

**THE CONDITIONS FOR LOGISTICS IN THE METALLURGICAL COMPANY**

KADŁUBEK Marta

*Częstochowa University of Technology, Faculty of Management, Częstochowa, Poland, EU,  
[martakadlubek@wp.pl](mailto:martakadlubek@wp.pl)***Abstract**

The paper presents the identification and analysis of the most important conditions for logistics in the selected company, particularly, taking into account the field of procurement, production and storage, distribution and sales, transport and costs. The empirical studies covered one of the Silesian metallurgical companies. On the basis of the analysis of the literature data, the interviews carried out in the company and the examination of the enterprise internal materials, the theoretical approach of logistics in the company was transferred to its practical use in the business activity. The determinants of logistics, identified in the metallurgical company and analyzed in the paper, referred to the activities of movement and storage, which are to allow the flow of products from their destinations to the locations of the end consumption, as well as the information connected with them to provide customers with the appropriate level of service at reasonable costs. Particularly, they referred to spatial and time allocation, status and flow of goods being the subject of these processes and, therefore, people, material goods, information and financial resources. Referring to the concept of logistics as the basis, whose achievements were analyzed in different conditions of the entity management, aims at the aspect of development of the organization.

**Keywords:** Logistics, procurement, storage, distribution, transport

**1. INTRODUCTION**

The determinants of logistics in the company should be oriented towards rationally and effectively developed logistics processes. At the same time, the field of logistics in the enterprise should integrate the flow of streams of materials, information and capital to support the development of the basic activity of the business entity, while amounting to an increase in productivity.

The above objective-task indications of logistics and its determinants are pointed out by one of the most well-known definitions of the concept, developed by the Council of Supply Chain Management Professionals [1], according to which logistics is the term describing the process of planning, implementing and controlling procedures of the economically efficient and effective transportation and storage of goods including services and related information from the point of origin to the point of consumption to satisfy clients' requirements. This approach is, among others, brought up by J. Baran, M. Maciejczak, M. Pietrzak, T. Rokicki, L. Wicki [2], F.J. Beier and K. Rutkowski [3], R. Z. Farahani, S. Rezapour, L. Kardar [4], H. Stadtler, C. Kiler [5], Y. Tseng, W.L. Yue, M. Aptaylor [6], according to whom the determinants of logistics may include (though they do not have to be limited to them): customer service, information flow, control of inventory, manipulative activities, execution of orders, reparation activities and supply of spare parts, location of production plants and warehouses, procurement processes, packaging, processing of returns, waste management, transport activities and storage. This definition implies that the logistics process creates the framework of the systems in which there are taken decisions integrating transport, inventory management, warehouses, material manipulation systems, packaging and other similar activities [7].

The reference to the definition of American practitioners on a scale of the enterprise (business logistics) is, among others, introduced by I.C. Dima, J. Grabara, V. Modrak [8], I. Manuj, J.T. Mentzer [9], M. Nowicka-Skowron and M. Man [10], who conclude that logistics aims at the achievement of the optimum coordination of the flow of materials, raw materials, activities connected with their storage, manipulative activities of goods,

problems concerning packaging, storage and flow of finished goods to end customers. The authors also assign logistics the following tasks:

- to improve the management of processes of flow and storage of products, which consequently results in satisfying material needs of the participants of logistics processes,
- to submit logistics activities to the requirements of customer service,
- an increase in the effectiveness of the flow of goods leading to reduction in costs of the flow, i.e. logistics costs.

D. Kisperska-Moroń and S. Krzyżaniak [11], M. Ingaldi, S. Jursova and K. Witkowski [12], P. Myerson [13], J. Nowakowska-Grunt, D. Jelonek, H. Kościelniak [14] state that logistics, in functional terms, includes planning and creating all the processes within the system and between social systems (such as business entities, associations etc.), which serve to overcome space and time, and also to direct, regulate and control. Logistics, as a scientific discipline, deals with the explanation, description and development of these processes.

The above considerations allow for the conclusion that the perception of the logistics activity is variable, and individual authors propose varied definitions, the range and subject of logistics. Most of all, this results from the evolutionary development of this field as economic knowledge and the sphere of business activity. However, most of the discussed studies allow for the generalization that logistics is most frequently identified with the coordination of the flow of raw materials, materials for production and finished goods for consumers with the minimization of costs of this flow [15].

The aim of the paper is to identify and analyze the most significant conditions for logistics in the selected company, particularly, taking into account the areas of procurement, production and storage, distribution and sales, transport and costs. The transfer of the theoretical approaches of logistics in the enterprise to its practical use in the business activity has been presented in the paper on the example of one of the steelworks located in the Silesia region in Poland.

## **2. THE CONDITIONS FOR LOGISTICS IN THE SELECTED ENTERPRISE**

### **2.1. General information**

The steelworks has been supplying different processing and construction industries, both the domestic and foreign ones, with rolled long products for more than 100 years [16]. Its commercial offer includes the goods such as: ribbed bars, plain bars, flat bars, square bars, angles, wire rod (plain, ribbed, straightened) and billets. The assortment of bars refers to the length of 4 - 18 meters.

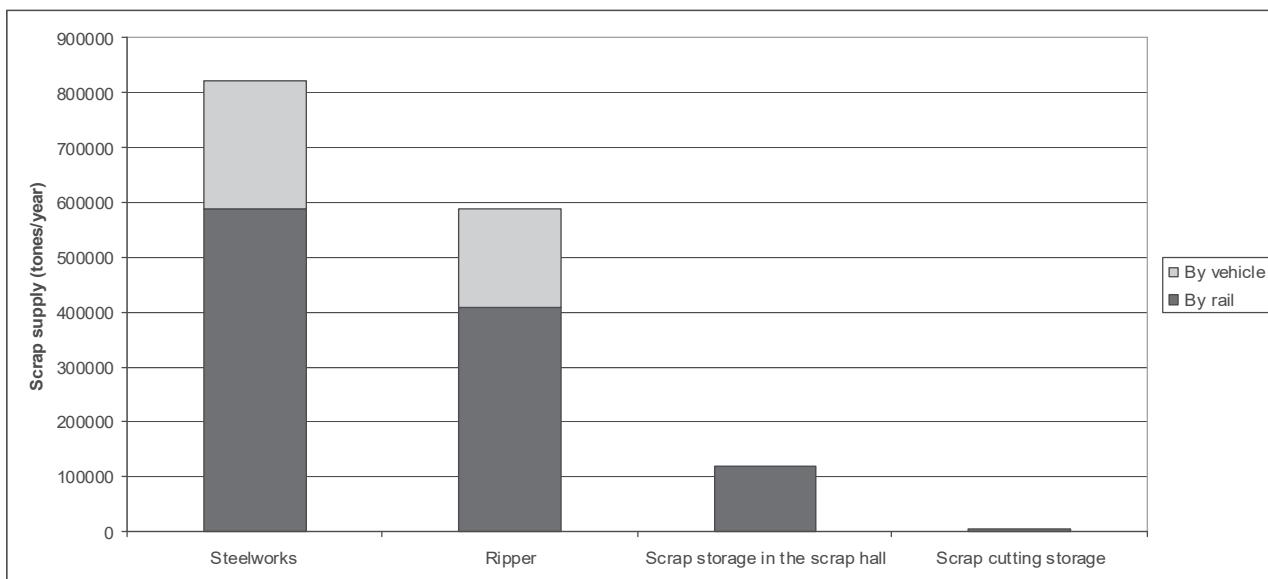
To provide the continuity of the supply of raw materials, i.e. scrap for steel production and allow clients to receive finished goods rapidly, it is essential to involve the logistics department of the steelworks, supervising the course of logistics processes. The major logistics department of the steelworks consists of: the technical warehouse, the warehouse of materials management and raw materials, the warehouse of finished products and shipment, the department of processing and scrap management, the department of rail transport and logistics, maintenance of logistics, the department of preparation and coordination and shipments, managers of maintenance of logistics.

### **2.2. Procurement**

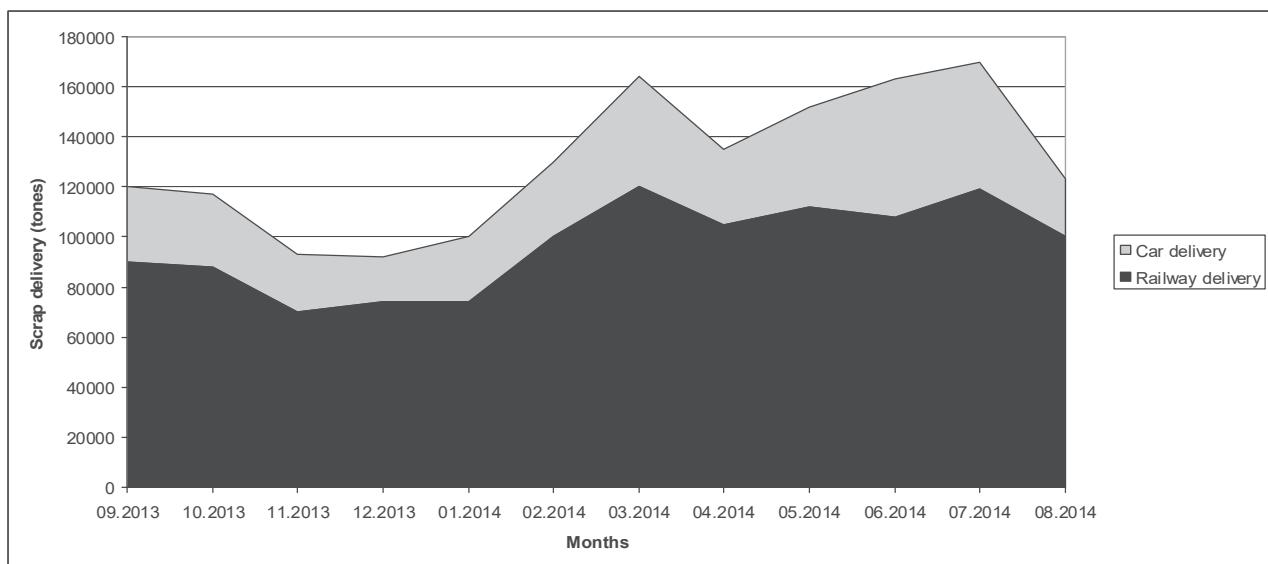
All suppliers, apart from the suppliers of scrap, i.e. mainly the ones from Poland, Ukraine and Czech Republic end up in the technical warehouse of materials management and raw materials. There are ordered and stored raw materials for production, devices, equipment, spare parts, elements and materials essential for securing cars, consignment (e.g. wooden spacers, steel strips etc.). Subsequently, the material is directed to appropriate locations for unloading, and some material remains in stock in warehouses in locations suitable for production departments. In case of production raw materials it is essential to confirm the reception from the

department in charge with the weight ticket. Then, the supply/suppliers are directed to unloading by employees. Raw materials are sent from the warehouse to the production hall via belt conveyors and dosed depending on the analysis of the specific type.

The department of processing and scrap management and the scrap purchasing department coordinate the amount of scrap essential for batch production by analyzing the inventory and the class of scrap supplied to the company. Scrap is checked, controlled with respect to radioactivity and there is specified the usability of the scrap class and storage destination. For example, batch scrap goes directly to the batch scrap of the steelworks and it is the subject to processing from there. Non-batch scrap is the subject to additional treatment (ripper, burn-through). Additionally, the department of processing and scrap management deals with all post-production scrap while collaborating with the department of the environmental protection. The average annual amount of scrap supply by vehicles and rail in such locations as: steelworks, ripper, scrap storage in the scrap hall and scrap cutting storage is presented in **Fig. 1**.



**Fig. 1** Scrap supply by vehicles and rail per location per year in tonnes



**Fig. 2** Amounts of scrap (car and railway) delivery per month in tonnes

The exemplary amounts of supplies by vehicles and rail to the steelworks in the period of September 2013 - August 2014 are illustrated in **Fig. 2**. According to the indications of the figure, as much as 73% of scrap is supplied to the company by rail.

### 2.3. Production and storage

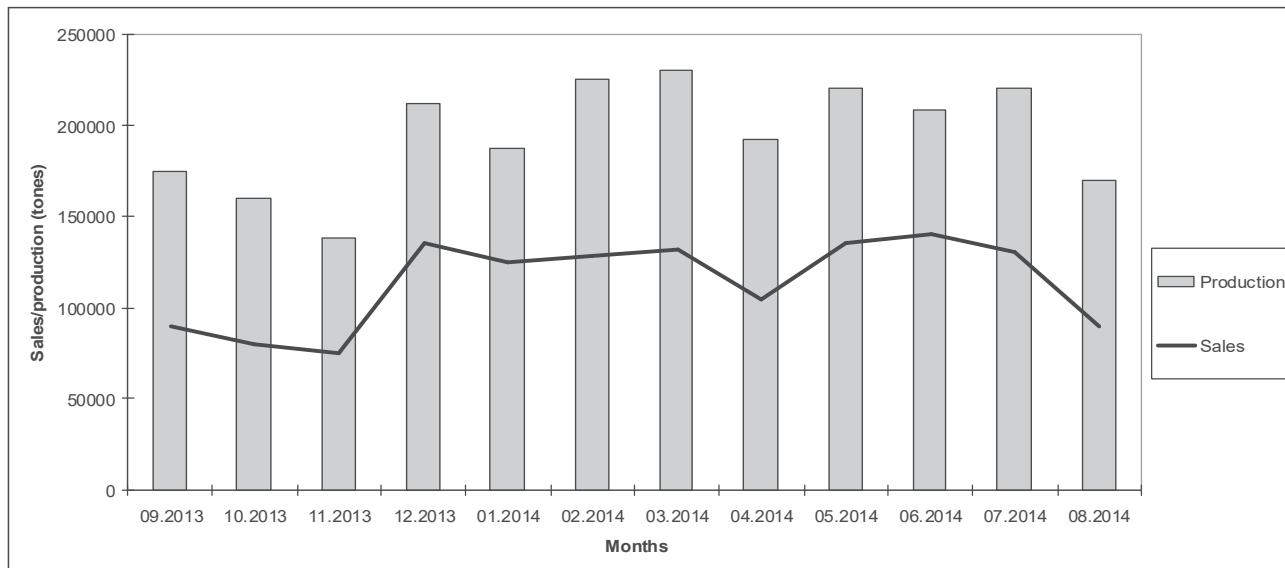
After melting steel, the intermediate product (billets) goes directly to the rolling mill storage, whereas some of it remains at the steelworks workhouse designed for shipping. Intermediate products are transported to the rolling mill by the three specialized vehicles with a payload of 70 tones. Loading takes place directly from the production grate of the steelworks.

Finished products from the rolling mill, in case of wire rod, are collected by cranes and trolleys and delivered to the storage destination. In case of bars, products are collected only by magnet cranes. The material from the bar rolling mill is transported between the halls by RC electric narrow aisle forklifts.

The material rolled and transported to the place of storage is appropriately labelled with barcodes and scanned to the IT system with the barcode reader along with the indication of the place of storage following the physical storage of the material.

The warehouse of finished products and shipment, most of all, deals with the reception and storage of all products from the three rolling mills, car and truck loading and securing cars. Products collected from the rolling mill are stored separately with respect to the size, type, length, specific recipient or quality. Products are collected with magnet cranes and, in case of wire rod, with cranes and trolleys. Before storing the material from production, the consignor plans the appropriate place for storage while being driven by the list of the current production for the specific shift. The material appropriately planned for car loading is directly loaded there and, in case of lack of cars or shipment at another time, stored in the hall or clearance gauge.

### 2.4. Distribution and sales



**Fig. 3** Production and sales of finished goods and intermediate products per month in tonnes

The instructions for shipment for the warehouse are issued by the sales department by creating sales order and, subsequently, the transport department by creating delivery notes and transport numbers. The warehouse of finished products performs loading onto a means of transport following the shipping instructions on the basis of the picking list obtained from the driver or disposer in case of cars and the instructions of the owner of the means of transport. The means of transport along with the load is weighed with checkweighing machines. If it

is within the tolerance of weight, the proof of delivery is automatically printed and the certificates for the batch of the material received. After confirming the compatibility of weights, the sales department, on the basis of the proof of delivery, issues the invoice.

Railway shipping is conducted according to the instructions attached to contracts and transferred to the foremen in the halls of the warehouse of finished goods. The shift foreman, on the basis of this information, coordinates works in the warehouse, places orders for appropriate cars and amounts. All materials to secure cars are previously provided to the warehouse.

The exemplary volumes of the production and sales of finished products and intermediate products in tones, in the period of September 2013 - August 2014, are presented in **Fig. 3**.

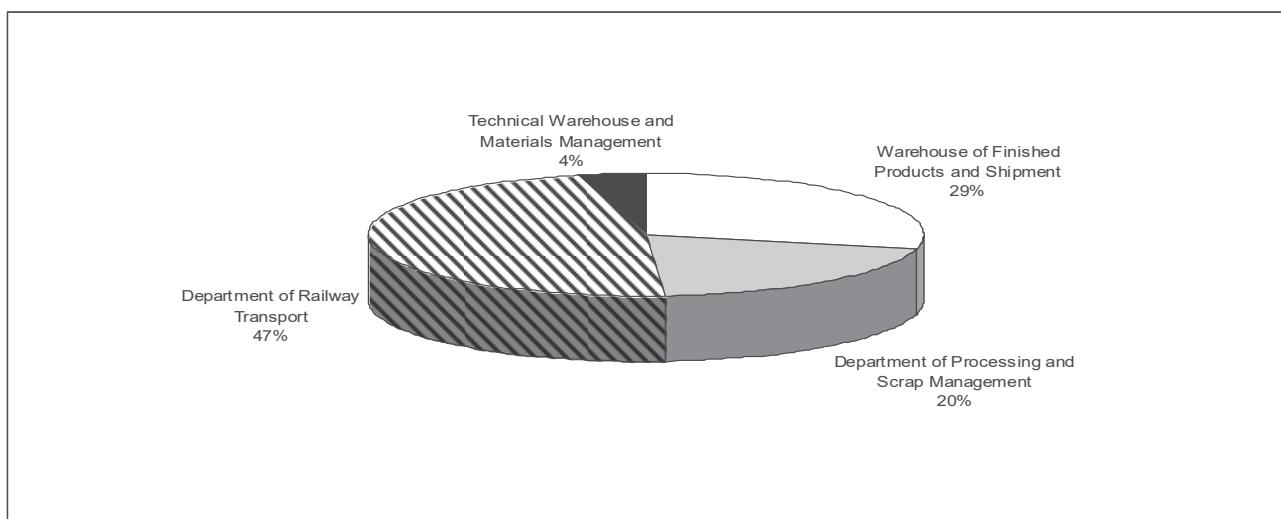
## 2.5. Transport and costs

The department of rail transport and logistics, most of all, places orders for cars from Polish Railways, logistics operators etc. in accordance with the demand reported from the department of preparation and coordination of shipment, following the instructions. Cars are checked with regard to their technical condition and all the data on the car are introduced into the system (tare, type etc.). Sorted cars wait at sidings of the plant to be placed at appropriate loading and unloading halls. Some cars, after unloading e.g. scrap, are used for loading finished products to reduce costs of ordering cars. The stoppage of cars at the plant generates higher logistics costs, therefore, they should be optimal and distributed quickly.

Maintenance of logistics deals with repairs and inspection of transport equipment (forklifts, railway cars, depot, truck scales and railroad scales etc.) as well as roads and tracks.

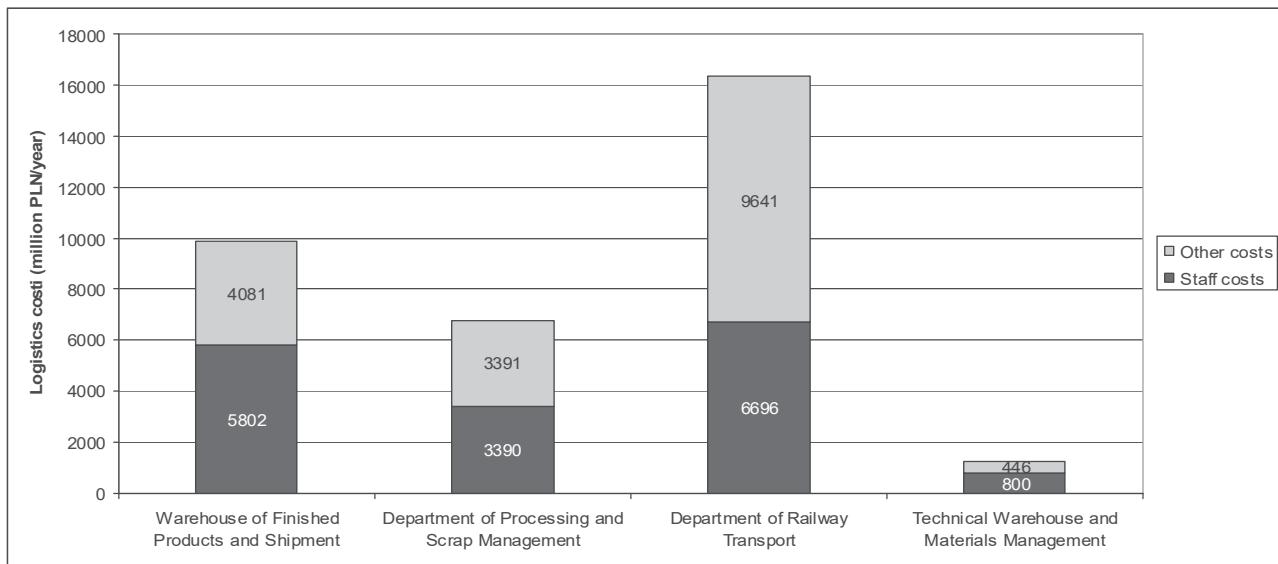
The department of preparation and coordination of shipment consults the sales and transport department, while collecting the amounts from orders and contracts for shipment, also checking the conditions of shipment, dates and shipping instructions to order appropriate cars and materials to protect goods. The department sorts out data with respect to the car type, transit through other countries, permissible axle mass, laying of the material, number of tons in a single car. Ultimately, the employees of the department send the demand along with the list of cars to the rail department.

The managers of the maintenance of logistics physically watch the efficiency and ergonomics of the transported cars in the steelworks area. They check the availability of sidings for cars in the halls and the rapidity of unloading to minimize the stay of cars in the steelworks area.



**Fig. 4** Logistics costs of the steelworks

Most costs of logistics processes developed by the steelworks, since as much as 47%, is generated by rail transport (see Fig. 4). A significant part of rail transport costs is the salaries, since they amount to 40% of the total costs of the department, however, almost the same share, since amounting to 39%, is constituted by the costs of the stay of cars in the company area. Other logistics costs of the steelworks are created, most of all, by the warehouse of finished goods, the department of processing and scrap management and the technical warehouse and the warehouse of materials management (see Fig. 5).



**Fig. 5** Distribution of logistics costs of the steelworks

### 3. CONCLUSIONS

The conditions for logistics identified in the metallurgical company and brought about in the above analysis included planning, coordination and control of the course, both in terms of time and space, of actual processes, developing the objectives adopted by the entity. Particularly, they referred to spatial and time distribution, status and the flow of goods being the subject of these processes and, therefore, people, material goods, information and funds. Creating, planning, directing and control referred to all the logistics conditions connected with the flows, which influenced the time and place of their course, mainly the areas of procurement, production and storage, distribution and sales, transport and costs.

At the same time, the identification and analysis of the most important conditions for logistics in the selected company proves that modern practical understanding of logistics processes is the integration of the streams of goods and information, the efficiency of their flow and also the costs they bring about. The analysis of logistics processes taking place in one of the Silesian steelworks, described above, also allowed for the identification of the developed basic tasks of logistics in specific conditions directed towards:

- coordination of the flow of raw materials, materials for production, finished goods and accompanying services to the consumer with the development of the processes of procurement, production, storage, distribution or transport;
- minimization of costs of logistics processes;
- submission of the logistics activity to the requirements of customer service.

### REFERENCES

- [1] [http://cscmp.org/sites/default/files/user\\_uploads/resources/downloads/glossary-2013](http://cscmp.org/sites/default/files/user_uploads/resources/downloads/glossary-2013) (access on: 06.04.2015).

- [2] BARAN J., MACIEJCZAK M., PIETRZAK M., ROKICKI T., WICKI L. Logistyka. Wybrane zagadnienia. Warszawa: Wydawnictwo SGGW, 2008.
- [3] BEIER F. J., RUTKOWSKI K. Logistyka. Warszawa: Wydawnictwo SGH, 2000.
- [4] FARAHANI R.Z., REZAPOUR S., KARDAR L. Logistics Operations and Management. Elsevier: London, 2011.
- [5] STADTLER H., KILGER C. Supply Chain Management and Advanced Planning. Springer: Berlin, 2005.
- [6] TSENG Y., YUE W.L., APTAYLOR M. The role of transportation in logistics chain. In Proceedings of the Eastern Asia Society for Transportation Studies, Vol. 5, 2005, pp. 1657 - 1672.
- [7] COYLE J.J., BARDI E.J., Langley JR.C.J. The Management of Business Logistics. USA: South-Western Publishing Company, 2009.
- [8] DIMA I.C., GRABARA J., MODRAK V. Location and Importance of Logistics in the Company's Organisational Structure. Polish Journal of Management Studies, Vol. 1, 2010, pp. 34-41.
- [9] MANUJ I., MENTZER J.T. Global supply chain risk management strategies. International Journal of Physical Distribution & Logistics Management, Vol. 38, No. 3, 2008.
- [10] NOWICKA-SKOWRON M., MAN M. Costs Related to the Functions of Company Logistics. Polish Journal of Management Studies, Vol. 1, 2010, pp. 23-33.
- [11] KISPERSKA-MORÓŃ D., KRZYŻANIAK S. Logistyka. Poznań: Wydawnictwo Biblioteka Logistyka, 2009.
- [12] INGALDI M., JURSOVA S., WITKOWSKI K. Logistic Flows of Metallurgical Aggregate Operation. In CLC'2013: Carpathian Logistic Congress. Ostrava: TANGER, 2013.
- [13] MYERSON P. Lean Supply Chain and Logistics Management. USA: McGraw-Hill Professional, 2012.
- [14] NOWAKOWSKA-GRUNT J., JELONEK D., KOŚCIELNIAK H. Logistics' Clusters as a Part of Regional Policy in Poland. In ICALT'2014: Proceedings of 3rd International Conference on Advanced Logistics and Transport. Hammamet, 2014.
- [15] KONSTANCIAK A., KARDAS E. Wybrane zagadnienia produkcji i zarządzania w przemyśle. Częstochowa: Wydawnictwo WIPiTM PCzęst., 2014.
- [16] The internal materials of analyzed company. Silesia 2015.