

The value component of the surface impedance  $Z_{12}$  hardly changes in the frequency range from  $10^5$  Hz to  $10^8$  Hz. At a frequency range from 100 MHz to 180 MHz, a sharp surge to the values of 0.28-0.35. The variation in the index affects the interval of frequencies from 100 kHz to 1 GHz. Smaller index value corresponds to high values of  $Z_{12}$  and high frequencies at which an increase in the surface impedance.

The value component of the surface impedance  $|Z_{12}|$  It almost does not change in the frequency range from  $10^5$  Hz to  $10^8$  Hz (at  $B = 15 - 50$ ). At a frequency of 300 MHz in a sharp surge in values to 0.17. The variation in the index affects the interval of frequencies from 100 kHz to 1 GHz.

Smaller index value corresponds to high values of  $Z_{12}$  and high frequencies at which an increase in the surface impedance.

The impedance of the test plasma-type layer is a complex value. Thus, the analysis is reduced to the separate study of amplitude and phase characteristics of the surface impedance. In this paper, there is analysis of the amplitude characteristics of the surface impedance. Quantitative manifestations of these effects are determined by physical and geological properties of the oil and gas fields: chemical and mineralogical composition of layers, of structural and textural features of the skeleton, the nature of the porosity and permeability, the percentage of constituent substances, especially the mechanical properties of the skeleton, the amount of produced water in the pores, its mineralization and etc., so in the expressions (1) it is necessary to take into account the corrections for these characteristics.

In this paper we have determined the values of the components of the surface impedance ASPT, as has been selected hydrocarbon deposit. The propagation of electromagnetic wave pools in FM mode - signals. The analysis is conducted in the impedance-frequency range of sounding signals. Various modes of application FM modulation. The results of interaction of FM signals with the environment over HD can be used for the development of radio-engineering signal (RES) search of oil and gas and improve the performance of high-quality exploration.

The analysis of the surface impedance of the medium over HD, the magnitude of which can assess the performance of antennas that have a fixed position in space relative to the interface when you change the properties of the underlying surface, which makes it possible to quantify the properties of the medium without the need for an accurate calculation of changes in the electrodynamic parameters of the underlying surface. The results can be used to develop new methods of electromagnetic exploration and delineation of HD.

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#### OVERVIEW OF SOFTWARE FOR THE AUTOMATION OF DISTRIBUTION LOGISTICS FUNCTIONS IN RETAIL CHAINS

**ALENA HALYNSKAYA, OKSANA GOLUBEVA**  
Polotsk State University, Belarus

*The paper discusses distribution logistics systems and the results of the comparative analysis of software for logistics.*

Nowadays in a competitive environment retailers with large chain store increasingly develop among retailers. For retailer of this type a significant proportion of performance measure are related to logistics. In addition, logistics is one of the most expensive segments in the total fraction of the cost. The experience of developed

countries and leading companies shows that logistics belongs to the strategically important role in modern business. Leading global companies successfully apply in their activities logistics concepts, systems and technologies that allow them to optimize the resources associated with the management of trade and information flows. Questions of logistics, which are focused on all developed European countries, becomes relevant also for commercial enterprises in Belarus.

**About distribution logistics in retail.** Types of logistics according to the area of tasks: purchasing, transport, distribution, production, warehouse. Besides, because of the high quality requirements sale service and information logistics are dedicated. In addition to considering specific areas of logistics as independent at various stages, they must be integrated into the overall control system.

The main objective of the logistics distribution system to deliver the goods to the right place at the right time. Unlike marketing, which is engaged in identifying and stimulating demand, logistics has to satisfy the demand generated by marketing with minimal costs. Efficient supply chain in retail trade is a set of interrelated and interdependent parts of a network of manufacturers, wholesalers, vendors and retailers, which provide the supply of goods in retail outlets with high level of service, minimum cost and an established throughput in the allotted period of time with sufficient to meet consumer demand stocks.

A key element of warehouse and logistics services of retailers, in which tasks of inventory management are considered together with questions of procurement management, sales and delivery of goods, is a distribution center. Distribution centers are the main points of the logistics structures of major retail chains. On the one hand, distribution centers control the flow of goods by distributing goods between outlets. On the other hand, the second general function of distribution center is a short-term storage. The goods are delivered from manufacturers, vendors, wholesalers to the distribution center, and then distributed to retail outlets. Distribution center is not required element of the logistics system of retailers. However, for large retailers there is a number of reasons for which the use of the distribution center is economically profitably.

Efficient material flows management has to provide continuity of the flows, i.e. retailers should provide a continuous supply of goods at retail outlets with minimal costs. Use distribution center allow to reduce dependence on suppliers, to neutralize the effects of fluctuations in demand. When distribution center is used, control of suppliers is carried out more efficiently, and provide an uninterrupted supply of goods to stores. In addition, often with large orders manufacturers make bulk discount. Cost reduction can further be achieved by reducing the required number of staff for the whole retail network, reducing costs for warehousing services. Product quality control is centralized and, consequently, more effectively.

One of the key processes at distribution center is the process of picking orders for the retail outlets. It is necessary to provide the highest quality of consumer demand satisfaction with minimal costs. Tasks distribution logistics are complex tasks, the solution of which requires a clear idea of business processes and the analysis of a variety of factors. Automation system improves the efficiency of the distribution center (5-30%) and reduce overall costs. Automation makes all process transparent, which in turn leads to increased control. The implementation of automation system reduces logistics costs, greatly enhanced business efficiency, which leads to increased competitiveness on the market.

**Compare of software for logistics.** Nowadays the market of software for logistics solutions in the Republic of Belarus and the CIS is developing. Warehouse management systems and transport management systems are the most widely used. Complex solutions are presented in the form of ERP-systems (Enterprise Resource Planning), most of which is the development of Western European companies and US companies. For a brief comparative analysis of information systems in logistics selected the following software solutions market in the Republic of Belarus and Russia, which is ERP-systems:

- IBM complex software solutions for supply chain management;
- Oracle software solutions for supply chain management;
- Roadnet Transportation Suite - a suite of software products aimed at optimizing the transport logistics trade;
- Software for logistics companies "First BIT";
- SAP solutions for supply chain management;
- DNA evolutions - on-line services for a variety of optimization problems in transport planning;
- JDA - a software solution aimed at business transformation of the supply chain. The object of planning is the supply chain based on demand management, including point of sale, intermediate warehouses, distribution centers, manufacturing facilities, suppliers;
- Axapta Retail - a system designed to automate the management of large enterprises and medium-sized businesses related to the system of class ERP II;
- Epicor industrial complex ERP-systems, based on service-oriented architecture and web-services.

The results of the comparative analysis of software according to provision of logistics types are shown in the table.

## The results of the comparative analysis of software

Logistic types	Software							
	IBM	Roadnet Transportation Suite	DNA evolutions	JDA	Axapta Retail	Epicor	SAP	Oracle
Purchasing	+			+	+	+	+	+
Production	+					+	+	+
Distribution				+	+	+	+	+
Warehouse	+			+	+	+	+	+
Transport	+	+	+	+			+	+

As follows from the table below, the distribution and production logistics are the least automated areas. At the same time for production logistics there are specialized solutions that are optimized for a specific type of production. Most of the research focused on the automation of processes (via the formation of databases and continuous updating of information). Based automation solutions reduce the time and simplify the processing of the information to provide its easy storage and retrieval of the necessary data at any time.

Automation is a necessary condition for the transition to the next stage of the process control companies - optimization based on the use of special methods. Using optimization methods enables the formation of solutions not only in the current situation, but in a variety of scenarios, provides flexible scheduling, the ability to quickly make the right decisions in a changing environment.

**Conclusion.** The reduction of all types of costs associated with the management of material flows, the cost of transportation, warehousing, order management, purchasing and inventory management, packaging, reduction of logistics risks allow the company to free up funds for additional investments in new production technologies and equipment, storage facilities, information and computer system, advertising, market research, etc. Optimal logistics solutions can be prepared by management of the company, not only by the criterion of minimum total cost, but also on key business factors as the time of execution of the order and the quality of customer service.

Nowadays on the software market in the Republic of Belarus there are warehouse and transport management systems. But there are just several solutions which provide function of planning distribution of goods and this software is very expensive. However, there is a need for such software in order to optimize distribution logistics processes in trade.

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SIMULATION OF ELECTROMAGNETIC WAVES INTERACTION  
WITH HYDROCARBON DEPOSITSYAHOR ADAMOVSKIY, VICTOR YANUSHKEVICH  
Polotsk State University, Belarus

*Examines the process of interaction of electromagnetic wave with the electrodynamic model of the environment of hydrocarbon deposits on the basis of the existing theory of the interaction of electromagnetic wave and plasma environments.*