

# MANAGING IRON AND STEEL ENTERPRISES: STUDY OF INNOVATIVE METHODS OF INDUSTRIAL ENGINEERING (LOGISTICS APPROACH)

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Specifics of the logistics approach in managing an iron and steel enterprise is reviewed. Attention is focused on the logistics management issues; the areas of their solution are defined.

The article proposes an economic mechanism for managing the logistics activities of iron and steel enterprises, including a set of consistent, mutually agreed management activities and measures that encompasses the cycle of assessing, analyzing and optimizing logistics activities and aims at achieving the performance goals. The mechanism is based on a system of methods, models and techniques and provides for the adjustment and control of deviations, thereby ensuring timely response to the deteriorating parameters of managing the logistics activities of an iron and steel enterprise.

*Key words:* management, iron and steel enterprise, logistics activity, logistics system, material flow,

## INTRODUCTION

Managing the supply, production and sales processes of a large iron and steel enterprise is described by a presence of many participants in supply chains, variety of flows of various directions and intensity, a wide range of resources and finished products, variety of conditions and forms of cooperation with suppliers and consumers, which require the use of efficient logistics technologies.

When an iron and steel enterprise aspires to secure the efficiency of economic activities and sustainable development based on the logistics-focused approach, a system of management methods that must be organically combined into an economic management mechanism becomes important. Introduction of logistics methods and principles allows to flexibly respond to the needs of consumers, reduce time between the raw materials arrival and the finished products delivery, minimize inventory and speed up the process of obtaining information.

## LITERATURE AND METHODS

A set of scientific methods was used in this article. In particular, the methods of economic and statistical analysis were used, which allowed to find out the specifics of managing the logistics activities of iron and steel enterprises. Besides, the method of cluster analysis

was analyzed to find out the specifics of logistics activities of iron and steel enterprises, and it was also substantiated that tools for factor analysis and analysis of random variables were useful in forecasting the product sales volumes of iron and steel enterprises.

Particular issues of managing the logistics activity of enterprises are reviewed in the papers of foreign researchers [1 - 3] and domestic scientists. [4 - 7] However, it must be noted that most studies focus on the logistics management of financial flows and information support for management processes, while the production link remains without attention.

The conducted review of the theoretical elaboration of the issues of improving the logistics activities management allowed to identify an inadequate study of the mechanism for managing the logistic activities of industrial enterprises, including iron and steel, which determined the purpose of the article – to provide the concept and substantiation of the economic mechanism for managing the logistics activities of iron and steel enterprises and to identify areas for improving the management of the iron and steel enterprise based on the logistics approach.

## RESULTS

The analysis of research has allowed to improve the interpretation of the term “logistics activities of the enterprise”, which the authors understand as the dimension of economic activities consisting in managing the material flows and accompanying information, financial and service flows of the enterprise through the consistently and reciprocally executed logistics operations

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based on the principles of consistency, complexity and integrity of all the links in the “supply-production-sales” logistics chain in order to achieve long-term success in business through the fullest satisfaction of customers’ demands, minimization of costs, harmonization of interests of all participants of commodity circulation in the context of risks, variability and uncertainty of the external environment.

Logistics activities as integrated flow management at the iron and steel enterprise encompass all its functional units and dimensions: supply, production, marketing, sales, finance, infrastructure. The object of the enterprise logistics activities is a set of material, financial, information and service flows.

The key aspect in the systems management of logistics activities of iron and steel enterprises is the formation of an economic management mechanism, identification of its components, levers and regulatory tools. The levers of logistics activities are norms and standards, limits and reserves, financial incentives and sanctions, prices and transport tariffs used as a means of changing the economic condition of the enterprise.

Let’s define the concept of an economic mechanism for managing the enterprise logistics activities as a system of methods, operations, levers and their interrelations that define the essence of the management process and altogether enable to achieve a logistics mission that is to achieve long-term business success in the competitive and changing external environment.

Stages of implementing the economic mechanism for managing the logistics activities of iron and steel enterprises provide for the consistent implementation of operations at three levels: target (tasks of managing the logistics activities are defined), analytical and optimization (areas to improve the efficiency of logistics activities are developed and implemented). The cyclic execution of these operations ensures the continuity of managing the logistics activities of an iron and steel enterprise.

One of the most important tasks to consider when building the mechanism is the selection of target indicators (target level), as well as identification of internal and external factors and the degree of their influence on logistics activities in a particular situation (analytical level).

The main feature of the proposed mechanism is separation of the target level as a separate unit, which has the greatest significance for the enterprise and serves as a landmark for improving logistics activities. Within the current study, an integral indicator of the enterprise logistics activities’ efficiency is proposed as an efficiency criterion, which, in turn, depends on the efficiency of its functional components:

$$IELA = f(ESU, EIP, ES, ET, EST)$$

where IELA is the integral indicator of the enterprise logistics activities efficiency; ESU, EIP, ES, ET, EST are the generalized indicators of the efficiency of the

logistics activities components (supply, in-production, sales, transport and storage, respectively).

The target level also assumes preliminary diagnostics of the causes of inefficient logistics management based on the intermediate evaluation of the efficiency of the logistics activities’ components through finding the actual values of indicators and comparing them with the target and limit intervals.

The actual value is the real value reached by this indicator at a given time. The target interval is the interval to which the indicator under study is expected to fall after implementing measures to improve logistics activities. The limit interval is the interval which determines the minimum and maximum values of indicators of the logistics activities efficiency. The lower limit of the limit interval defines the critical (lowest permissible) level of the logistics activities’ efficiency, the reduction to which in certain areas of activities means the transition of the enterprise to the area of inefficient logistics management.

The limit values of indicators  $E_{SU}$ ,  $E_{IP}$ ,  $E_S$ ,  $E_T$ ,  $E_{ST}$ , as well as the relative coefficients  $K_{IELA}^{max}$  (coefficient of proximity to the highest value of the integral indicator of the logistics activities’ efficiency) and  $K_{IELA}^{crit}$  (coefficient of remoteness from the critical level of indicator  $IE_{LA}$ ) are the levers of the mechanism target level. It is proposed to use a scenario approach in strategy development. It is important to consider the following requirements in the process of developing a set of scenarios (strategies for improving  $IE_{LA}$ ) [8]:

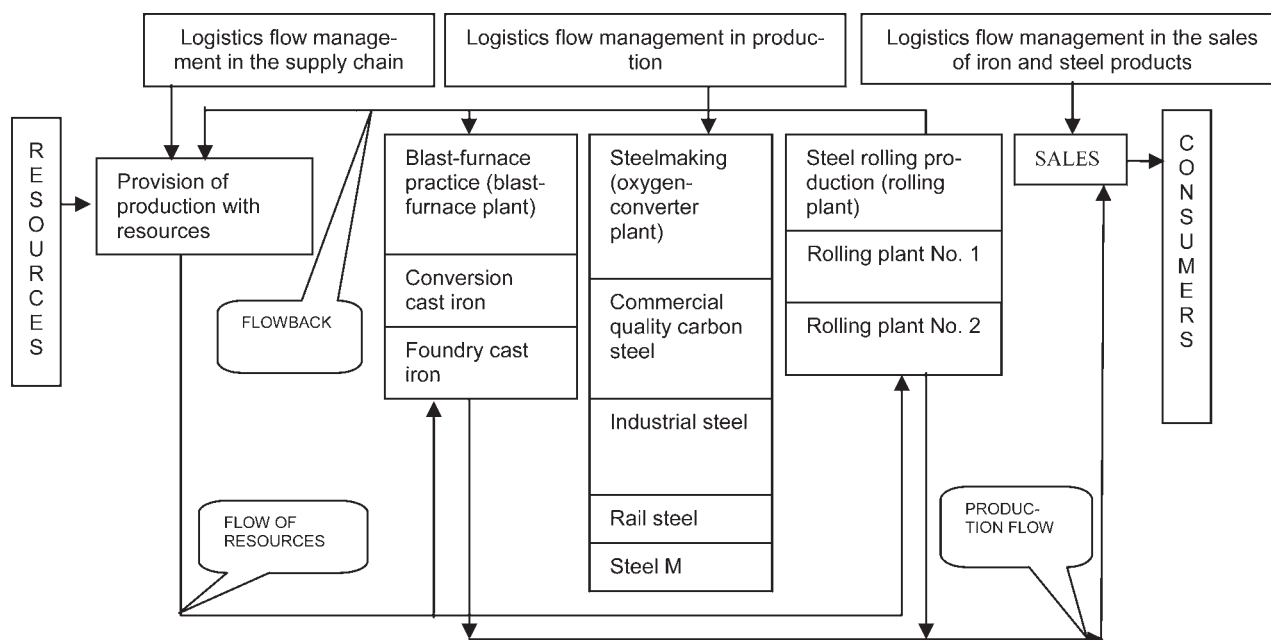
- 1) identifiability – the current situation of the enterprise and the dynamics of the factors that impact it can always be accurately assessed as a result of the scenario development;
- 2) predictability and rationality – special forecasts should be made and rational proposals of experts should be developed for factors that have impacts with uncertain development trends;
- 3) completeness – scenarios should cover all possible options for the situation development and the enterprise response.

External (use of logistics outsourcing) and internal (optimization of logistics flows) options are identified among the possible options of strategies for improving the integrated indicator of the logistics activities’ efficiency of the iron and steel enterprise.

As noted in paper [9], the essence of outsourcing is in the transfer of certain logistics management functions to third-party specialized entities, which allows to achieve an increase in  $IE_{LA}$  due to the better experience of these entities.

Optimization of the parameters of logistics flows based on the use of modern economic and mathematical methods and models is an internal option of the strategy for improving the logistics activities’ efficiency of the iron and steel enterprise.

A scheme of managing the logistics flows in the LLC “KMZ” (Kolpinsky Metalloobrabatyvayuschy Za-



**Figure 1** A scheme of managing the logistics flows in the LLC "KMZ"

vod) production system can be an example of the mechanism for managing the enterprise logistics activities (Figure 1).

## DISCUSSION

Figure 1 reveals that as a complex logistics system, an enterprise includes the following stages of the material flow transformation: the stage of production and supply of raw materials, semi-finished products and auxiliary materials, the stage of manufacturing finished products, the stage of sale of finished products, and the stage of disposing the flowback of materials, semi-finished products, waste and used products. This means that managing the enterprise as a complex logistics system is divided into the following subsystems:

- subsystem of logistics supply management;
- subsystem of logistics production management;
- subsystem of logistics sales management.

Managing physical resources starts with logistics management in supply. Since physical resources directly relate to the current assets of the enterprise, the cost of which is fully attributed to the cost of finished iron and steel products, the attention should be paid to the quantity and quality of the raw materials used. Iron and steel production requires procurement of a huge range of raw materials. Therefore, along with the improvement of logistics components, it is necessary to conduct marketing research of the search for the best supplier of iron ore [10].

The next subsystem is a subsystem of logistics production management. Application of the logistics approach to management and organization of the production and technological process at iron and steel enterprises provides a number of advantages: it will allow to make operative and efficient managerial decisions, re-

duce the cost price of iron and steel products, raise its quality and reduce costs in all links of the logistics chain.

As for the subsystem of logistics sales management, it is a functional area for transferring finished products, sometimes including the logistics of intermediation and trade (sale) of products on the way from the manufacturer to the end consumer. It is aimed at integrated planning, management and physical processing of the flow of finished products, accompanied by the necessary information, financial and service flows from the time of transfer and acceptance of goods from production to the consumer [11, 12].

## CONCLUSION

In view of the above said, it must be noted that the results obtained in the course of the study indicate that the presented mechanism allows to create conditions conducive to obtaining positive economic results of the iron and steel enterprise activities and ensuring competitive advantages, which include: the existence of an efficient resource management system, the best supply of physical resources, real-time analysis of information about the market situation, creation of sales channels for finished products, flexible organization of logistics services, and the ability of the enterprise to arrange efficient production and sales of products.

## REFERENCES

- [1] D.J. Bowersox, D.J. Closs, *Logistical Management: The Integrated Supply Chain Process*, New York, 1996.M.R. Linder, H.E. Fearon, *Supply management and inventory management*, Logistics. Victoria Plus, 2002.
- [2] D. Waters, *Logistics: An Introduction to Supply Chain Management*, N.Y. Palgrave Macmillan, New York, 2003.

- [3] M.P. Gordon, Rynok i logistika [Market and logistics], MOSCOW Economics, 1993.
- [4] B.A. Anikin, Logistika [Logistics]: Study guide, MOSCOW INFRA-M, 1997.
- [5] V.S. Lukinskiy, V.V. Lukinskiy, N.G. Pletneva, Logistika i upravleniye tsepyami postavok [Logistics and supply chain management], MOSCOW Uright, 2016.
- [6] V.I. Sergeev, Logistika v biznese [Logistics in business], MOSCOW INFRA-M, 2001.
- [7] A.N. Gornostaeva, I.N. Gornostayeva, Strategicheskiye marketingovyye trebovaniya k protsessam logistiki [Strategic marketing requirements for logistics processes], Logistics – innovation – management: collection of abstracts of the Second International research-to-practice conference, 2012, 20-22.
- [8] B.C. Giri, B.R. Sarker, Improving performance by coordinating a supply chain with third party logistics outsourcing under production disruption, Computers & Industrial Engineering 103 (2017), 168-177
- [9] V.I. Sergeev, M.V. Dudinskaya, Analiz logisticheskikh riskov v tsepyakh postavok metallurgicheskikh kompaniy [Analysis of logistics risks in supply chains of iron and steel companies], Logistics and supply chain management 5 (2016) 76, 65-79.
- [10] Grantsov, Logistika kak faktor ekonomiki chernoy metallurgii [Logistics as an economy factor in the iron and steel industry], Ferrous metals 1 (2013) 973, 80-83.
- [11] V.D. Sekerin, M.N. Dudin, S.V. Bank, A.E. Gorohova, Y.G. Lesnykh, Vertically integrated holdings in the system of developing the national complex of iron and steel industry, Metalurgija 56 (2017) 3-4, 429-431
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