsibilities would be: coordinating the activities of employees from different departments, controlling the timing and quality control of intermediate results, organizing the necessary meetings and conferences, and so on. That is, the chief technologist must be not only a good specialist, but also an adequate manager. In this case, the process of creating a newspaper menu as a cross-cutting process, its analysis, detection and elimination of problems can have a positive effect.

The following end-to-end business processes are possible for the restaurant:

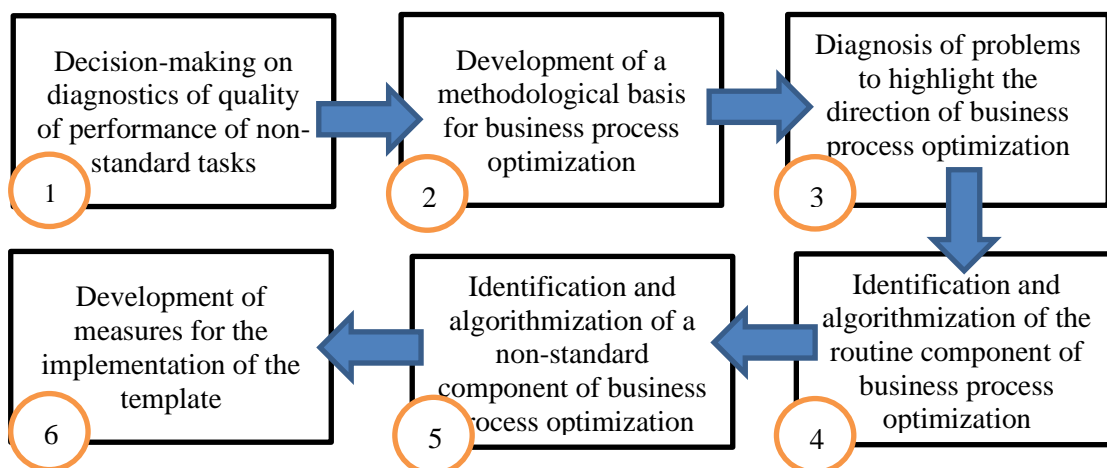
- customer service at the stage of order acceptance;
- new product development;
- launch a new menu;
- contacts with suppliers;
- budgeting process;
- recruitment process, etc.

Allocation and implementation of end-to-end processes will ensure:

- systematic approach to management and real process management;
- employees' understanding of the integrity of the process and their role in meeting customer needs;
- improving the nature of the interaction of units (employees) involved in end-to-end processes and achieving synergetic effects;

- increasing efficiency, effectiveness and quality;
- qualitative changes in the enterprise.

Transformation of such non-standard (project) activity at the enterprise into routine will have a positive effect - saving resources, process optimization, customer satisfaction (Martunyuk et al., 2019; Prokopenko O. et al., 2020). To do this, it is proposed to use business process templates that contain its description, sequence of execution steps and instructions for execution of each stage (sequence of actions, duration of each action and the necessary resources). Figure 5 shows the scheme of forming a template for optimizing business processes.



**Figure 5** Stages of development and implementation of business process optimization templates

The effect of the application of business process optimization templates of the enterprise is estimated by the formula:

$$E = Q \left( S + C_n - C_\gamma + \sum_{j=1}^m L_j W_j - \sum_{k=1}^p L_k W_k \right) - C_w - C_i - C_p \quad (1)$$

where – Q it is the number of cycles of business process repetition;

S - additional income of the enterprise from a single implementation of the optimized business process, obtained through the use of a template;

$C_n$  - the cost of the business process in the absence of a template;

$C_\gamma$  - the cost of performing an optimized business process using a template;

$L_j$  – losses from the occurrence of the j -th situation during the implementation of the business process in the absence of a template;

$W_j$  - the probability of the j -th situation;

$L_k$  – losses from the occurrence of the k-th situation during the implementation of the business process in the presence of a template;

$W_k$  - the probability of the k-th situation when performing a business process in the presence of a template;

$C_w$  - the cost of developing a template;

$C_i$  - the cost of implementing the template;

$C_p$  - the cost of refining and improving the template.

That is,  $C_w$ ,  $C_i$ ,  $C_p$  represent an investment in the development and implementation of a template for optimizing the business process of the enterprise. Return « R » of such investments is calculated by the formula:



$$R = \frac{Q(S + C_n - C_\gamma + \sum_{j=1}^m L_j W_j - \sum_{k=1}^p L_k W_k)}{C_w + C_i + C_p} \quad (2)$$

Conditions and restrictions for the optimization of business processes of the enterprise using templates are as follows:

$$\left\{ \begin{array}{l} E \geq E_{min} \\ C_w \leq C_w^{max} \\ C_j \leq C_j^{max} \\ C_p \leq C_p^{max} \\ C_w + C_i + C_p \leq C_{max} \end{array} \right. \quad (3)$$

$E_{min}$  - the minimum acceptable for the enterprise value of economic effect from use of a template concerning optimization of business process;

$C_w^{max}$  - the maximum allowable amount for the company to develop a template;

$C_j^{max}$  - the maximum allowable for the company the cost of implementing the template;

$C_p^{max}$  - the maximum allowable amount for the company to update the template;

$C_{max}$  - the maximum allowable for the company the amount of total investment in the development, implementation and improvement of a template for optimizing the business process.

Reorganization and modernization of business processes of the enterprise - it is transformation of business through optimization of business processes. An integrated approach to this process is provided by the architecture of the enterprise.

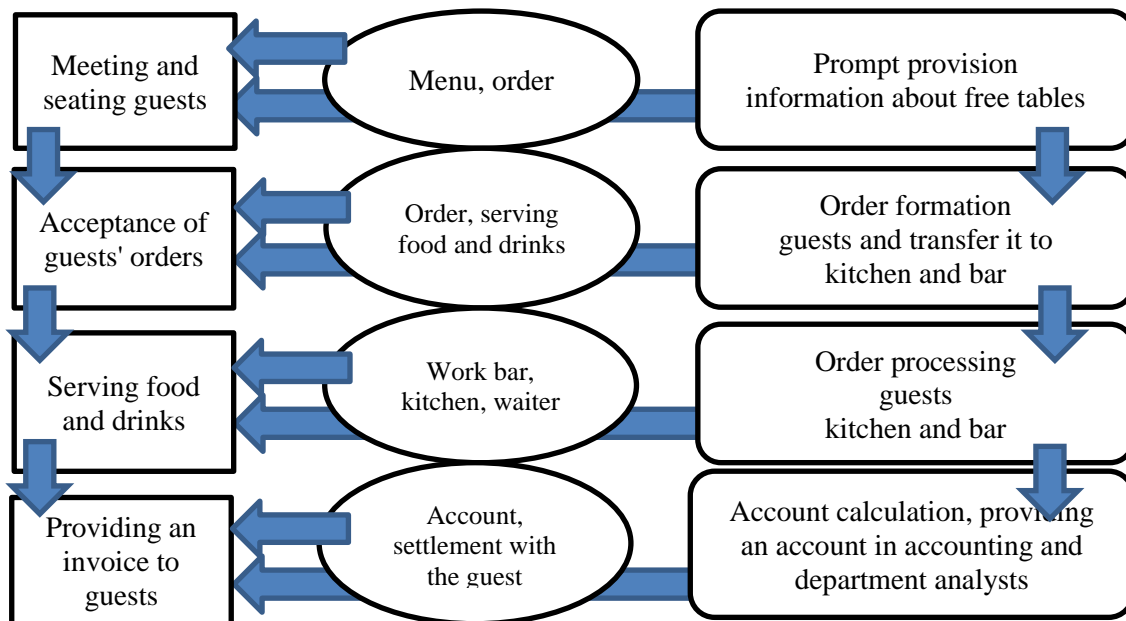
## 4.2. Models of Business Process Architecture Templates of the Enterprise in the Course of their Optimization

Enterprise architecture it is an object of management that reflects the integrity of all elements and processes of the enterprise as a complex active system (Lankhorst, 2013). The model of enterprise architecture is the basis for understanding the current situation, diagnosing problems, targeting the design of changes that are needed to improve the business model of the enterprise through the improvement of business processes.

Modeling the integration of functions or processes it is the formation of end-to-end logical management of business processes and business events, coordination of information, according to new process templates, to the time and place of operations.

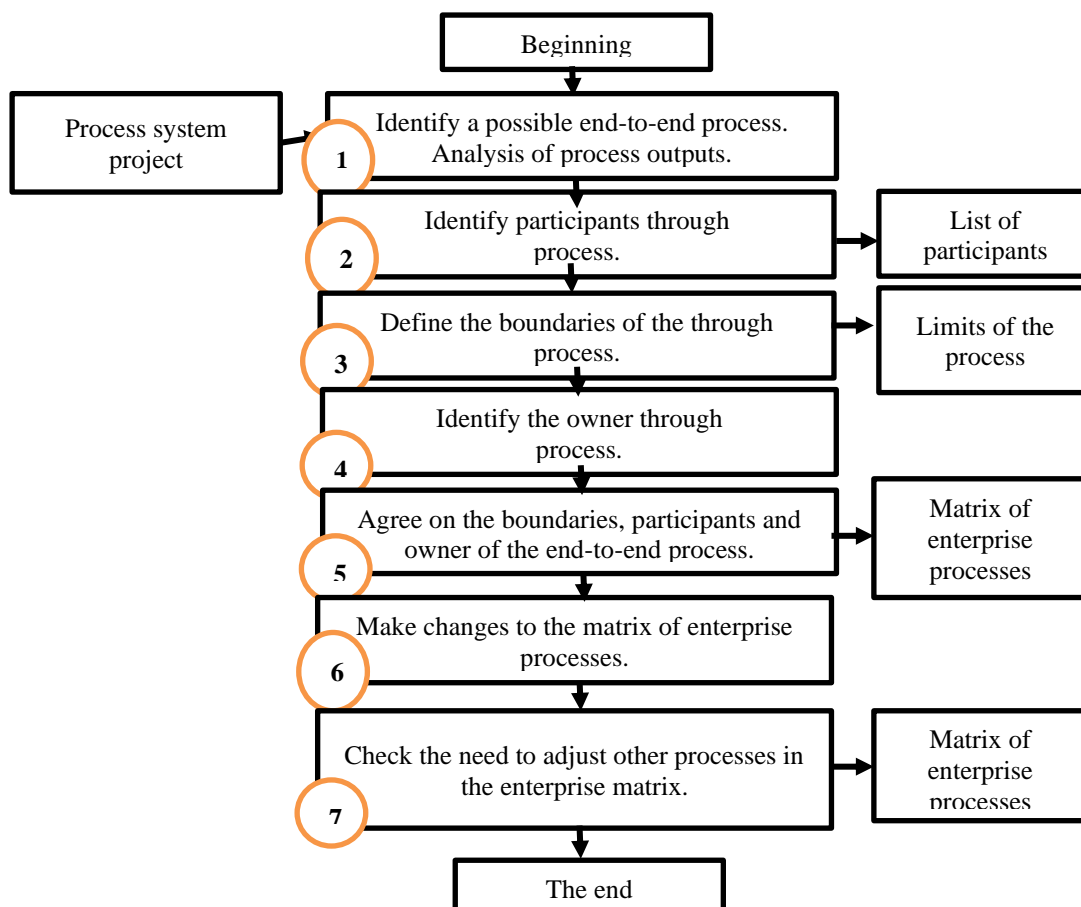
The integration model is the basis for building information architecture and application systems architecture for business process modernization. On the basis of such models of information and data models graphic templates of separate business processes in the information are created. These templates are the basis for the reorganization of business processes and the construction of new application systems, the nature of the interaction of individual processes, information exchange with contractors.

The integrated model of the business process "Customer Service" of the restaurant, which is based on the principles of end-to-end logistics, is presented in Figure 6.



**Figure 6** Integrated business process model "Customer Service"

The sequence of steps for the implementation of end-to-end logistics in the process of optimizing business processes is presented in Figure 7.



**Figure 7** Algorithm for the implementation of end-to-end logistics during the optimization of business processes of the enterprise

At the figure 5 as an input shows the "Project of the enterprise process system". It is possible to determine end-to-end processes if managers already have a fairly complete idea of the enterprise process system. The first stage of the algorithm is the analysis of process outputs.

You should choose the outputs according to the following criteria:

- the output is supplied to an external consumer or counterparty;
- the unit performing the process actively interacts with other units;
- to obtain the output of the process requires appropriate resources, as well as management resources that come from other processes at intermediate stages;
- the owner of the process is not able to fully provide the necessary performance indicators (effectiveness, quality) and customer satisfaction;
- a significant part of the final product / service is formed in other processes in the previous stages;
- output is important for several domestic consumers simultaneously.

On the second stage, it is necessary to identify the participants in the end-to-end process (units) and the processes they perform in the end-to-end process.

Next, the boundaries of the end-to-end process at the entrances / exits, its owners are determined. The owner of the process may be the head of one of the units, the process of which is included in the end-to-end process as a subprocess.

At the next stage, the boundaries, the composition of the participants and the owner of the process are agreed with all stakeholders in the hierarchy of enterprise management.

When selecting end-to-end processes, it is advisable to take into account the following criteria: nature of resources under management, possible scale of problems in case of mismatch of process outputs (for example new product development process, menu development process, etc.), frequency of process recurrence, process versatility, significant flows information (documents); significance of the process in terms of enterprise development and corporate culture.

Thus, only the most important business processes are important for achieving the goals of the enterprise and customer satisfaction.

Automation is the basis for optimizing end-to-end processes. There are special programs and models for automating business processes of enterprises.

## 5. CONCLUSION

The study found that for optimization of business processes of enterprises it is expedient to apply logistic concepts and technologies. It is shown that the business processes of the enterprise can be represented as a continuous chain of operations. To ensure the integrity of the business model, it is important to create an appropriate enterprise ecosystem. It is proved the application of approaches to the management of logistics chains to optimize business processes both within the organization and at the inter-organizational level, providing targeted movement of flow processes in logistics systems. To do this, it is proposed to consider sequential operations as an end-to-end process, which is appropriate to manage end-to-end logistics technologies. It is proposed to use business process templates that contain its description, the sequence of stages of execution and instructions for the execution of each stage (sequence of actions, duration of each action and necessary resources). It is proposed to apply the model of enterprise architecture to understand the current situation, diagnose problems, target the design of changes that are needed to improve the business model of the enterprise through the improvement of business processes.

Modeling the integration of functions / processes is the basis for building information architecture and application systems architecture for business process modernization. On the basis of such models of information and data models graphic templates of separate business processes in the information are created. These templates are the basis for the reorganization of business processes and the construction of new application systems, the nature of the interaction of individual processes, information exchange with contractors. An algorithm for the implementation of end-to-end logistics during the optimization of business processes of the enterprise is proposed.

Modeling the architecture of the business model of the enterprise - the direction of further research.

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