

## ELEMENTS OF WAREHOUSING AS LOGISTIC STRATEGY OF AIC ENTERPRISES

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The article deals with the warehousing activities based on integrated logistic strategy of agricultural enterprises. The methodology of formation of logistics management is described. The article is focused on the mechanisms of control of logistics warehousing agriculture and the research of strategic decision which create and improve functioning of the structural elements of the material flow in warehouses. The relation between the basic functional units of logistics services in warehouses agricultural enterprises has been discussed.

**Key words:** agrilogistics, material flow, AIC, warehouse, storage, logistic strategy, WMS

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## ЕЛЕМЕНТИ СКЛАДСЬКОЇ ДІЯЛЬНОСТІ ЯК ЛОГІСТИЧНА СТРАТЕГІЯ ПІДПРИЄМСТВ АПК

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Розглянуто складську діяльність підприємства на основі інтегрованої в неї логістичної стратегії підприємств АПК, методологію становлення логістичного управління. Акцентується увага на механізмах управління логістики складування АПК та дослідження стратегічних рішень з вдосконалення та покращеного функціонування структурних елементів матеріального потоку на складах. Обґрунтовано взаємозв'язок між основними функціональними одиницями логістичного сервісу на складах підприємств АПК.

**Ключові слова:** агрологістика, матеріальний потік, АПК, склад, складування, логістична стратегія, WMS

### Problem statement

The development of the agricultural enterprise activity depends on a comprehensive and strategic approach to all elements and integrated parts logistics process of agriculture enterprise. Since any agricultural production is characterized by seasonality of their production, the process of harvesting and storage products with minimum cost comes to the first place and is the main task of logistics enterprises.

We do not need to forget that the logistics process can be viewed as a set of specific and integrated elements in the overall material flow. The main components of which are: the usage of warehouse space, appropriate management supporting documentation, the usage of informational technology for automatic processing of products, and also transport logistics services. In order to create the effective mechanism of control of AIC logistics system, it pursues optimization and improvement the existing logistics system as in a term of its operation, and in real time. It is a necessity now that in today's market almost every AIC company must "survive" in a difficult competitive conditions of transitional economies. Therefore warehousing business activity of AIC enterprises directly must be based on the strategic planning of logistics operations.

### Analysis of recent research and publications

Theoretical and practical aspects of warehouse logistics service activities of enterprises payed attention in their works such scientists as A.S Danilenko [1] E.V Krykavskyy [2], M.A Oklander [3] N. Chukhray [4], and others. Among foreign scholars question sourcing companies in the works examined

D. Bowersox [5], D.D Coyle [6 ] J. Sadler [7] and others. Formulated concepts, regulations, conclusions and recommendations allow us to establish the criterion of importance of logistics strategies in the agricultural sector. However, the issue about warehouse activities as an integrated element of logistics needs to be study further.

### **Objectives**

The main purpose of the article is to study the theoretical and methodological decisions of logistics strategies in the agricultural sector. The aim of the article is to study the rational usage of logistics for the effective work of warehousing agricultural enterprises.

### **Materials**

One of the main objectives of agrilogistics is to create an integrated system of effective regulation and control of the material and information flows of AIC enterprises that provides the highest quality in storage, supply and production. To reduce costs inside the enterprise, it should be clearly formulated the strategy of each of the elements.

In most cases, the functional areas of AIC warehousing logistics begin and end with the warehouses. The storage is functioning at the boundaries of these areas and combines material streams. Warehouse network is a complex of objects of warehousing destination located in a particular area. Methodological principles of formation of storage networks based on a systematic approach and depend on: goals, objectives and functions of the wholesale enterprise and its location (functional area) in the logistics system; type and characteristics of the material flow; location of storage networks; relationships between the encirclement suppliers and customers; vehicle characteristics; infrastructure network conditions; material and technical base of the enterprise; availability of an information system inside the warehouse network.

In order to determine the total demand for storage facilities for agricultural enterprises it is necessary to predict sales based on market analysis, market segmentation, competitor analysis. On the basis of a certain amount of power handling capacity analysis is carried out both either own warehouses or rent. The combination of its own storage and the rent one is particularly attractive and effective solution that provides the minimum overall costs while expanding the market in different regions, and in the case of seasonal demand for goods. A key aspect of the selection is the volume of warehouse sales. Preference is given to the proper composition of stable large volume of stocked products and the high turnover of warehouse. The primary importance here is stability. Another important aspect is the market space, the higher concentration of consumers in the area of sales, the better organization of the own warehouse is. Together with the density of the market it is necessary to take into account the consistency of demand for products.

The main terms of the effective functioning of the warehouse as an element/unit of logistic system (LS), we can mention the following: the warehouse is considered not as isolated unit but as part of the LS. The effectiveness of the functioning of the storage corresponds to the effective functioning of LS in general; taking into account the interaction and relationships of the warehouse at the level of LS (encirclement) and within the LS; technical and technological possibilities of movement of a stream that runs through the storage with the external transport and direct suppliers and customers; reducing of costs for warehouse handling goods does not influence on a reduction of quality in customer service; range of logistics services corresponds policy of customer service inside the enterprise; technical and technological solutions follow from the logistics necessity and economic expediency; used an automated information management system, and not depend on the level of technical equipment of the warehouse; provides a unified approach to workflow between all members of LS; implemented bar-coding.

Logistics is a complex object or a large system, and therefore can be modelled and studied by means of general systems theory. In the dynamic and motivated inevitably analyzed the problems of managing (or rather multifaceted regulation), and – synthesis and analysis of control systems, which in its turn can be successfully modelled and studied by appropriate methods of cybernetics.

If there is an object (in our case – storage system) and subsystem of management and regulation, decision-making problems arise and the problem of choosing the optimal solutions and evaluation of the functioning system regulation (control). The solution of such problems and challenges provided by the methods of operational research.

Logistics strategy of warehouse activities of agricultural enterprises is based on solution and improvement of the basic elements of the storage system: the use of warehouse space; appropriate supporting documentation management; the use of information technology for the automation process of handling products; transport logistics service. There is a need to consider each of these elements separately and as integrated logistics phenomenon.

Efficient usage of storage space of any enterprise in the agricultural sector provides considerable advantages in the competition for the consumer and minimize agricultural expenditure. The problems that are solved with the proper usage of warehouse space:

1. The master plan design warehouses in the area, which has been selected for development;
2. Determination of characteristics of warehouse based on perspective freight (usually 5 years) , the level of technical support and design of the warehouse;
3. Development of optimal storage system: choice of optimal storage system modules, including efficient storage of cargo units , as well as technological and lifting and transport equipment; choice of competitive options planned decisions of cargo handling ; selection of the optimal (efficient) variant of planned solution (based on optimisation criteria) that provides the maximum use of storage facilities provided to minimize the total expenditure establishment and operation [9].

Logistic information is targeted volume of facts, events, actions that show the interest and require registration and processing to ensure the management process of logistics enterprise system. Implementation of most logistics concepts (systems) such as SDP, JIT, DDT and others would have been impossible without the use of high-speed computers, local area networks, telecommunications systems and information software.

Logistic system is a complex structured organizational system in which management processes aimed to optimizing material and accompanying information, financial, human and other flows from start of production to disposal. LS are the opened systems. Typical tasks that solves the system of logistics structure are: determining the warehouses of raw materials and products to reduce operating costs; optimization of transport operations inside the storage. The warehousing software gives possibility of direct analysis and coding the different product groups, significantly accelerating the movement of information flow in the technological process inside the storage. Information flow can exist in the form of paper and electronic documents. Modern trends in science, engineering and technology is closely intertwined with the processes of information management. The essence of the data is to replace paper documents into electronic – which actually means the transition to paperless exchange of logistics information system. The main principle of electronic goods storage technology is that the receipt of goods and the time of issue, all the information stored in the computer memory.

The ability to represent a wide range of goods to consumers with high speed and accuracy of order processing is largely caused by the technological capabilities of the IT industry in the field of logistics. Nowadays, warehouse logistics industry demonstrates growth, in large cities more and more storage terminals warehouses of temporary use, distribution centres are growing.

Increased demand undoubtedly lead to increased competition in this market segment as a result, the need is to improve the efficiency of warehouses and expanding the range of warehousing services to gain a competitive advantage.

The most typical in international practice is to solve these problems providing temporary warehouse management system – WMS (Warehouse Management System), which includes the hardware and software system that allows you to efficiently manage the placement and movement of goods in the warehouse. The fundamental difference between WMS and warehouse accounting systems is that WMS except purely accounting function also performs active management role by analyzing all tasks that are in the queue to be made, and giving the signal to the staff of the warehouse to start finish the highest priority task. WMS should provide optimization routes of handling devices, and create reference for the staff on the basis of its optimal load [1].

Another important function of a WMS is billing (eng. bill - account), automatic calculation of the value (cost) of storage, based on current accounting unit load warehouse. This function is particularly relevant for the enterprises that provide services to the temporary holding of goods in their warehouses. It

is possible to calculate the cost of services provided to the cargo (mechanical and manual loading and unloading, packaging, placement, etc.). Usage of WMS enables to perform warehouse operations, including the work of coding and radio frequency identifying (RFID).

The existence of a more or less unified approach to the storage of goods in warehouses agricultural enterprises, provides the theoretical possibility of adapting any universal system WMS to the economically profitable project of storage.

Practical application and operation of WMS shows that the term for which the system becomes financially profitable is not more than 1.5–2 years. Practical analysis of the introduction shows it with the following indicators:

- Reduce time to receive / complete set / shipped orders 1.5–2 times;
- Increased accuracy of orders up to 99 %;
- Reduce the number of staff in 2–2,5 times;
- Significant reduction of losses connected with the shelf life of the goods;
- Increased range of goods by raising the accuracy of work;
- Significant reduction in costs associated with downtime;
- Reduce time for the preparation of warehouse personnel [10].

The economic activity of agricultural enterprises depends largely on natural and climatic conditions. Almost all natural phenomena can significantly affect the harvest, to low productivity. Analysing economic activity natural and climatic conditions of each year and each industry must be considered. For the analysis results, which would correspond the actual data and reach correct conclusions about the operating results of the current year figures should be compared with agricultural enterprise data during 2 – 7 years.

Since agriculture is characterized by seasonality of production, during the year labour, equipment, materials used irregularly, products buying inconstantly, income is not stable. Combine harvesters can only be used 10 – 20 days per year, seeders 5 – 10, potato harvesters 20 – 30 days. This feature is also necessary to take into account when analyzing such factors as security and usage of basic means of production, land, labour and financial resources [8].

The production process in agriculture is very long and does not match the working period, that is why many options parameters can be calculated only summing the results for the whole year of production. In this regard the fullest analysis of crop can only be for the year. During the year and in certain periods the plan of farming practices by periods of agricultural work in the enterprise is analysis. [8]

Manufacturing, warehousing, transportation in agriculture has its own peculiarities in the use of resources, which in many cases are “living organisms”. Therefore, the level of agricultural enterprises is influenced not only economic, but also biological, chemical and physical laws, making it difficult and sometimes impossible to measure the impact of factors on the parameters of business results. At the same time, records of these laws is crucial in the analysis of agricultural enterprises.

Unlike many activities, agricultural business is accompanied by significant operational and financial risks associated with providing the required amount of rhythmic material and compliance with the appropriate level of quality. Important role is played the land resources and its transport logistics efficiency, reflected in optimizing the placement of crops and routes of delivery of products in the total supply chain. That is why, there is a problem in need of transport as a monitor positioning during field work, and during transportation of finished goods. It should be mentioned that special place in logistics agricultural enterprises owned warehouse management, because the size of storage networks and storage conditions must meet production capacity and taking into account the seasonal harvesting process should ensure continuous supply of raw materials during the operating cycle. An important element in the development of logistics management is the question of AIC information support foreign trade and improving customs clearance procedures (electronic declaration technologies prior notification of changes in customs procedures, updating normative databases). One of the main problems is the compatibility of information systems of public institutional and industrial enterprises in most of its activities using distributed (or made to order) software products focused on automation of financial and management reporting. However, these programs do not address the issues of logistics control, that is why it requires

additional development on the basis of own decisions and platforms of these programs to accelerate information exchange.

Perform analysis and control of major logistic processes and procedures for implementation of agricultural enterprises require monitoring mode for the key points in conjunction with the selection choices management decisions. This approach makes strategic logistics planning agricultural enterprises in one line with the global goal and long term development. Logistics strategy includes the following components: logistics network configuration, development of the organizational structure of the logistics system, identifying key directions and coordination an idea, formation requirements for compliance with product quality, development of a hierarchical system of inventory management and logistics information system design [9].

The movement of material resources from the primary source to the final consumer should be considered as a single material flow, provided vehicles. This is the foundation of transport logistics based on. The place of transport logistic can be provided next way (fig. 1)[8].

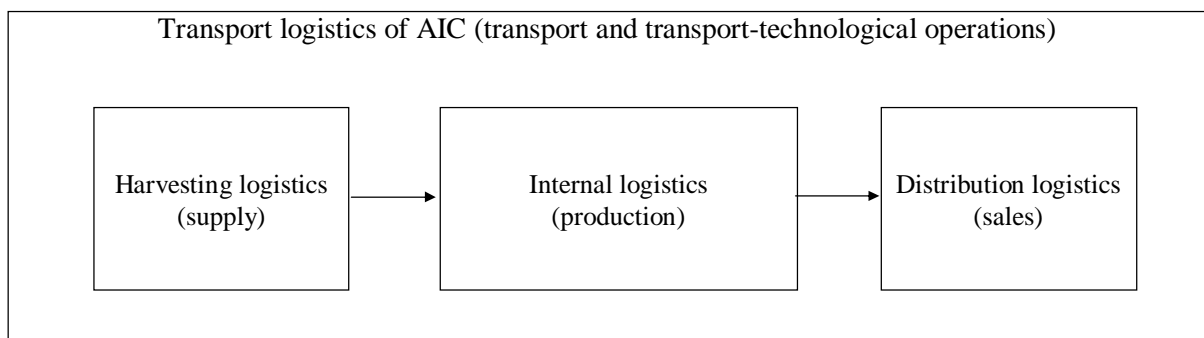


Fig.1. Relationship scheme harvesting, internal, distribution logistics  
Source: processed and developed by author

The amount of transport resources (Po) should be measured by the formula 1:

$$P_o = \sum_{i=1}^n P_{T_i} + \sum_{\kappa=1}^m P_{M_\kappa} + \sum_{y=1}^t P_{\phi_y} + \sum_{x=1}^z P_{i_x}, \quad (1)$$

where  $P_{T_i}$  – human resources (personnel)  $i$ -type;  $P_{M_\kappa}$  – Material resources  $k$ -type;  $P_{\phi_y}$  – financial resources  $y$ -type;  $P_{i_x}$  – information resources  $x$ -type;  $i = 1, \dots, n$  – number of sorts of human resources (drivers, drivers handling equipment, etc.) used in the transport process;  $\kappa = 1, \dots, m$  – number of types of material resources (machines, equipment, buildings and facilities, including roads, maintenance materials, except energy) used in the transportation process;  $y = 1, \dots, t$  – number of types of financial resources (equity, loans, etc.);  $x = 1, \dots, z$  – number of types of information resources (technology, regulatory legislation, cost information, etc.).

### Conclusions

Logistic strategy – it's a part of an overall strategy of industrial enterprises and is a long-term program of action for the specific industrial and economic activity for the establishment and implementation of established product. It involves the implementation and progressive development of the logistics capacity of enterprises to achieve strategic competitive advantage.

Sequential and parallel improvement of each of the above mentioned elements strategy of storage agricultural enterprise will lead to the implementation of the established plans. However, it should comply with the following conditions:

- the availability of global strategy and supporting policies;

- the possibility of forming size and structure of production in terms of logistics requirements;
- integration of verticality in the areas of logistics enterprise;
- orientation on the structures of supply, production, storage and distribution in the flow of materials and finished products;
- compliance management systems and information;
- compliance measure effectiveness;
- appropriate levels of automation production equipment, moving materials and information;
- usage of the appropriate personnel classification.

### Prospects for further research

In warehousing activity of AIC enterprises an important role played the process of storage and preservation products. In order for further design and development of logistic strategy of AIC storage enterprises need to conduct further research of the main factors which are influence the positive activities, and organize the management of all aspects of logistics services.

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