

Increasing warehouse complex operational efficiency



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ABSTRACT

The logistic system is an integral part of each production company, which provides management of inventory flows for the implementation of a continuous production process. The research is intended to find features to determine the best solutions for the goods distribution in the warehouse network. Companies must to create their own logistics network to become successful and well-developed. This means investing in warehouse infrastructure. The work is based on analysis of scientific works about the warehousing management, the calculations made by using mathematical statistics methods, selective observation and inventory management strategies. These calculations are based on statistic data of company warehouse, economic data company. This study should help companies identify whether to introduce a new WMS or enough to update and improve the company's existing technologies.

Key words: optimization, warehouse managment, distribution, mathematical methods

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INTRODUCTION

In the current conditions of the global financial crisis it is impossible to talk about the development of the country's economy without the development of logistics. In order to compete in the world market and to be in the leading roles in the process of the development of the world economy, it is necessary to focus on optimizing the overall logistical costs in the process of product movement. Materials management in a company defines and solves the problems of logistics. The movement of material flows is ensured by the transportation, warehousing, storage and other operations integrated into a logistic system. Logistic material management system should provide the minimum cost and maximum commercial benefits.

The relevance of the work lies in the fact that for the production company under consideration, warehousing is one of the most important elements of the chain between the manufacturer and the customer; through the warehouse flow of finished products and materials to several billion dollars a year.

The aim of this work is to analyze the existing warehouse logistics system of one of the main Russian confectionery industries, as well as to develop for this company in the existing difficult economic conditions of the project to optimize warehouse logistics.

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To reach the aforementioned aim, there is a need of attaining of the following objectives:

- to give a general description of the organizational and economic state of the enterprise-object of study;
- to analyze the market;
- to analyze the logistics system of the company;
- to study the theoretical aspects of warehousing
- to analyze the types and technologies of warehouse operations at production companies;
- explore methods for improving the organization of warehousing;
- to propose and justify the need to change the automated warehouse management system

The research question covers the proposed study, which can be presented as an illustration of the practical result.

The novelty of the work is determined by the material flows are transferred, the required volumes of stocks are stored at certain stages at various stages, for which purpose the corresponding warehouses are used. This, affects the increase in the cost of goods, because the process is associated with certain costs. Therefore, the optimization of the movement of material flows in the logistics chain is connected with the problems of the functioning of warehouses; the competitiveness and efficiency of the company also depend

on it, no matter how innovative or advanced it is in terms of scientific developments.

The structure of this proposal is determined by its objectives. The first part (the literature review) is theoretical and devoted to the study of mathematical and analytical methods of optimization models. The second part is methodological and based on analyses of practical experience of Russian confectionery companies. Moreover, this part will describe basic methods of warehousing optimization. The last part describes anticipated results.

LITERATURE REVIEW

In the logistics system of any production company, warehousing is the most important link in the flow of material stocks from the supplier of raw materials to the final consumer (buyer) of finished products. In order to optimize warehousing, you must first determine the size of the warehouse. It is worth noting that the costs associated with decisions on the size of the warehouse include linear rental costs and fixed cost plus linear adjustment. The author decomposed production periods and warehouse adjustment periods in a recursive procedure in the opposite direction and developed the $O(T^4)$ DP algorithm. (Fan, G. Wang 2017, A. Kovacs 2017, E. Malaguti, G. Nannicini 2018, (Fan, G. Wang 2017, Jonas C. P. Yu 2016) found that $O(T^4)$ is much more efficient than the commercial MIP solver, and joint optimization is superior to consistent decision making. Thus, in this study, the total cost of warehouse, production, and inventory adjustments can be reduced on average by more than 10%. (A. Kovacs 2017) also revealed that the

algorithm mentioned earlier is effective. Thus, the total value of stock, production, and inventory adjustments can be reduced on average by more than 10%. (E. Malaguti, G. Nannicini 2018) The authors examined the problem of distribution and pricing faced by international retailers involved in e-commerce. They developed a mathematical decision making model of increased complexity, and then tested these models on instances derived from real data. Thus, the development of heuristic approaches and decomposition methods works well for large-scale projects. (Jonas C. P. Yu 2016) proposes to optimally use the JELS optimization model for the wear of products in a two-tier two-fold system with a shortage of orders, a trade credit and a reduction in the cost of rent. The model assumes a limited warehouse capacity of the distributor, discounted cash flow. In addition, a sensitive analysis shows that the connection speed significantly affects the total cost of the system. In addition, a decrease in warehouse rent or an increase in a trade credit will reduce overall joint expenses. To optimize the system, the decision maker must develop the most cost-effective replenishment strategy.

Using models to determine the size of the warehouse, to optimize warehouse operations is not enough. Mathematical modeling also allows you to determine how to optimize the warehouse network. In the following articles, the authors presented optimization procedures that allow us to determine the best solution according to many criteria for the task of distributing goods in the warehouse network. (S. Fa-liang 2007, V. Dybskaya 2017) S. Fa-liang 2007 proposes a new mathematical model with choice constraints and multiple goals, using a genetic algorithm (GA). Experimentally, he proved

that GA is efficient, reliable and can increase efficiency work on the collection of orders for automatic warehouses, which also saves energy sources. . It is important to note that the GA approach is useful for solving some optimal combination problems and complex NP problems. In addition, other methods are also available, for example, a computational method and an operation research method for calculating WOPP (warehouse order picking optimization problem) . WOPP should be considered taking into account the state of the delivery system and the entire operation of automatic warehouses. V. Dybskaya (2017) revealed that it is possible to build and use a simulation model of random orders from stores to the Monte Carlo distribution center on the necessary planning horizon. The model is built in such a way that allows to take into account any temporary order structure. In addition, in addition to using the Monte Carlo method, choices have been illustrated based on the synthesis of the work criterion and the Hurwitz criterion with the processes of the analytical hierarchy.

The automotive industry is one of the most competitive sectors, in which rigour, flexibility, quality and agility constitute the critical

factors of success. Warehouse activities and their associated costs play a vital role in logistic functions. Optimization methods can be associated not only with mathematical modeling, but also through the introduction of a WMS system or its optimization (S. Gharbi, H. Zgaya 2013, S. G. Tzafestas, P. Poulos 2000, R. Caridade, T. Pereira 2017) Thus, in the study (S. Gharbi, H. Zgaya 2013) it is proposed to study the method of optimizing the way of choosing orders based on communication with the agent. The results show that the optimization approach integrated into the behavior of the optimizer <https://assignbuster.com/increasing-warehouse-complex-operational-efficiency/>

agent allows the operator to overcome fewer miles. The scientist found out that while improving the existing WMS system, the reduction of the distance traveled by choosing the order and the time it takes to collect the order increases the productivity of the warehouse. Thus, the gain of profit can reach 28%. The issue of replenishing warehouses with goods is paramount to warehousing optimization. Scientists (S. G. Tzafestas, P. Poulos 2000) have found a new way to replenish stocks in stock. Due to the rapid increase of the warehouse and increase in the warehouse for making decisions on all the tasks, it is necessary to use automated management services (WMS). These solutions should provide optimized use of resources, which leads to lower costs and improved customer service. The main solution to this problem is the use of storage space, which consists of different types of storage facilities and similar product groups. The problem of optimal replenishment is a multiparameter problem of combinatorial nature. For this reason, a heuristic method for achieving a good solution is appropriate when WMS is implemented. The warehouse can be optimized in several ways, not only by mathematical calculations, but also by expanding the warehouse, as it was done (R. Caridade, T. Pereira 2017). The authors proposed to reorganize the warehouse to eliminate the need to store goods outside the company. The existing warehouse was reorganized to eliminate the need for storage outside the company. Thus, the warehouse space was expanded from 2, 450 m² to 6, 200 m² by building a territory covering three floors with direct access to the plant. After the initial diagnosis and ABC analysis, it was determined what changes would be required in the raw materials management policies, switching from FIFO to FEFO. The introduction of WMS and allowed to increase the level of employment of the shelves from about <https://assignbuster.com/increasing-warehouse-complex-operational-efficiency/>

50% to 100%. KPIs were also identified, which can now be measured using the new IS solution. Thus, WMS and basket management allow real-time updates of both SKU and storage performance.

Competent organization of loading and unloading operations can significantly save the company's budget. (V. Shepelev, Z. Almetova 2018) propose a method for determining the optimal parameters of the complexes. Scientists propose a cost-based criterion in the form of minimum total costs for loading and unloading of transport and storage complexes and rolling stock idle time during loading and unloading operations performed by transport organizations in order to determine the optimal number of loading and unloading mechanisms and stations in the warehouse complex. Thus, the savings in total costs and losses that are borne by carriers and the terminal when organizing unloading vehicles using two loaders at one unloading station amount to 23% compared with unloading at two unloading stations.

Methodology

The proposed object will be designed as a mixed methods study and will employ: analysis, synthesis, induction, deduction, forecasting, modeling and system analysis. The chapter provides the which are applied for research. Also, in my study will be used methods of graphical, economic and statistical analysis, SWOT, Pest analysis, correlation and regression analysis, expert survey.

The structure of the chapter is following: firstly, description of the method for the research with explanation of the principle of my choice, secondly, <https://assignbuster.com/increasing-warehouse-complex-operational-efficiency/>

description of chosen data and some characteristics, and finally there will be a conclusion.

At the beginning of project, exploratory research will be carried out in order to analyze actual articles and books about using methods of different ways of analysis, other warehousing company's practices. As a main method for accounting it will be use ABC and XYZ methods. The advantage of these methods that they allow to classify range of finished products of the company according to their importance. Also these methods are chosen because there are a lot of varied data resources that should be researched.

The second method that will help to optimize the warehousing system of the company is an adjustment of the WMS system. The main result will be of this method will be an increase in the work of warehouse operations. Also according to the research (R. Caridade, T. Pereira 2017) The WMS and bin management increase in shelf occupancy rate, from approximately 50% to 100%.

As a result there will be evaluated the effectiveness of the proposed solutions, which should contribute to customer satisfaction and lower logistics costs in terms of warehouse logistics.

Anticipated results

This research is expected to be an in-depth study of possible ways of warehousing optimization. Although the work provides possible and expected results, that can be done due to symbiosis of deep study of scientific literature and logical thinking. As a result of the study of the warehouse

capacity and storage cost, it will be possible to conclude that, following the implementation of the proposed solutions, storage costs will decrease, the storage rack area capacity will increase, and payback will occur in a short time, which will further lead to a significant reduction in the company's operating costs parts that will affect the increase in the profitability of the company as a whole. All the recommendations and calculations can be introduced as a potential project of current delivery process's reforming. In addition, all the methods that will be used in the research may become an instruction for future routes planning.

CONCLUSION

This research proposal is aimed at developing the theoretical basis for choosing logistics methods of reducing company's costs , identify the main tools for forming optimal ways for warehousing optimization, as well as take into account external and internal factors.

Based on the analysis of logistics processes, it can be concluded that for a manufacturing company, at present, the need to improve logistics processes is becoming more important. This is explained by the fact that only an efficiently functioning logistics system can provide an increase in the effectiveness of a company's operations and reduce its overall costs.

Therefore, especially in the conditions of the current situation of external economic crisis, as well as the peculiarities of the development of a young innovative company, it is necessary to reconsider the approach to organizing the management of the enterprise and the company's divisions that make up its overall logistics system.

As experience grows, however, the logistic sphere is rapidly changing, and many other innovative practices are still poorly understood, so there are a lot of questions that open new perspectives for the future research.

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