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## THE BUSINESS PROCESSES MODELLING OF THE TRANSPORT ORGANIZATION

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*The paper describes various business processes in logistics, their classification and programs for modelling and reengineering them. For the example of OJC "Belmagistralavtotrans" the process of modelling business processes was presented for a specialist in freight forwarding and a specialist in customs clearance.*

The development of technology, and at the same time, production, as a consequence, of other spheres of life activity, is natural. An integral part of development is the improvement of system, i.e. removal of unnecessary elements, and most importantly, optimizing the system. Such work is possible only if the system is divided into parts, which are subject to detailed analysis and adaptation. This analysis is possible when applying business processes (BPs). Modeling of business processes helps to solve two problems at once:

1. Study of business. Graphic representation in the form of schemes allows to understand the features of the company's work and identify possible "bottlenecks" quickly.

2. Providing visibility. Schematic representation of the company's work helps the head and owner of the business to understand the essence of the problem much quicker and evaluate the proposed solutions.

So, let's look what is meant by the concept of a business process.

A business process is a collection of related, structured activities or tasks that produce a specific service or product (serve a particular goal) for a particular customer or customers. It may often be visualized as a flowchart of a sequence of activities with interleaving decision points or as a process matrix of a sequence of activities with relevance rules based on data in the process [1].

The business process is a stable, purposeful set of interrelated activities (a work sequence) that, by a certain technology, transforms the inputs into outputs according to certain rules with the help of certain mechanisms [2].

A business process is a set of interrelated activities or works directed into creating a specific product or service for consumers. Flowcharts of business processes are used as a graphic description of the activity. [3]

Thus, we can say that the business process is a regularly repeated sequence of interrelated activities (operations, procedures, actions), in which the resources of the external environment are used, value is created for the consumer and the result is given to them.

To specify the sphere, we list the business processes that take place in logistics:

- product movement planning (part of the planning and management process);
- delivery of products from a manufacturer or a supplier (part of the resource process);
- maintenance of warehouse accounting of the received cargo (part of the resource process);
- delivery of goods to stores (part of process of marketing products);
- control over the movement of commodity flows (an integral part of planning and management process).

The simplest approach to the classification of business processes divides them into groups [4]:

Primary processes (main processes) are the main and value-creating processes of an enterprise. These processes permeate the whole company, from the consumer to the suppliers.

Supporting processes (auxiliary, providing processes) are necessary to ensure the main processes.

Developing processes (processes of management and development) are processes that allow to create a chain of values in the main and in auxiliary processes at a new level of factors.

A more detailed classification of business processes [4]:

- main processes;
- associated processes;
- auxiliary processes;
- supporting processes;
- control processes;
- development processes.

Main business processes are processes focused on the production of goods or the provision of services, which are the target objects of the establishment of an enterprise and which ensure income generation. For example, the main business process for the plant of chipboards and parts is the production of laminated chipboard.

## Economics

Associated processes are processes focused on the production of goods or the provision of services, which are the results of the accompanying basic production of production activities and they provide income. For example, the process of repairing third-party transport for a trucking company on its own repair base is an associated process.

Auxiliary business processes are processes designed to ensure the performance of basic BPs and to maintain their specific features. For example, for a CHP or HEP plant, an auxiliary business process is the process of repair of production equipment.

Providing business processes are processes designed to support all other BPs and are oriented towards supporting their universal features. At enterprises of any industry, this is the process of financial support of activities, the process of staffing, engineering and technical support, and so on.

Business management processes are processes that cover the entire complex of management functions at the level of each BP and the business system as a whole. These are the processes of strategic, operational and current planning, the formation and implementation of managerial influences.

Business processes of development are processes of perfection of the made goods or services, technologies, equipment modifications. For example, this is the conduct of research and development (R & D) in mechanical engineering, the process of technical re-equipment in the electric power industry, and so on.

For the management of business processes and their moderation, there are various software products and tools. Consider some of them in Table 1.

Table 1 – Analysis of software products for modeling business processes

Program	Functional and features	Cost
BizAgi Suite	<ul style="list-style-type: none"> <li>– Modeling of business processes, their verification and analysis</li> <li>– Creation of a description of business processes</li> <li>– Creating executable applications based on models</li> <li>– Real-time execution and monitoring of processes</li> <li>– Assigning processes to employees</li> <li>– Assigning other resources to business processes</li> <li>– The program is in Russian</li> </ul>	<ul style="list-style-type: none"> <li>– Free, up to 20 employees.</li> </ul>
ELMA BPM	<ul style="list-style-type: none"> <li>– Building business process models</li> <li>– Assigning business process roles to employees</li> <li>– Real-time execution and monitoring of processes</li> <li>– System work with document circulation</li> <li>– Convenient "help"</li> <li>– Excellent support</li> <li>– Integration with 1C</li> </ul>	<ul style="list-style-type: none"> <li>– Standard platform costs 900 \$ plus costs for every user but they have Community Edition which is a semi-functional version for free</li> </ul>
Visual Paradigm	<ul style="list-style-type: none"> <li>– Modeling business processes in different notations</li> <li>– Building other models</li> <li>– Checking models</li> <li>– Automatic generation of documents</li> <li>– Managing model elements attributes</li> <li>– Creating and assigning behavior rules of models</li> <li>– Ability to add your own elements to models</li> <li>– Interrelation of models</li> <li>– Uploading models as a program code</li> <li>– Uploading the model in graphical form</li> </ul>	<ul style="list-style-type: none"> <li>– Subscription — 35\$ per month</li> <li>– Full license — 800\$</li> </ul>
<b><i>BPsimulator</i></b>	<ul style="list-style-type: none"> <li>– Process modeling</li> <li>– Estimation of cost / duration of the process</li> <li>– Simulation</li> <li>– Convenient building of models</li> <li>– Reports</li> <li>– Saving models in Google Drive or One Drive</li> </ul>	<ul style="list-style-type: none"> <li>– Free with advertising;</li> <li>– 5 rubles per month without advertising</li> </ul>

BPsimulator was selected within the framework of a design and modeling research of business processes of OJSC "Belmagistralavtotrans" (Open Joint-stock Company).

OJSC "Belmagistralavtotrans" is a diverse company, whose structure now includes trucking departments, transport and logistics center, service stations and forwarding units.

A business model for two specialists working at this enterprise was created. The system will allow to test the efficiency of working hours use. The researched positions are a forwarder from the freight forwarding department and a customs clearance specialist from the customs regulation department.

Business processes performed by a freight forwarder are shown in Figure 1:

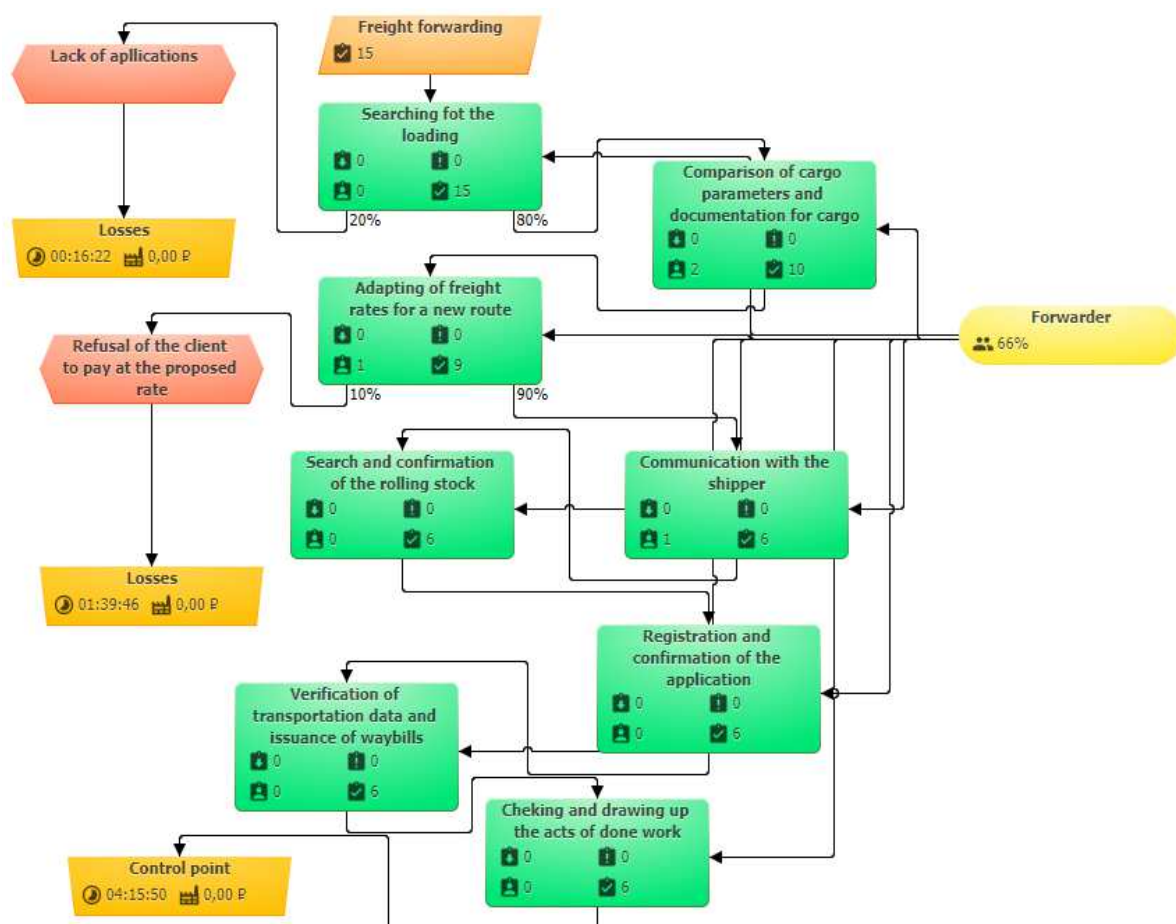


Fig. 1. Business processes of a specialist in freight forwarding

Let's describe how the working scheme is developed. We will discard the time for lunch and employment by printing navigation reports of previous day's trips. In total, this time will average 1.5 hour.

1. Start the day with searching for loading, assume that its average number is 15. There are 2 options at this stage:

- Absence of shipment requests, which makes further work impossible. That leads to an average time loss of 16 minutes 22 seconds (while processing one request);
- We compare the parameters of cargo with available trucks, i.e. we select a vehicle, issue appropriate contracts with customers. Time expenditures will be 10–20 minutes, the number of requests will be 80% of incoming requests (it is assumed that 80% of incoming requests pass to the next stage, and 20% are eliminated for various reasons).

2. At the next stage the freight rate is being agreed. We suppose that in 10% of cases the rate will not be agreed upon, which leads to an average time loss of 1 hours 39 minutes. Time for the reconciliation procedure is from 20 to 60 minutes.

3. If the agreement is successful, then we contact with a shipper, the time spent on processing the operation is 40–95 minutes:

## Economics

4. Next, the search and confirmation of a rolling stock is carried out, which takes 40-80 minutes.
5. Then the registration and confirmation of the request takes place (10–15 minutes).
6. Verification of transportation data and issue of waybills takes in general 7–20 minutes.
7. Next step is checking and drawing up the acts of the work done (6–15 minutes).

By the last stage there are 6 requests left. Remind you that there were 15 in the beginning. Average processing time is 4 hours 16 minutes.

So, the loss of time arose because of the intermediate difficulties with current orders, searching and docking the load. More efficient operation of the system could be presented by a more advanced communication system of the shipper-forwarder-consignee. It is possible due to better information services, using online platforms, reduction of telephone calls to clarify information, and also by bringing the exchange of necessary information only in electronic form.

Business processes performed by a customs clearance specialist are presented in Figure 2.

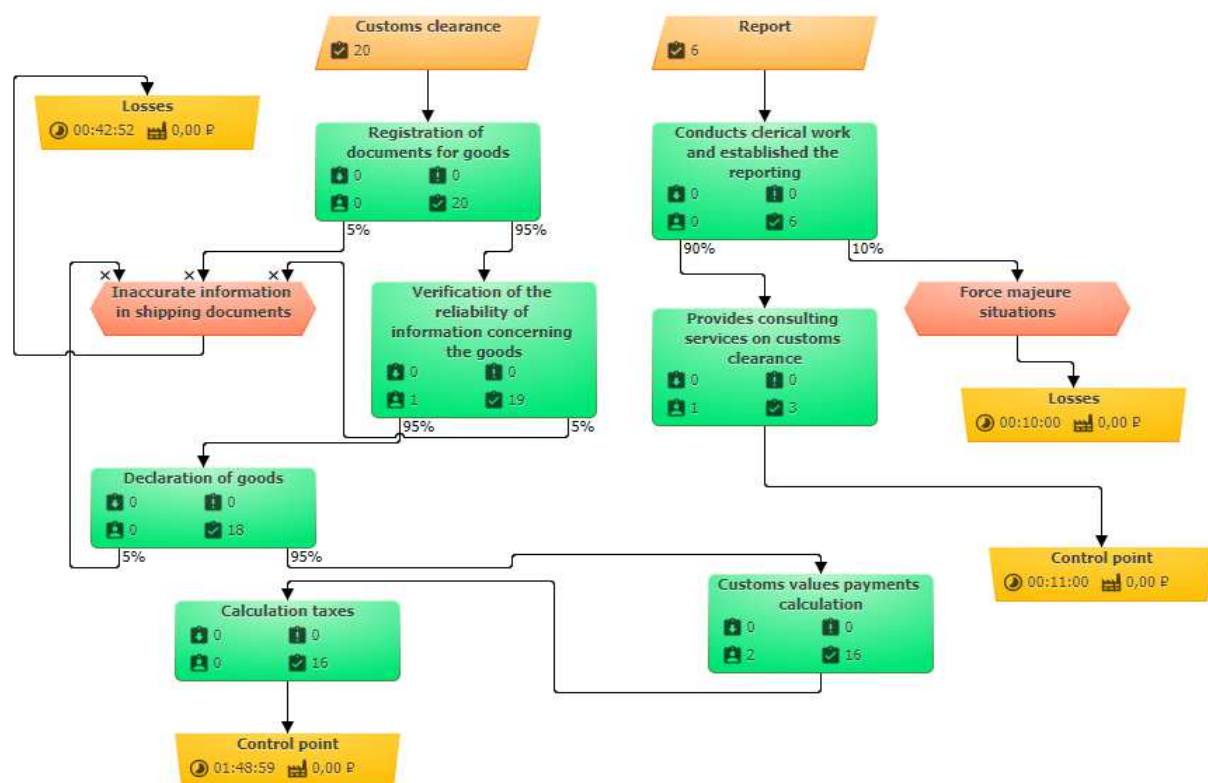


Fig. 2. Business processes of the specialist in customs clearance

We will discard an hour for working with reporting, 90% of the time will be useful while 10% is spent on failures, so at this stage time loss will comprise 11 minutes. We will deduct another hour for lunch break, half an hour for other force majeure situations.

1. The registration of documents for goods will take 10–15 minutes on average.
2. Verification of the reliability of information concerning the goods being moved will take 15-40 minutes.
3. The declaration of goods will take 7–15 minutes.

In all three paragraphs we assume that 42 minutes will be wasted due to inaccurate information or for any other reasons. That means 95% of documents will go to the following stages.

4. Customs values payments calculation, which takes 30–45 minutes.
5. Calculation of taxes takes 15-25 minutes.

There are 17 requests left up to the last stage while there were 20 in the beginning. Average processing time is 1 hour 48 minutes.

In our scheme most errors arose due to incorrect information that reduced the efficiency of the work. We propose to introduce and increase penalties for incorrect filling in of declarations, choice of the product code and non-compliance of goods with the applicable documents. In our opinion, this should reduce the number of mistakes made by a worker.

We have built work models, analyzed working days of each of the specialists, suggested ways to eliminate time losses. In practice, we see the benefits of applying business process diagrams, because first of all it gives us a clear picture of a current mode of work and, as you know, when we simplify our own work, it makes the whole system more efficient and organized.

## REFERENCES

1. Weske, M. Business Process Management: Concepts, Languages, Architectures / M. Weske – Springer Berlin Heidelberg (Berlin), 2012. – 404 p.
2. Системы менеджмента качества. Требования : Стандарт ISO 9001:2000. – Введ. 31.08.2001. – М. : Стандартиформ, 2001. – 15 с.
3. Lambert. D.M. Fundamentals of logistics management / Douglas M. Lambert, James R. Stock, Lisa M. Ellram. – The McGraw-Hill Companies Inc., 1998. – 611 p.
4. Pawlewski, P. Process Simulation and Optimization in Sustainable Logistics and Manufacturing / P. Pawlewski, A. Greenwood. – Springer Publishing (Luxembourg), 2004. – 184 p.
5. BP Simulator URL [Электронный ресурс]. – Режим доступа: <https://www.bpsimulator.com>. – Дата доступа: 19.01.2018.
6. ОАО «Белмагистральавтотранс»: организационная структура [Электронный ресурс]. – Режим доступа: <http://www.bmat.by/review-1287.html>. –Дата доступа: 19.01.2018.