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***Boldyrieva L.M.**, Doctor of Economics, Associate Professor, Associate Professor of the Management and Logistics Department, ORCID 0000-0002-9147-5524, e-mail: boldyrewaljuda@ukr.net*  
***Chaikina A.O.**, PhD in Economics, Senior Lecturer of the Management and Logistics Department, ORCID 0000-0003-3821-2079, e-mail: alinachaikina@ukr.net*  
*National University «Yuri Kondratyuk Poltava Polytechnic»*

## LOGISTIC INNOVATIONS IN THE SYSTEM OF INNOVATIVE MANAGEMENT

**Abstract.** *Improvement of consumer logistics services, combination of EDI and bar coding, CTP scheduled notification system, radio frequency identification, planning systems MRPII, CSRR, JIT, KANBAN, OPT, ERP, DRP, OR, VMI was offered in the article. Use of packaging systems with regard to the communicative role of packaging was investigated. Application of backflow logistics involved in waste management, container use and other reusable packaging were studied by authors. It was suggested to use such methods of logistics management as outsourcing of logistics services, benchmarking in logistics, supplier associations, and corporate shipment. Creation of enterprises with manufacturers of material and technical resources that use FMEA reliability assurance system was characterized. Processing of cargo through the use of AS/RS (“automated warehouse”) and WMS warehouse management systems were studied.*

**Keywords:** *logistics, management, logistics innovation, technology, innovation development, enterprise.*

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***Болдирєва Л.М.** доктор економічних наук, доцент, доцент кафедри менеджменту і логістики ORCID 0000-0002-9147-5524, e-mail: boldyrewaljuda@ukr.net*  
***Чайкіна А.О.**, кандидат економічних наук, доцент кафедри менеджменту і логістики ORCID 0000-0003-3821-2079, e-mail: alinachaikina@ukr.net*  
*Національний університет «Полтавська політехніка імені Юрія Кондратюка»*

## ЛОГІСТИЧНІ ІННОВАЦІЇ В СИСТЕМІ ІННОВАЦІЙНОГО УПРАВЛІННЯ

**Анотація.** *Запропоновано удосконалення логістичного обслуговування споживачів, поєднання системи EDI та штрих-кодування, система повідомлень про заплановані замовлення CTP, системи радіочастотної ідентифікації, системи планування MRPII, CSRR, JIT, KANBAN, OPT, ERP, DRP, OR, VMI. Досліджено використання пакувальних систем з урахуванням комунікативної ролі упаковки. Вивчено застосування логістики зворотніх потоків, що займається утилізацією відходів, використання контейнерів та іншої тари багаторазового використання. Запропоновано використання таких методів логістичного менеджменту як аутсорсинг логістичних послуг, бенчмаркінг в логістиці, асоціації постачальників, корпоративне вантажовідправлення. Охарактеризовано створення підприємств з виробниками матеріально-технічних ресурсів, які застосовують систему забезпечення надійності FMEA.*

*Вивчено вантажопереробку шляхом застосування автоматизованих транспортно-складських систем AS/RS («автоматизований склад») і систем управління складами WMS.*

**Ключові слова:** логістика, менеджмент, логістичні інновації, технології, інноваційний розвиток, підприємство.

**Introduction.** The relevance of scientific research is inextricably linked to the need for new approaches to managing financial and economic activity of domestic enterprises in modern market relations. At present, all domestic enterprises are actively focused on logistics innovations. Logistics can therefore, to a certain extent, become a versatile optimization tool for business use.

Analysis of logistic activity of domestic enterprises shows that there is a certain gap between domestic and abroad approaches in the logistic development, presence of unused reserves in the introduction of logistics innovations. The issue of innovation in logistics is in the field of view of researchers that involved in logistics. There is one of the few spheres of economy in every country that needs innovative development – transport and communications, another infrastructure that ensures smooth movement of goods, capital, information, people, services. Another reason for actualization of innovative development in this area is increase of megatrends, which characterize rapid growth of material, information, financial and human flows parameters. The same megatrends triggered an accelerated diffusion of knowledge in logistics, a new field of economic science.

An analysis of literature indicates that problematic issues of innovation and logistics of goods were covered in their publications by N. Chukhray and R. Patora [1]; strategic logistics management was investigated by foreign scientists Stoke J. and Lambert Douglas M. [2]; D. Ferney, M. Vesta, and L. Sparks [3]; Johnson James, Wood Donald F., Wardlow Daniel L., Murphy-Jr. Paul R. [4]. A. Yelizyeva, R. Artiukh, E. Persiyanova researched programs and projects of transport infrastructure development with allocation of logistics system. Authors attempted to develop a systematic representation of the process of logistic transport system development, taking into account goals of the program of transport infrastructure development [8]. Scientists such as Bushuyev S., Bushuiev D. and Kozyr B. have been engaged in scientific research of economic and mathematical models of transport system development [9]. Kosenko V. explored principles of sustainable development. Their studies allowed us group them into four categories: Social, Economic, Financial, Ecological [10].

The main purpose of the research is to identify, substantiate and further develop practical recommendations for logistics innovation use in the innovation management system.

**Methods.** Theoretical and methodological basis of scientific research is dialectical method of scientific cognition, systematic approach to the study of economic phenomena, position of modern economic theory, scientific works of domestic and foreign scientists engaged in logistical innovations in the system of innovative management. Scientific research is based on the use of general scientific methods of research: theoretical generalization, system analysis and synthesis; logical-historical method; systematic approach; terminological analysis; abstraction and formalization.

Information technology is widely used for warehousing and storage. In particular, Porsche (Germany) [1, p. 9-10; 2, p. 396] uses warehouse management systems (WMS) software to enable distribution center to obtain more accurate information about spare parts stored in warehouses, reduce amount of paper media and maintain documentation time. The company has also installed a Radio Frequency Identification System (RFID) that provides real-time inventory control. Combination of WMS and RFID systems has made it possible to speed up processing of information about incoming parts. As a result, bandwidth of warehouses increased by 17%. Practice of using WMS system shows that the payback period does not exceed 1.5-2 years.

Recently, logistics of return flows involved in the treatment of returned goods and disposal of waste have attracted attention. Yes, the NKL cooperative (Norway) [2, p. 24], which produces food, uses 1.5 million reusable fruit and vegetable containers to reduce costs and speed orders, delivering 14,000 tonnes (70% of all Norwegian fruit and vegetables). At the same time, cooperative has achieved an increase in the level of loading of its railway transport from 50% to 60%, as a result of

which it has reduced the cost of transportation, energy consumption, pollution of the environment.

Foreign firms widely use of the MRP system (Resource Need Planning) [3, p. 307-313] computerized product-oriented reception that aims to minimize inventory and adhere to delivery schedules. The American Society for Production and Inventory Control defines resource planning as “a system formed around resource planning, and one that includes additional scheduling functions: production scheduling, drawing up the main production schedule, and capacity planning.

Advanced Version (MRP II) [3, p. 314-316] is more widely used than MRP, since it can be used not only for the planning of material resources, but also for labor and financial resources, production equipment. The next step in development (after MRP and MRP II) is the ERP (Enterprise Resource Planning) system, which is defined as “a business management system that, with the support of multimodal application software, integrates all divisions of individual functional areas of the enterprise”. Use of the ERP system allows for: faster inventory rotation and reduction in inventory costs by 10-40%; quality customer service, increasing level of order fulfillment to 80-90%; higher inventory accuracy (up to 90%) with reducing physical inventory checks; shorter system debugging time (25-80%); higher quality of operations; timely revenue generation and cash flow increasing.

Considering issues of the Resource Planning System (ERP) implementation, Mark West and Lee Sparks [4, p. 242] draw attention to the following dangers: underestimation of change management importance; selecting a software product before determine business process; promises to provide an ERP package “tailor-made for your business”; insufficient funding for specialist training; choice of “big bang” technique (with company-wide coverage); limited time to choose a supplier; attempt to save existing systems; fragmented development at the individual unit level; apathy (or “it's not my job” attitude) by top executives; use of the new ERP system while maintaining previous forms of management reporting; belief in the perspective of “open systems” of ERP interfaces; assumption that enterprise resource planning is a project of limited duration.

DRP (Distribution Requirements Planning) system [3, p. 317] is inventory control and scheduling techniques that apply principles of MRP to inventory distribution, method of replenishing inventory in a multi-gallon business setting. A further development of the ERP / MRP II approaches has become the CSR system (resource planning, synchronized with the consumer), also called the integrated product lifecycle support system, offered by Symix.

A just-in-time (JIT) procurement system developed in Japan [3, p. 320] is regarded as a stock control philosophy, purpose of which is to maintain a sufficient volume of materials in the right place and at all times necessary to produce required amount of product.

One of the first attempts to put the JIT concept into practice was developed by Toyota Motors the KANBAN system, which is a “haulage logistics system”. This system was introduced by the corporation at the Takahama plant (Nagoya, Japan). The essence of the KANBAN system is that all production units of plant are supplied with material resources only in such amount and to specific time required to fulfill customer unit order.

Created in Israel [3, p. 325] optimized production technology (JIT) is aimed at minimizing material inventories and work in progress, reducing production component of order execution time, especially with streaming and batch production methods.

At the end of the twentieth century, gets application logistics technology Lean production (“slender / flat production”), whose essence is creative combination of high quality, small size of production batches, low inventory levels, highly skilled personnel, and flexible equipment. At this time, various variants of DDT (Demand-Oriented Logistics) systems, including ESR, QR and VMI, have become widely available in logistics distribution. The ESR system (effective response to the consumer) is, to a certain extent, equivalent of a JIT system adapted to meet consumer needs. The ESR system is linked by a QR (rapid response) system based on the use of computer-aided automated technology for identification of goods for everyday business transactions related to the movement of goods by manufacturing and retail firms.

If ESR and QR systems are used in the trade of groceries and other consumer goods, the CPR

(Continuous Replenishment Planning) system is used in the service. Kendall Healthcare Products [5, p. 91] has successfully applied this system to hospital supply.

VMI (seller-managed inventory) [3, p. 326] is a type of JIT in which decision to replenish inventory is made centrally by manufacturers or distributors from top links of the chain. In our view, it is advisable include to management innovations applied in logistics, such as outsourcing, benchmarking, suppliers associations, cooperatives of shippers. Outsourcing is strategic use of external resources to solve problems traditionally provided by internal company resources [3, p. 375]. It is a management strategy whereby non-key functions of the company are assigned to an outside (third) party, which is a specialized as professional service provider. In particular, Lucent Technologies [6, p. 30], which owned most of its manufacturing plants, after defeating in the market, transferred all plants to outsource. This innovation, as well as strategic partnership with suppliers, has resulted in almost 20% reduction in the cost of production.

In the field of logistics, outsourcing can also be used for transportation management, and information technology. Polish Researchers [7, p. 138] note that outsourcing of warehouse services is increasingly used in developed countries. The largest European market for logistics services is Germany (28% pan-European), followed by France (20%) and the United Kingdom (17%). Thus, in the UK, almost 40% of logistics operations are contracted.

In Ukraine, outsourcing of logistics services is developing not so actively, which is explained by following reasons: non-compliance with undertaken obligations regarding the level of service; lack of strategic vision in management staff; difficulty in achieving cost reductions; increase in prices after establishment of cooperation; reducing ability to influence and control functions delegated to the service provider; lack of knowledge-based advisory opportunities, etc.

Suppliers associations are a group of critical subcontractors to the company, mutually beneficial relationships that work on a regular basis of coordination and co-operation, and provide mutual assistance to benefit from co-operation on the basis of Japanese manufacturing principles such as Kaizen, Just-In-Time, U-cell-production. This definition was later expanded to include a regular, collaborative group of companies created to openly and productively share knowledge and experience. Major Japanese manufacturing companies, such as Toyota, with the help of the Association of Suppliers facilitated development of contractors, coordination of their activities to disseminate best practices, provide technical assistance, use training when needed.

**Conclusions.** Conducted analysis shows that it is necessary to ensure higher rates of research (scientific, research and development works) on the creation of new logistics technologies and logistical facilities in comparison with pace of innovation development by industry; the latter should accordingly exceed pace of their practical implementation in the production and commercial activity of enterprises. Generalization of foreign experience in the field of logistics allows us to distinguish the following areas of logistics infrastructure development:

- 1) improving consumer logistics through the use of modern methods of forecasting food demand;
- 2) effective management of raw material and product stocks for which can be used: CFAR online replenishment protocol; EDI electronic data exchange system; a combination of EDI and bar coding; CTP Order Notification System; radio frequency identification systems; MRPI, CSRR, JIT, KANBAN, OPT, ERP, DRP, OR, VMI planning systems;
- 3) improvement of cargo processing (movement of raw materials, stocks, products of work in progress or finished goods) through the use of AS / RS automated warehousing and storage systems (“automated warehouse”); WMS warehouse management systems;
- 4) use of packaging systems, taking into account communicative role of packaging, use of packaging, which allows to reduce volume of packaging;
- 5) minimizing transport costs by optimizing location of distribution centers and warehouses, as well as using the concept of supply chain management, in particular transport logistics;
- 6) establishment of enterprises with manufacturers of material and technical resources that use the FMEA reliability system;

7) application of backflow logistics for waste management, container use and other reusable packaging;

8) use of such methods of logistics management as outsourcing of logistics services, benchmarking in logistics, suppliers' associations, corporate shipment.

**Scientific novelty:** have developed further methodological foundations of innovative management of logistics infrastructure development, which, unlike existing approaches, are based on the feasibility of providing higher rates of research (scientific, research and development works) on creation of new logistics technologies and logistical facilities compared to pace of industrial development of such innovations; production by industrial sector of aforementioned machinery should ensure pace of their practical implementation in the production and commercial activity of enterprises.

**Practical significance of scientific research:** analysis and systematization of practical approaches to logistical innovations in the system of innovative management. Prospects for further research are to explore issues related to the logistics innovation management system.

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