Vitalii Lytvynov, Doctor of Technical Sciences
Chernihiv National University of Technology, Chernihiv, Ukraine
Olena Skakalina, PhD in Technical Sciences
Inna Khomenko, PhD in Technical Sciences
Poltava National Technical Yuri Kondratyuk University, Poltava, Ukraine

THE CONCEPT 5PL-LOGISTICS AS A MEANS OF INFRASTRUCTURE DEVELOPMENT NATIONAL AGRICULTURAL HOLDINGS

В.В. Литвинов, д-р техн. наук
Чернігівський національний технологічний університет, м. Чернігів, Україна
О.В. Скакаліна, канд. техн. наук
І.В. Хоменко, канд. техн. наук
Полтавський національний технічний університет імені Юрія Кондратюка, м. Полтава, Україна

КОНЦЕПЦІЯ 5PL-ЛОГІСТИКИ ЯК ЗАСІБ ІНФРАСТРУКТУРНОГО РОЗВИТКУ НАЦІОНАЛЬНИХ АГРОХОЛДИНГІВ

В.В. Литвинов, д-р техн. наук
Черниговский национальный технический университет, г. Чернигов, Украина
Е.В. Скакалина, канд. техн. наук
И.В. Хоменко, канд. техн. наук
Полтавский национальный технический университет имени Юрия Кондратюка, г. Полтава, Украина

КОНЦЕПЦИЯ 5PL-ЛОГИСТИКИ КАК СРЕДСТВО ИНФРАСТРУКТУРНОГО РАЗВИТИЯ НАЦИОНАЛЬНЫХ АГРОХОЛДИНГОВ

It is shown that the solution move up one level 5PL-LOGISTICS in terms of national agricultural holding is in the intelligent application of information technology. Application of evolutionary algorithms to optimize logistics processes and group method of arguments based neural network solving short-term forecasting economic performance of the agricultural holding. A structural solution is economically feasible, as can significantly reduce major expenditures entity.
Key words: agricultural holding, 5PL-LOGISTICS, information technology, evolutionary algorithms, group method of data handling, neural network, ERP-system.

Показано, що вирішення проблеми переходу на рівень 5PL-LOGISTICS в умовах національного агрохолдингу полягає у застосуванні інтелектуальних інформаційних технологій. Запропоновано застосування еволюційних алгоритмів для оптимізації логістичних процесів та методу групового врахування аргументів на основі нейромережі для вирішення задач короткотермінового прогнозування економічних показників агрохолдингу. Висунуто структурні рішення є економічно доцільними, оскільки дозволяють суттєво скоротити основні статті витрат господарюючого суб'єкта.
Ключові слова: агрохолдинг, 5PL-LOGISTICS, інформаційні технології, еволюційні алгоритми, метод групового урахування аргументів, нейромережа, ERP-система.

Показано, что решение проблемы перехода на уровень 5PL-LOGISTICS в условиях национального агрохолдинга заключается в применении интеллектуальных информационных технологий. Предложено использование эволюционных алгоритмов для решения задач кратковременного прогнозирования экономических показателей агрохолдинга. Высунутые структурные решения являются экономически целесообразными, т. к. позволяют существенно сократить основные статьи затрат субъекта хозяйствования.
Ключевые слова: агрохолдинг, 5PL-LOGISTICS, информационные технологии, эволюционные алгоритмы, метод группового учета аргументов, нейросеть, ERP-система.

Problem formulation. Currently, logistics is one of the fastest growing areas of productive activity. This process is associated not only with the growing demand for logistics services, but also with the strengthening of mutual integration of business opportunities while logistics and infrastructure development of the Territories. The most significant development of methods and algorithms of interaction of the logistics processes is due to the rapid development of information technology, which resulted in a widespread network of organizational forms of business, on-line flow of documents, the transition to electronic payment systems, virtualization logistic processes, etc. On the basis of the information infrastructure of innovation Logistics takes you to a new level of intelligent control processes, the formation of new logistics concepts "PartyLogistics".

Given the factor that Ukraine is one of the largest of the manufacturers and suppliers of grain to the world food markets, as well as the high quality of the cereal, national agricultural area has a very high investment potential Ukraine is able to influence the world food market, from Ukraine depends heavily on food security meathure. Ministery Agrarian Policy and Food of Ukraine in 2015, has developed a draft single integrated strategy to develop agriculture and rural areas in the 2015–2020 years, one of the main goals of which is increase efficient use of existing infrastructure, the creation of a stable climate for investment in Agrologistics, reduced logistics costs.

In April 2015 in Ukraine, given start of development national control movement of goods on the basis of modern information technologies, which attaches great importance to the solution of the problem of optimization of logistic processes in agricultural holdings.

Analysis of recent research and publications. One of the main trends of the world market is to increase the concentration of capital for the main core business. To perform non-core functions can be created subsidiaries. However, at the present stage, these functions are increasingly directed to outsourcing. In full, this trend is observed in the area of logistics services. You can use as an example the United States, where the turnover of logistics services is about $ 40 billion. Currently, logistics is one of the fastest growing fields. This is due not only to increased demand for logistics services, but also to the development of infrastructural capacity in this business. The most significant changes in the ways and forms of interaction of the logistics caused by the development of information technologies, which resulted in the spread of networked organizational forms of business virtualization of logistics processes, the spread of electronic document management, the use of electronic payment systems and so forth.

On the basis of innovation information logistics infrastructure is the development of management tools, formed new logistics concepts such as "Party Logistics" [1], which are based on determining the level of involvement of independent companies (logistics providers / operators) to solve customer business problems. Now it allocates 1PL-, 2PL-, 3PL-, 4PL- and 5PL-logistics. 5PL-level (Fifth Party Logistics) provides support for advanced network computing.

Distributed following classification of logistics operators [2] in the context of supply chain management. 1PL - an autonomous logistics, in which all operations are carried out by the contracting authority; 2PL involves engaging a third party to perform work of a certain type; 3PL provides for the use of subcontractors; 4PL solves the problem of formation of the supply chain, planning, management and monitoring processes within the logistics organizations. 5PL provides the organization of logistics outsourcing by utilizing a global information space (Tabl. 1).

Table 1

Features of the existing types of logistics, depending on the resource base

Type logistics	Features of information space, resource properties	Type of communication resources
1PL	Own resources, focus on specific customers	Resources directly under the manager
2PL	Dedicated resources division, a wide range of customers	Resources are separated in division
3PL	Outsourcing resources, resources as customer	Possible outsourcing autonomous resources
4PL	Consulting, diverse resources, customers	The decision of the problem of cooperation of different resources
5PL	Resources are combined within the portal	Cooperation resources in the form of free interactions in the information space

Activities 5PL-provider (operator) is based on a complex of modern information technology.

Thus, 5PL-operator controls the main flow of information about orders, resources, plans and the actual state of the transport network. Models of management of interactive scheduling within 5PL considered in works [3].

5PL-provider - logistics outsourcer, providing full range of services through the use of global information and technology space. You could say that this - the so-called "Virtual" logistic partner in whose hands all the information about the logistics capabilities of market participants and the high-tech IT-products, allowing to build the most optimal supply chain. The European Union is actively financed from the budget of the new global development of IT-technologies in the field of logistics. As one of the potential outcomes of this process may appear unified information logistics network in the entire European Union. In Ukraine, begin work on the implementation of a new level of logistics services 5PL, enabling it to become one of the first countries in the world in this direction, because She is one of the leading places in the world in terms of IT professionals. Given the significant factor that in a period of consolidation of the world market producers competitive advantage will be the company with the right structure assets and investment strategies that use a flexible operating model and apply new information technologies. To take advantage of the huge opportunities offered by increasing global demand for agricultural qualitative products, agricultural companies must also apply more effective methods of business management. Selection of the unsolved parts of the general issue of problems key optimal structure of agricultural holding is vertical integration, which should ensure the value chain and the decline in market (price) risks.

Using business process modeling can not only analyze the current structure of agricultural holdings, but also to work out details of its new architecture. Through a simplified representation of real-world business processes in the form of a model achieved these goals:

– improving business processes through the development of scenarios and simulations;
– elimination of business processes which do not adding value;
– the elimination of overlapping functions / processes / roles / positions;
– creating a framework for the assessment and monitoring of the effectiveness of business processes;
– standardization activities;
– providing storage and knowledge transfer / replication of business processes;
– simplifying the process of learning and reducing the duration of the training of new employees.

Using business process modeling can not only analyze the current structure of agricultural holdings, but also to work out details of its new architecture. This leads, in turn, need to find new, previously unused management systems of agricultural enterprises, which would give the opportunity to obtain a synergistic effect due not only to optimize their facilities management, but also due to the interaction with related parties in the chain of promotion of agricultural raw materials and processed products (Tabl. 2).

Table 2

The value chain of agricultural products, depending on the depth of processing

1st chain	2nd chain	3rd chain
raw materials	raw materials	raw materials
plant growing	plant growing	plant growing
harvest safekeeping	harvest safekeeping	harvest safekeeping
Sale / Export	processing	fodder
CUSTOMER	distribution channels	cattle breeding
	CUSTOMER	meat-processing
		distribution channels
		CUSTOMER

In operation on the 1st chain of the crop agricultural producers forced to sell immediately after harvesting to cover current expenses and short-term loans. In this case the price of the product - the lowest.

Operation on 2nd chain suggests keeping harvest to saving facilities (elevators). It is possible to consider the seasonal price increases. In addition, the availability of own or leased processing capacity allows to reduce the influence of international markets for grains and to diversify sales with products of deeper processing.

Operation on the 3rd chain includes, in addition to its own distribution channels cattle breeding and meat-processing. Cattle breeding is another one of the options to reduce the impact of the price situation by selling animal feed, meat in live weight, carcasses, milk, eggs and other agricultural products. Meat-processing and the milk-processing also allow to manage market risks by offering deep-processing products, differentiation and branding.

It is such an effective tool for managing agribusiness companies in Ukraine may be the concept of optimization of logistics in the direction of combining theoretical and methodological approaches used by the modern world experience optimizing material flow in logistics formations.

Due to the fact that Ukraine is estimated Ukrainian Logistics Association (ULA) [4] only formed logistics outsourcing market, forecasts for its growth on the order of 30–40 % per year. Due to the significant impact of innovative technologies on the production capacities of Ukraine, observed the growth dynamics of logistic operators (Tabl. 3):

Table 3

The dynamics of growth of the national logistics operators

PL-level	2006	2010	2014
1-PL	10	8	6
2-PL	89	73	34
3-PL	1	14	69
4-PL	0	1	5
5-PL	0	0	0

The purpose of the article. The main purpose of this article is to assess the current state of automation of logistical processes in Ukraine, study possibilities of integration in the supply chain of the European Union at the level of 5PL- Logistics, rationale for the use of evolutionary algorithms for solving the optimization of logistic processes. The expediency of applying the method of group account of arguments based on neural network for short-term forecasting of the basic economic indicators of agricultural holdings.

Statement of the basic material. As the domain objects have been chosen following agro - Education: AK KERNEL (international level), Astarta – Kiev (national level), LLC "Octane" (regional level, Poltava region).

In the framework of this topic provides the following solutions [5]:

1. Software implemented the classic genetic algorithm, which was used to optimize the process of transport routes in the above AH. Summary economic effect lies in the range 4,5–5 % of the initial amount of costs.

2. On the basis of WEB-technologies programmatically implemented algorithm ant colony that was used for the automation of optimal schedules and routes of freight traffic on the database Akhtyrsky plant Shishatskiy area in the Poltava region. Summary economic effect - from 4,84 to 9 % of the original reference plane.

3. A software module short-term forecasting of major economic indicators AX based GMDH neural network:

    – cost of sales;

    – gross income;

    – net income;

    – the volume of goods and services;

    – selling, general and administrative costs.

Total of 15 budget items AH. The deviation from the actual predictive values in the range (0,9 to 9,89 %).

4. An automated information system for fleet management in the conditions of agricultural holdings taking into account the timing of technical inspections of units of utility vehicles, with the possibility of recording, analysis and prediction of all expense items.

5. An automated information management system storage capacity in a given agricultural holding, depending merchantability stored agricultural products from the time of its storage. Forecast module enables short-term forecasting of the basic indicators.

6. The automated management information system generating capacity under agricultural holdings, taking into account the structure of the cost of seed, taking into account the current state of the fertile layer, taking into account the costs of seasonal irrigation on fertilizing, management certification of industrial assets Arts. Forecast module enables short-term forecasting of the basic indicators.

7. Implemented a software application to solve the transportation problem in small transport companies (up to 25 units of transport) based on the use of software MS Excel. Minimizing the total cost of transport is an average of about 8 %.

8. Create Web-monitoring system of flights and the automatic distribution of technological transport flights in the online mode, to collect data on the actual costs of fuel, speed, traffic, monitoring current location of transport in real time.

Conclusions and suggestions. The proposed structural modules for IMS, based on which possible implementing ERP-system (4PL-level) and Internet Logistics (5PL-level) can improve the quality indicators of the national logistics uslug.Ukraina world's first introduced the concept in the context of 5PL Development Programme in Ukraine and strategies 2020.

Reforms that in Ukraine is one of the leading places in the world for programmers and IT professionals, the process of implementing the concept of "5PL-Logistics" can be treated as a component of the formation of a new innovative thinking.

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