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DEVELOPMENT AND USE OF IT SOLUTIONS IN LOGISTICS

Abstract. Continuous movement to perfection requires constant control and improvement of management decisions in the enterprise. Achieving the outlined goals and objectives is possible on the basis of IT technology for logistics needs. IT companies (360data, Alpega, C3 Solutions, CyberLogitec, Data2Logistics, etc.) focus on solving both individual and complex tasks (Load planning, optimization, purchases, speed and rates, reverse logistics, routing and planning, system transport management, etc.) logistics companies. This allows us to implement and operate IT solutions in the areas of supply chain, logistics, vertical specialization, base cost, third-party logistics and additional solutions. Today, the issues of improving the efficiency of logistics processes require active action on the part of company management, so their competitiveness primarily depends on the timeliness of responding to global trends and challenges in the field of IT technologies. According to research, IT developers focus most on solving the problems of transport service providers - they account for more than 90% of all surveyed. It should also be noted that more than 80% of IT solutions in vertical specialization are concentrated in the field of agriculture in production, transportation and wholesale trade. Despite these achievements, less than 40% of companies use technology to control theproductive efficiency of supply chains. Due to the increasing difficulty of shippers sending goods to customers, many companies turn to the so-called 3PLs (third-party logistics). Studies have shown that more than 80% of all shippers use 3PLs, which helps them improve the quality of customer service. Among the companies that implement and use the achievements of IT technologies in their logistics activities, we can highlight Maersk, Schneider, Lufthansa Cargo, SAS Cargo Group A / S, AsstrA and others. These IT solutions have enabled such companies to more effectively control and coordinate the delivery of goods, integrate the interfaces of the shipper and the customer into a single network, optimize the work of their own departments, reduce logistics costs and so on. This is also confirmed by the fact that more than 60% of all senior executives involved in the operation of transport in enterprises have experienced significant positive changes in the global transformations.

Keywords: innovations, IT technologies for logistics needs, IT solutions, logistics companies, logistics services.

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РОЗВИТОК І ВИКОРИСТАННЯ ІТ-РІШЕНЬ У ЛОГІСТИЦІ

Анотація. Безперервний рух до досконалості вимагає постійного контролю і вдосконалення управлінських рішень на підприємстві. Досягти окресленої мети і завдань можливо на основі ІТ-технології для потреб логістики. ІТ-компанії (360data, Alpega, C3 Solutions, CyberLogitec, Data2Logistics та ін.) зосереджують свою увагу на вирішенні як окремих, так і комплексних завдань (планування завантаження, оптимізація, закупівлі, швидкість та ставки, зворотна логістика, маршрутизація і планування, система управління транспортом тощо) логістичних підприємств. Це дає змогу впроваджувати та експлуатувати ІТ-рішення в області ланцюгів поставок, логістики, вертикальної спеціалізації, базової вартості, сторонньої логістики та додаткових рішень. На сьогодні питання підвищення ефективності логістичних процесів вимагають активних дій з боку керівництва компаній, тому їхня конкурентоспроможність, передусім, залежить від своєчасності реагувати на глобальні тренди і виклики в області ІТ-технологій. ІТ-розробники, як засвідчили дослідження, найбільше концентрують свою увагу на розв'язанні проблем постачальників транспортних послуг — на них надає понад 90 % усіх респондентів. Також потрібно відмітити, що понад 80 % ІТ-рішень у вертикальній спеціалізації зосереджено в галузі сільського господарства щодо виробництва, транспортування та гуртової торгівлі. Попри зазначені досягнення, менше ніж 40 % компаній використовують технологію для контролю продуктивності ланцюгів поставок. У зв'язку зі зростанням складності відправлення вантажовідправниками вантажів клієнтам, багато компаній звертаються до допомоги так званої 3PLs (third-partylogistics). Проведені дослідження показали, що понад 80 % усіх вантажовідправників використовують 3PLs, що допомагає їм підвищити якість обслуговування клієнтів. Серед компаній, які впроваджують і використовують досягнення ІТ-технологій у своїй логістичній діяльності, можна виділити Maersk, Schneider, LufthansaCargo, SAS CargoGroup A/S, AsstrA та ін. Зазначені ІТ-рішення дали таким компаніям можливість більш ефективно контролювати і координувати доставку вантажів, інтегрувати інтерфейси вантажовідправника та клієнта в єдину мережу, оптимізувати роботу власних підрозділів, знизити логістичні витрати тощо. Це також підтверджується й тим фактом, що понад 60 % усіх старших керівників, які причетні до роботи транспорту на підприємствах, відчули суттєві позитивні зміни глобальних перетворень.

Ключові слова: інновації, ІТ-технології для потреб логістики, ІТ-рішення, логістичні компанії, логістичні послуги.

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Introduction. IT technologies have become widespread in various sectors of the economy, including transport and logistics. The introduction of IT solutions in the logistics of companies allows to gain tangible advantages over competitors in the market. First of all, all processes are accelerated (responding to emerging problems, round-the-clock customer support, etc.), coordination and control of all logistics functions are increasing. IT solutions help to solve customer problems, create long-term business relationships, improve the image of logistics companies, etc., which is relevant in today's turbulent environment.

Analysis of research and problem statement. Logistics issues are relevant and are studied by both national and foreign researchers. Among the issues of concern for the scientific community are the implementation and operation of innovative IT solutions in the logistics development. Thus, in their study Chukurna O. R. and others [1; 2; 18; 19; 20] consider the main directions of innovative development of transport logistics and warehousing logistics on the basis of e-commerce solutions, the latter being one of the main features of the 4 industrial revolution; Witkowski W., Huk K. and Perzyńska A. [3] propose to implement IT innovations in logistics; Douglas M. [4; 5; 21] summarizes that IT solutions in logistics are most in-demand to ensure effective integration of manufacturers and customers; Duester R. [6] states that the higher the cost of implementing IT solutions, the less visible they are; Nitsenko V. and others [8] propose to use methods of economic and mathematical modeling and analysis of various factors in order to reduce the level of riskiness of IT solutions; Wiggins J. P. [9] recommends developing a transport management system (TMS) that will help solve many problems within the company and provide competitive advantages, and so on.

Unsolved aspects of the problem. Due to the turbulent development of the IT solutions market, additional research is needed on the trends in the development, implementation and operation of logistics companies.

The purpose of the article. To study the main trends in the development of IT solutions in the innovation market for the needs of logistics and their effectiveness in logistics companies.

Research results. Surveys conducted in 2019 showed that 93% of all IT solution developers provide services to transport service providers against 87% in 2018 [4]. An interesting fact is that vertical specialization in logistics services is the most common in agriculture, accounting for 85% of all IT solutions for production, transportation and wholesale trade. The lowest level of IT solutions is observed in energy (37%) and related industries — oil and gas (45%) [5]. At the same time, the Business Continuity Institute's Supply Chain Resilience Report 2019 shows that only 37% of companies use technology to monitor supply chain productive efficiency[6]. That is, fruitful work is required to improve the company's image, reduce financial costs and so on.

IT solutions in logistics provide the implementation of various services, such as: supply chain solutions (demand management, product life cycle management, etc.), logistics solutions (inventory management, optimization, purchase etc.), vertical specialization (by type of economic activity), platform (Cloud, SaaS, etc.); base cost (free of charge (price is based on other variables), transactional (subscription), etc.); servicing of other economic activities (production, retail, etc.) and additional (related) solutions (Blockchain, asset management, Big Data management, etc.).

Here are examples and a brief description of well-known companies engaged in the above IT solutions (*Table 1*).

In [8—11] the information support of cargo delivery as a subsystem of logistics is considered. This component can significantly reduce the cost of basic logistics services, which has been studied specifying the main factors of influence.

The implementation of TMS is proposed for use to ensure the implementation of the order through the customer system and to implement their solution in the most efficient and cost-effective way [12].

The process of sending goods from shippers to customers is constantly becoming more complicated, so many of the former turn to 3PLs (third-party logistics). More than four out of five shippers who responded to the 2018 Penn State and Penske Logistics 3PLs survey noted that 3PLs help them improve customer service [13].

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Table 1

Characteristics of companies providing IT solutions for logistics needs

Name of the company	Platform	Pricing	Industries Served	Supply Chain Solutions	Logistics Solutions	Additional Solutions
360data	Cloud / SaaS / Hosted	Transactional	E-Commerce, Manufacturing, Wholesale, Services / Government, Transportation	-	TMS	EDI Integration
Alpega	Cloud / SaaS / Hosted	Transactional	Manufacturing, Retail, Wholesale	-	Load Planning, Optimization, Procurement, Rate & Bid, Reverse Logistics, Routing & Scheduling, TMS	Capacity, Order Management, Process Improvement, Strategic Sourcing
C3 Solutions	Cloud / SaaS / Hosted	Transactional	E-Commerce, Manufacturing, Retail, Wholesale, Transportation	Dock Scheduling and Yard Management Systems	Dock Capacity Planning, Routing & Scheduling	IoT / IIoT
CyberLogitec	Cloud/ SaaS/ Hosted	Transactional	Manufacturing, Services/ Government, Transportation	GTM, Security	Optimization, Routing & Scheduling, WMS, Wireless / Mobile	Freight Forwarding, Liner Management, Terminal Operating System
Data2Logistic	Cloud / SaaS / Hosted	Transactional, Seat/User	E-Commerce, Manufacturing, Retail, Wholesale, Services / Government	Modeling / Forecasting / Predictive Analytics, Security, Supply Chain Control Tower	Auditing / Claims / Freight Payment, Procurement, Rate & Bid	Big Data Management, Process Improvement, Strategic Sourcing

TMS — Transportation Management System; GTM — Global Trade Management.
Source: based on [7].

Among the companies that are the flagships of the implementation and use of logistics IT solutions are well-known global companies: Maersk, Schneider, Lufthansa Cargo, SAS Cargo Group A/S, AsstrA and others (*Table 2*).

Table 2

Practical aspects of innovative IT solutions in logistics companies

Name of the company	**Implemented IT solutions**
Maersk	Updated the existing virtual assistant Captain Peter and provided efficient remote container management in the combined fleet of Maersk and Hamburg Süd. The implemented solution makes it more convenient to monitor various parameters (eg temperature) in the middle of the container. Constant improvement of cloud technologies made it possible to increase the speed, adjust the information to the needs of each individual client.
Lufthansa Cargo	Increased sales through the digital channel. To achieve a higher result, the company used the mechanism of dynamic spot prices, ie immediate booking. The company plans to implement this IT solution in all its branches by the end of 2020.
Schneider	Launched a new tool that makes it possible to book cargo in real time for third-party operators. The implemented IT solution allowed to reduce the time spent on logistics operations, streamline all processes and eliminate time-consuming operations to establish a connection between the operator and the broker.
SAS Cargo Group A/S	A new e-booking tool has been launched from Scandinavian Airlines' cargo and logistics department. The customer using the Internet can use direct tariffs, which is provided by the available bandwidth on WebCargo. The latter is a platform for automating tariff management and back-office operations.

Table 2 (*continued*)

Name of the company	Implemented IT solutions
AsstrA	Implemented the following IT solutions: EDI solutions for integration with customers. Providing information about shipment to the client; Track & Trace solution is designed to track cargo in real time by using GPS navigation or the company's mobile application. AsstrA constantly automates and improves its processes based on OTM (Oracle Transportation Management). CRM and ECM solutions are being actively developed. In addition, management decisions, analysis of work is carried out through a customized Business intelligence-system, abbreviated BI, in which all information is consolidated.

Source: based on [14; 15].

The implementation of IT solutions provides increased efficiency of individual units and the company as a whole. There is a gradual decrease in administrative, operating and other costs within the enterprise [16].

A recent study by Forbes Insights [17], which surveyed more than 400 senior executives directly involved in transportation, found that 35% did not experience significant changes in global transformation, while 65% did the opposite.

Thus, IT technologies provide a high degree of efficiency of implemented innovative solutions in logistics companies, namely:

— reduction of time for information processing, integration of separate client bases and bases of shippers;

— high degree of automation of logistics processes;

— control and coordination of all logistics operations (chains) within the enterprise;

— reduction of administrative, operational and other costs;

— optimization, coordination and control of cargo movement, etc.

Conclusion. IT technologies give a powerful impulse to the development of logistics. Currently, IT developers offer a wide range of solutions for logistics companies (supply chains, logistics solutions, vertical specialization, base cost, service of other economic activities, additional (related) solutions). It should be noted that the largest share (93%) of all IT solution developers are transport service providers. Among the owners of logistics companies, more than 60% do not use technology to control the productive efficiency of supply chains, which has a negative impact on their image and costs. At the same time, the experience of the world's leading companies (Maersk, Schneider, Lufthansa Cargo, SAS Cargo Group A/S, AsstrA) shows the high effectiveness of the implemented IT solutions in logistics. As a result, there is a significant reduction in total costs of enterprises, increasing the degree of control, coordination and preservation of goods and logistics processes, the integration of interfaces of transportation carriers and customers into a single network.

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