

supply chain; information technology;
transportation; information systems

Olga ZHURAVLEVA

Donetsk National Technical University
Ukraine, 83001, Donetsk, Artema, 58

Corresponding author. E-mail: golden_violet@mail.ru

INFORMATION TECHNOLOGY AND SYSTEMS IN TRANSPORT SUPPLY CHAINS

Summary. The article deals with the logistics processes in supply chain management, information technology in management and prospects for the use of information technology in the transportation logistics segment, with particular attention paid to the key factors in information technology that affects the efficiency of transport logistics segment, as well as conclusions are reached regarding the importance of active use of information technology in logistics.

ИНФОРМАЦИОННЫЕ ТЕХНОЛОГИИ И СИСТЕМЫ В ТРАНСПОРТНОЙ ЦЕПОЧКЕ ПОСТАВОК

Аннотация. В статье рассмотрены логистические процессы в управлении цепями поставок, информационные технологии в управлении и перспективы использования информационных технологий в транспортном сегменте логистики, особое внимание уделено рассмотрению ключевых факторов информационных технологий, влияющих на эффективность транспортного сегмента логистики, а также сделаны заключения относительно важности активного использования информационных технологий в логистике.

1. INTRODUCTION

The development of logistics in the world is fast. Every day there are more industrial and commercial enterprises, having in the governance structure of logistics services. The economy is constantly expanding the scope of application of modern logistics systems and technologies. The business is rapidly being introduced and a new management concept survives SCM - Supply Chain Management with regard to our country, only a few leading companies are paying enough attention to it, creating the first SCM-units and recruiting appropriate staff.

The importance and role of logistics in business over the past few decades have undergone significant changes. Logistics has risen to the level of a certain specific pattern in the conduct of business. With the increasing competition, individualization of markets, growth and formation of new, ever-expanding network of creation cost, logistics continues to grow and become a strategic resource that has already requires a certain level of staff and a variety of in-depth knowledge.

For the existence of a market economy, transport companies should focus on getting the single most effective economic results in the supply chain. This may contribute to a number of factors, namely formed market of transport services, competition between enterprises and various modes of transport, and others.

Thus, due to transportation, logistics of goods movement process is transformed into a single technological chain, and transportation is becoming an integral part of an integrated transport and production process.

2. TRANSPORTATION AND LOGISTICS PROCESSES IN THE SUPPLY CHAIN MANAGEMENT

Organization of transport and logistics processes within the supply chain management, based on consideration of the entire logical chain, which includes all businesses, combined with information technology tools. Advance the concept of market trends, a significant potential can be increased. The driving force is the rate of change in a certain area of the economy, including transport.

The union of all businesses in the logical chain contains information on all activities that occur within this chain, from forecasting customer needs, distribution of orders and ending with shipment. This facilitates the interaction of all the major logistical problems, namely the supply-production-distribution-transportation. The Fig. 1 below shows how the chain is using logistic information.

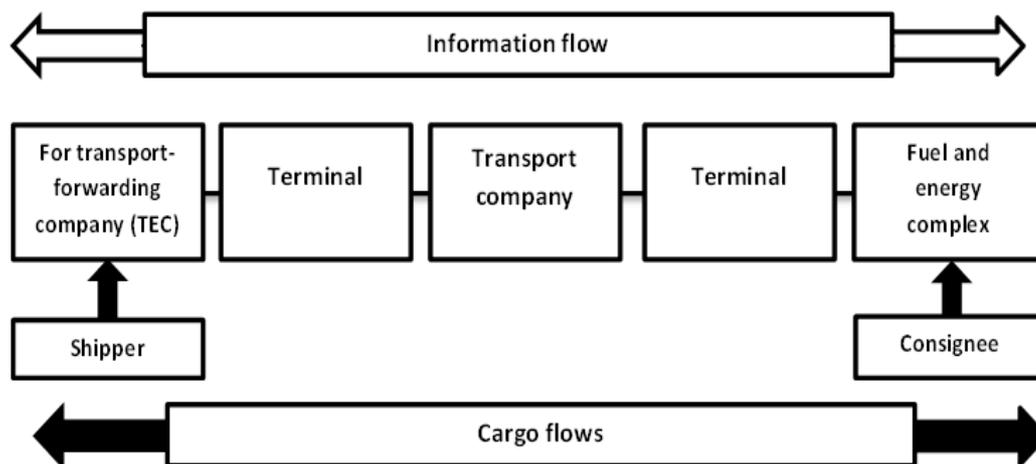


Fig. 1. Cargo and information flows in the transport chain

Рис. 1. Грузовые и информационные потоки в транспортной цепочке

During the integration of new logistics processes are formed by combining a series of operations, based on the new business organization. Integrated Logistics is a link in the chain and has a greater degree of influence on management.

The main indicator of the development of SCM is the growth of information networks. For the successful use of logistics information required to locate in the chain of communication networks, focused on logistics processes. Information and communication networks form the basis for the integration of long freight information, commodity flows. Here, for example, the use of Internet technology has a great impact on reducing delivery times. Consider the example of some company A, DLC equipment manufacturer, which could reduce the delivery time up to several days, and the replenishment time from 60 to 8 days. The use of integrated information systems can achieve significant economic benefits:

- may reduce the buffers to 20 or even 50%!
- may decrease the duration of production cycles to 50%;
- profit rises 30%, while costs are reduced by 20%.

And this is just one example of thousands of possible showing in practice the real possibilities of the enterprise by using the selected method.

3. INFORMATION TECHNOLOGY TRANSPORT SERVICES SUPPLY CHAIN

In logistics, as in principle the economy, information technologies are a major source of productivity growth and competitiveness. There are five major information of technology: information product interoperability, the elimination of intermediate links, globalization, convergence.

The introduction of modern information technology allows the user to work in a convenient and accessible information environment, which can eliminate the intermediaries. These factors are very important in the context of scientific and practical development of the transportation logistics segment, as shown in the Fig. 2 below.

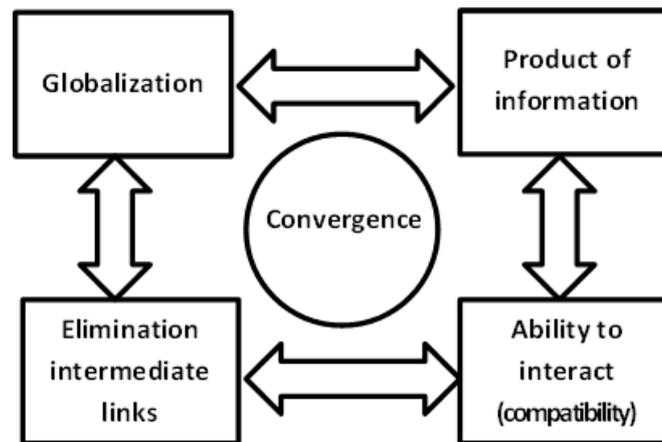


Fig. 2. Structure of the interaction of information trends

Рис. 2. Структура взаимодействия информационных тенденций

Automating processes reduces transport and logistics chain to a certain optimum level. With the improvement of internal logistics operations, the elimination of redundant links will also take place within the chain, and between its members engaged in the supply.

The latest logistics automated control systems capable of providing three Serious benefits:

- reduce costs by optimizing transport and logistics operations;
- a guarantee for fulfillment of orders supplies and transportation in the right quantity and at the right time;
- ensuring a high level of services provided.

Key factors in information technology that affect the efficiency of transport logistics segment parameters are presented in the Fig.3 below.

Electronic data interchange - is an information exchange between users, which is carried out with the help of modern telecommunications. What is the effectiveness of this concept? First and foremost, to increase productivity, reduce operating costs, and of course raising competitiveness.

With regard to communication means of communication and the Internet, they provide constant communication with vehicles on the road. The main benefits obtained from involvement and communication technologies - to improve the quality of service, namely the acceleration of the transfer of information about orders, inventory, goods and transportation.

Bar coding covers most countries and is constantly finding new applications constantly. Automated identification system has produced a revolution in the sphere of trade and transportation. Bar coding and the code reader facilitates the processes of gathering data for a certain type of product. The use of bar codes makes the process of preparing and processing orders, reduces costs, simplifies records transport, control of traffic on the road, making a more accurate inventory records, and time of storage significantly reduced, which leads to the flexibility of the system.

The main goal is to maintain an integrated logistics life cycle of the product. Information support of the product life cycle covers design, manufacture, operation and disposal. Customer satisfaction - is

the solution of one part of the task, while the other part - this is an improvement on the stages of the process to reduce production costs, maintaining the product in good condition and quality of products.

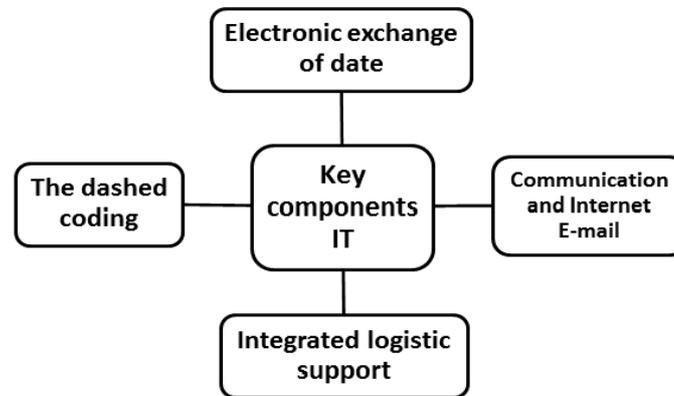


Fig. 3. Key factors in the IT segment of the transport logistics

Рис. 3. Ключевые факторы ИТ транспортного сегмента логистики

4. ADVANCED INFORMATION SYSTEMS

Modern information technologies, such as decision support systems, expert systems, and others provide the ability to effectively analyze the technical and economic projects, process modeling, preparation and presentation of results for subsequent decision-making. The use of modern information technology can improve the efficiency of cargo delivery by enabling rapid access to information about the subjects and objects of delivery.

One of the objectives of the information system Gonrand is to collect information on the availability of goods. The carrier makes an application for free freight transportation opportunities and direction. The information entered into the database. Information on the goods supplied to the system continuously. The system allows you to group shipments by senders, recipients, number of sites and gives information on the administration, the name of the consignee, the vehicle number, customer, department and the code amount of items by department.

The system is designed to Videotrans information service enterprises of transport that can get help and input information about the presence in their possession or transport of the goods for delivery.

The system provides for the CTC Freight information about the availability of goods, types of vehicles, the most efficient routes of movement, addresses of transport companies with a presence of a free rolling stock, etc. For carriers of the system provides the following information: the ability to load a cargo, the sender's address, place and time of loading, time of arrival of cargo, destination address, etc.

The system operates similarly to the BRS system STS. The shipper is not in contact with the carrier, and with the information system. The company guarantees the payment made to carriers transport, if the customer has failed to make timely payment, which increases the attractiveness of the service, thereby expanding the market reach of consumers.

The system informs the user Espace Cat parameters of the goods carried and their position in the vehicle body, presenting the data in the form of three-dimensional graphs. The system calculates the optimum parameters of the package. With its modular structure, it is quite easy to adapt to user requirements.

The system is ISCIS integrated information system serving the logistics channel. Time of delivery of messages from anywhere in the world to another is limited only by the duration of the process of reformatting the data, the time waiting for the service, and message processing is performed in real time, which is essential for suppliers and consumers, working on the system of Kanban, "on time" and etc.

The system GPS - global satellite automated system designed to determine the latitude and longitude location of the vehicle. The system is connected with artificial satellites. Each satellite continuously broadcasts time signals and the coordinates of its location. The vehicle must be equipped with a special receiver that receives signals from three satellites simultaneously, processes them and outputs the coordinates of the location in [7].

5. FUTURE USE OF INFORMATION TECHNOLOGIES IN TRANSPORT AND LOGISTICS SEGMENT

It is hard to imagine the formation and organization of the chain of delivery of goods without intensive rapid exchange of information between participants in the transport process, without the capacity for rapid response to market demand for transport services. Today, virtually impossible to provide the required customer service quality and efficiency of transport operations without the use of information systems and software tools for analysis, planning and decision-support business decisions. Moreover, thanks to the development of information systems and technologies, enabling automation of routine transactions in transport processes, logistics has become the dominant form of organization of goods movement in the technologically highly competitive market of transport services.

Characteristically, all the modern trends in the development of the transport market-oriented use of electronic forms software business operations. This is reflected in the names of new, highly advanced and efficient electronic technologies: e-mobility; e-business; e-logistics, etc. The prospects for further implementation of information systems and technologies in the transport processes are related, in particular:

- with the integration of information transport through the Internet to provide global monitoring of trans-European movement of goods;
- the development of a network of high-speed toll roads to remote forms of payment;
- the improvement of internal and external document for transport and transport-service companies;
- the formation of a virtual network of freight forwarding agencies on the Internet for very institutional processes between customers and suppliers of transport services (service self-denial);
- a solution to the problems of transport at the boundaries of downtime by actively introducing technologies "Green Custom" ("Green Customs"), based on electronic documents (EDI);
- with the integration of information goods-producing and transport-service companies with consumers on a platform of Internet technologies.

However, even a relatively simple form part of information of commercial activities that are available today, shipping companies are able to provide a substantial increase in performance [6].

6. CONCLUSIONS

Logistics is inconceivable without the active use of information technology. It is impossible to imagine the formation and organization of the chain of delivery of goods without intensive rapid exchange of information between participants in the transport process, without the capacity for rapid response to market demand for transport services.

Large enterprises, especially those related to international transportation, among the first to feel the need to introduce information technology in management of production processes. Competition in the market of transport services in connection with the emergence of many small private companies and an active exploration eastward transport by foreigners, coupled with tight fiscal policy and the rising costs of resources supplied to the transport companies need to mobilize internal resources. It became obvious that without the use of information technology and personal computers, efficient operations of transport companies are no longer possible.

Information technology in logistics has a few useful functions. First, with their help accelerate the process of receiving orders, delivery of goods. The sooner all this is happening, the less the duration of the cycle of works from the perspective of the customer, and therefore costs. Second, information technology productively impact on planning and evaluating alternatives.

The process of introducing information and computer technology now required and, moreover, is inevitable. This is due to the increasing volume of data to be processed. Conventional, traditional methods are no longer able to extract from this thread with all useful information and use it to manage the enterprise. The determining factor in the administration is the speed of data processing and obtaining the necessary information. The turnover of all the essential information influences the efficiency of the company, its financial success. In developed Western countries the cost of information is greater than the cost of energy. And these costs with a reasonable approach, given a positive result. First of all, the introduction of computer accounting and data processing significantly improves the productivity of labor in the field of workflow. Modern information technology, built using the concepts of data warehousing and data mining, are now able to provide a return of 100%.

Bibliography

1. Aldin, N. & Stare, F. Electronic commerce, marketing channels and logistics platform – wholesalers perspective. *European Journal of Operation Research*. 2003. Vol. 144. P. 270-279.
2. Flint, J.D. & Larsson, E. & Gammelgaard, B. & Mentzer, T.J. Logistics innovation: a customer value - oriented social process. *Journal of Business Logistics*. 2005. Vol. 26. No. 1. P. 113-147.
3. Chatzipanagioti, M. & Theodori, V. & Vlachos D. VMI modeling in global and electronic markets. *International Journal of Logistics Systems and Management*. 2007. Vol. 3. No. 3. P. 271-287.
4. Wanga, Y. & Pottera, A. & Naima, M. & Beevorb, D. A case study exploring drivers and implications of collaborative electronic logistics marketplaces. *Industrial Marketing Management*. 2011. Vol. 40. No. 4. P. 612-623.
5. Lewandowska, J. Innowacje technologiczne i informatyczne w logistyce. *Logistyka*. 2007. Vol. 5. P. 20-21. [In Polish]
6. Ballou, R.H. *Business Logistics Management: Planning, Organizing, and Controlling the Supply Chain*. 4th Ed. Prentice Hall. 1998.
7. Tan, A. & Kritchanhai, D. An information technology implementation framework for the logistics industry in Singapore. *International Journal of Logistics Systems and Management*. 2006. Vol. 2. No. 4. P. 371-386.
8. Rabinovich, E. & Knemeyer, A. & Mayer, C. Why do Internet commerce firms incorporate logistics service providers in their distribution channels? The role of transaction costs and network strength. *Journal of Operations Management*. 2007. Vol. 25. No. 3. P. 661-681.
9. Gutarevich, V. & Ovcharenko, A. & Zhuchenko, V. Service areas of transformation centers. *Transport Problems*. 2009. Vol. 4. No. 3. P. 53-56.

Received 05.01.2012; accepted in revised form 11.02.2013