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FEATURES AND OPTIMIZATION OF AGRICULTURAL ENTERPRISES LOGISTICS SYSTEMS

ОСОБЛИВОСТІ ТА ОПТИМІЗАЦІЯ ЛОГІСТИЧНИХ СИСТЕМ СІЛЬСЬКОГОСПОДАРСЬКИХ ПІДПРИЄМСТВ

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This paper presents the main prerequisites for the development of logistics systems at agricultural enterprises. The definition of the "agrologistic system" category is given, trends in the agrologistic system development are indicated, taking into account the needs for storage, transportation and processing of products. The theoretical and methodological foundations are investigated and the research and practice foundations of the economic mechanism of the functioning of the logistics systems of agricultural enterprises are substantiated. It has been proven that only by carefully examining the logistics systems functional areas, formulating tasks and outlining goals determined as the purpose when creating a logistics system at an agricultural enterprise, it is possible to create an effective agrologistic system and an effective management mechanism.

Keywords: optimization, agrologistic system, agriculture, economical effectiveness.

У статті розглянуто основні передумови розвитку логістичних систем на сільськогосподарських підприємствах. Надано визначення категорії «агрологістична система», визначено що це особливий вид логістичних систем, функціонування яких пов'язане із виробництвом продукції з сільськогосподарської сировини, її зберіганням, переробкою і доведенням до споживача та що метою функціонування агрологістичних систем є задоволення потреб споживачів і зниження витрат на виробництво та переробку сільськогосподарської продукції, окреслено тенденції розвитку агрологістичної системи з урахуванням потреб у зберіганні, транспортуванні та переробці продукції. Досліджено теоретико-методологічні та обґрунтувано науково-практичні засади економічного механізму функціонування логістичних систем сільськогосподарських підприємств. Логістичне управління в підприємствах сільського господарства знаходиться на початковому етапі розвитку. Саме тому завдання вдосконалення формування системи управління на засадах логістики набуває важливого значення та потребує доопрацювання наукових та практичних аспектів діяльності підприємств сільського господарства, створення відповідних методичних та організаційних інструментів управління. При цьому підготовка рішень у менеджменті все частіше здійснюється за допомогою моделей, що відображають особливості внутрішньовиробничих логістичних систем. Застосування відповідних моделей, як правило, вимагає значного обсягу вихідної інформації й опрацювання певних алгоритмів для оцінки й оптимального вибору серед існуючих альтернатив. Моделювання управлінських рішень у логістиці дозволяє здійснювати опис процесів та імітувати поведінку об'єкта при зміні зовнішніх і внутрішніх умов. Підтримка багатьох рішень в агрологістичних системах також здійснюється через процес моделювання за певним критерієм

оптимальності. У статті доведено, що тільки ретельно досліджуючи функціональні сфери логістичних систем, сформулювавши завдання та намітивши цілі, що поставлені за мету при створенні на агропідприємстві логістичною системою можливо створити ефективну агрологістичну систему та дієвий механізм її управління.

Ключові слова: оптимізація, агрологістична система, сільське господарство, економічна ефективність.

Formulation of the problem. Long-term crisis resolution and bringing the agro-industrial complex of Ukraine (AIC) to the course of sustainable development is one of the priority tasks of the country's economic development. At the same time, the problems of the agro-industrial complex accumulated over the past decades require a systematic and integrated approach to their solution, which implies the development of new management tools for the domestic economy. Logistics is becoming more and more popular in the agro-industrial complex – a powerful tool for increasing the efficiency of the agricultural sector of Ukraine in capable hands, since it allows optimizing the chains of agricultural products movement from the field to the consumer. The main goal of agricultural logistics is to ensure the delivery and storage of the right product in the right quantity and of the appropriate quality at the right place and at the right time with optimal costs. Thus, the development of logistics in the agro-industrial complex is becoming an extremely necessary factor for the sale of agricultural products, an increase in farmers' income, a decrease in commodity costs, in general, a sustainable development of the agricultural sector. Thus, the study of the methodology of agricultural enterprises logistics, the identification of its system characteristics, the construction of criteria for the effectiveness of the functioning of the logistics systems of the agricultural sector become relevant.

Analysis of recent research and publications. Many scientists paid great attention to theoretical aspects, the current state and trends in the development of logistics, in particular the economic content of logistics, among such scientists it should be noted: O. M. Varchenko, A. S. Danylenko [1], Ye. V. Krykavskyi [2], M. A. Oklander [3], V. V. Pysarenko [4], S. A. Pelykh [5], T. M. Tereshkin [7], L. V. Frolov [6], N. I. Chukhrai [7], D. D. Koil, R. K. Naidzheman, D. Bowersox, T. Levitt, Sedler and others. Scientific approaches to the formation of the concept of logistics, the provisions, conclusions and recommendations formulated in their works, occupy an important place in the modern theory of logistics and make it possible to realize the complexity of solving logistics problems at the enterprise.

Solving previously unresolved parts of the overall problem. At the same time, the processes of formation of the economic mechanism of the functioning of logistics systems, its influence on the results of the economic activity of the enterprise require further detailed research.

Formulation of the goals of the article (statement of the task). The purpose of the article is based on the study of the essence and features of agrarian logistics, since one of the main tasks of agrarian logistics is the formation of an integrated effective system of regulation and control over material and information flows of agricultural enterprises, which will ensure high quality of product delivery.

Presentation of the main research material. Taking into account the specifics of agricultural production, agricultural logistics is a source of additional profit formation by reducing on-farm costs for a complex of logistics activities.

Agrologistic system – is a special type of logistics systems, the functioning of which is associated with the production of products from agricultural raw materials, storage, processing and delivery to the consumer. The purpose of the agrologistic systems functioning is to meet the needs of consumers and reduce the cost of agricultural products production and processing. The effectiveness of the logistics system depends on the perfection of the economic mechanism of the latter's functioning. We understand the economic mechanism of the logistics systems of agricultural enterprises as a complex of specific forms and levers, the interaction of which ensures the functioning of logistics systems and the efficiency of their management, which will further bring the enterprise to a higher level of development and consolidate its position in the market. The formation of a management mechanism for the logistics system of an enterprise is necessary for the reason that it makes it possible to quickly respond to changes in the internal and external environment by taking into account a large number of factors and the availability of the required amount of necessary information.

Logistics management at agricultural enterprises is at an early stage of development. This is precisely why improving the formation of a management system based on logistics becomes important and requires the completion of scientific and practical aspects of the activities of agricultural enterprises, the creation of appropriate methodological and organizational management tools. At the same time, the preparation of decisions in management is increasingly carried out using models that reflect the features of intra-production logistics systems. The use of appropriate models, as a rule, requires a significant amount of initial information and processing of certain algorithms for the assessment and optimal choice among the existing alternatives. Modeling management decisions in the field of logistics contributes to the description of processes and imitation of the object's behavior when external and internal conditions change. Support for many decisions in agrologistic systems is also carried out using the modeling process according to a certain criterion of optimality. The composition of the main goals of the agrologistic system functioning should be built on the basis of a logistic mix (7 "R-s" – products, quantity, quality, place, time, consumer, costs) and individual features of the formation of agribusiness directions. At the same time, it is recommended to separate the logistics costs, since they are one of the main factors of the efficiency of logistics management (Fig. 1). In this case, not minimization should be the goal of logistics management, but optimization of logistics costs, which maximizes profits from a unit of limited resource.

We believe that the main indicators for assessing the effectiveness of the enterprise's logistics system should be:

– monitoring indicators characterizing the dynamics of the logistics system - the level of service, elements of the cost structure;

– benchmarks that indicate the effectiveness of the system, on the basis of which the activity is adjusted in case of deviations from the standards;

– operational management indicators characterizing the level of staff motivation.

The indicators characterizing the logistics system include indicators for evaluating logistics assets (fixed assets, working capital) – inventory rotation rate, investment payback period, storage area, storage capacity, throughput, volume of finished products, etc. Indicators that reflect the performance of the system include indicators of efficiency, productivity, reliability and flexibility of the logistics system.

Effective logistics management is one of the important factors in realizing the competitive potential of a modern enterprise. In many sectors of the economy, theoretical, methodological and applied developments in entrepreneurial logistics are being actively implemented in the operational and strategic activities of organizations. The peculiarity of the agrologistic system of the enterprise is that at the entrance of the system, the main resource is feed, seed material, fuels and lubricants, etc. (occupy more than 70% in the structure of the production cost of the enterprise), and at the output - crop and livestock products (Fig. 2).

Often, the main criterion for such efficiency is considered the minimization of logistics costs.

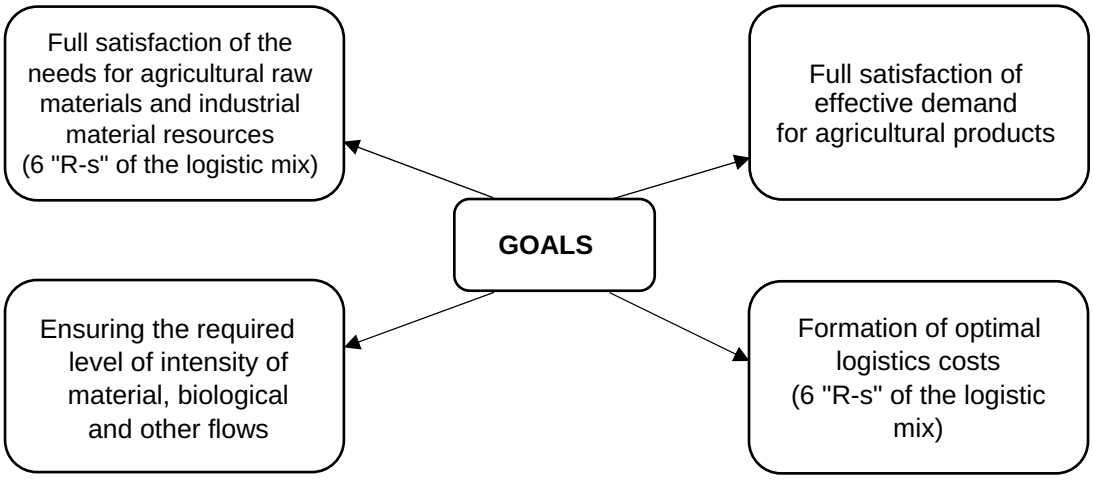

Figure 1. The main goals of the agrologistic system functioning

Source: elaborated on the basis of [4]

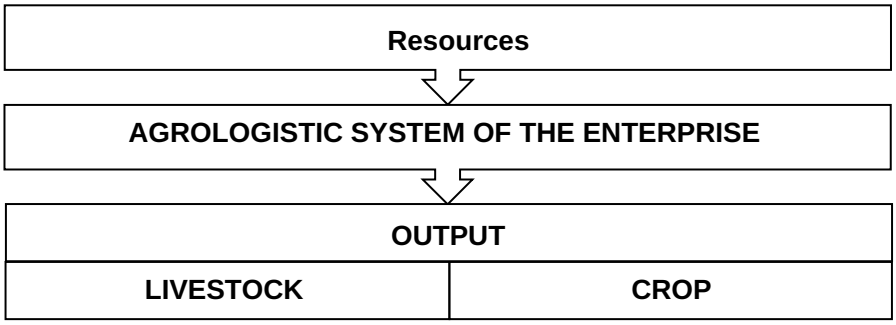

Figure 2. Scheme of "inputs" and "outputs" of the enterprise logistics system

Source: elaborated on the basis of [4]

We consider that an important component of increasing the economic efficiency of the logistics system is the identification and implementation of reserves for savings and / or optimization of resource costs. It should be noted that the process of forming efficiency involves taking into account costs, saving and / or optimizing them at all stages of the passage of material and accompanying financial, information, energy and personnel flows (Table 1).

Table 2 shows methodological approaches to assessing the efficiency of the functioning of the logistics system of an enterprise.

The main methodological principle for determining the efficiency of the logistics system should be a systematic approach, since its use helps to determine the effectiveness of the activities of all structural links of the logistics system in the process of passing material and accompanying flows from the supplier to the consumer of the finished product, taking into account the economic interests of the participants in the system and costs.

The importance of logistics in the agro-industrial complex is increasing due to the fact that the final results of agro-industrial production depend not only on the level of development of agriculture, but also on the branches serving it.

It should be noted that logistics costs are understood as the costs associated with the movement and storage of inventory items from the primary source to the final consumer. The composition of the logistics costs of the enterprise, in addition to the actual costs, should include the loss of profit from the immobilization of working capital (inventories, work in progress, finished goods), losses of the enterprise from the inadequate level of quality of resources and finished products at all stages of the logistics chain - from delivery to the distribution of the enterprise's products.

A prerequisite for determining the performance indicators of an enterprise's logistics system is taking into account the social effect, which consists in eliminating routine operations, organizing creative and less psychologically stressful interaction between participants in the logistics system, ensuring a high culture of customer service, etc.

Improving the management of the processes of logistics activities of enterprises requires the calculation of indicators characterizing its effectiveness. The use of logistics tools makes it possible to reduce costs, increase productivity, improve customer service, and, therefore, gain competitive advantages. Therefore, it is relevant to develop proposals for assessing the effectiveness of the functioning of material flows in logistics systems.

Conclusions. To form a systemic vision of the definition of "logistics of agricultural enterprises", the author's view of the essence of its concept is presented, which is based on the principles of agricultural logistics. The economic mechanism for managing the logistics system of an agricultural enterprise includes a set of scientific methods and tools that affect logistics processes (manage the activities of the logistics system, control and correct actions, allow timely identification and response to changes in the internal and external environment). The construction of an effective mechanism for managing the logistics system of an enterprise aims to optimize and improve the existing logistics system both in the perspective of its functioning and in real time. Only a thorough study of the functional areas of the logistics system, a clear formulation of the tasks set for the logistics system created at the enterprise and an understanding of the goals set for its developers will make it possible to create an effective logistics system and an effective mechanism for managing it. The results of a study of modern trends in the use of logistics systems

Table 1

Areas of saving resource costs in the logistics system

Types of flows	Stages of flow in the logistics cycle			
	Supply	**Production**	**Storage**	**Distribution**
Material flows	Savings due to optimal procurement of resources.	Savings by reducing equipment downtime, improving technological processes.	Cost savings by optimizing storage costs.	
	Cost savings by reducing waste of resources, reducing the size of stocks.			
Information flows	Cost savings while reducing order processing time:			
	Due to the timely receipt and provision of reliable information from suppliers.	Due to the optimal organization of the production process.	By reducing the cost of servicing warehouse processes.	By reducing transaction costs.
Energy flows	Saving energy costs due to: 1. rationalization of the use of energy resources for the production and sale of the enterprise's products; 2. reduction of direct energy consumption; 3. ensuring the specified levels of technological characteristics, technological processes; 4. effective use of the technical components of the enterprise's logistics systems; 5. reducing the energy intensity of the transport process.			
	Cost savings due to: 1. Use of energy-balanced feed rations; 2. Optimization of the energy intensity of fattening taking into account the energy intensity of the main products and by-products.		Saving energy costs by stabilizing the initial energy flows.	
Personnel flows	Cost savings due to: 1. reduction of profit losses due to irrational use of personnel; 2. optimization of costs for recruitment, training, placement, retraining, professional and qualification growth of personnel, remuneration and incentives for personnel.			
Financial flows	Saving resources due to: 1. reduction of expenses related to inventory reduction; 2. reducing the amount of working capital while accelerating the speed of movement of funds.			

Source: elaborated on the basis of [5]

Table 2

Methodological approaches to assessing the effectiveness of the functioning of the logistics system

Indicator	Formula for calculation	Conventional signs
Aggregated indicator of the efficiency of the enterprise's logistics system	$A_{\log.en.} = \frac{P}{C_{\log.t.}}$	$A_{log.en.}$ – aggregated indicator of the efficiency of the enterprise's logistics system; P – profit from the sale of finished products of the enterprise, UAH; $C_{log.t.}$ – total logistics costs, UAH.
Total logistics costs	$C_{\log.t.} = C_{mov.} + C_{st.} + C_{un.}$	$C_{mov.}$ – costs of material resources movement, UAH; $C_{st.}$ – storage costs of material resources, UAH; $C_{un.}$ – loss of profit because of unused opportunities due to the existence of inventories, UAH.
Economic effect of the logistics system of the enterprise	$P^* = P + \Delta P + \Delta C_{\log.}$	P*– economic effect in the logistics system, UAH; P – profit from sales, received under basic conditions, UAH; ΔP – increase in profit from sales obtained as a result of an increase in proceeds from the sale of finished products through the use of logistics methods, UAH; $\Delta C_{log.}$ – reduction of logistics costs in the system, UAH.

Source: elaborated on the basis of [6]

for agricultural enterprises prove the existence of a positive relationship between efficient logistics and business success. The use of logistics makes it possible to determine the optimal technology for promoting crop and livestock products both in the domestic and foreign markets.

Optimization of resources can be carried out at different levels of the hierarchy of the logistics system, for example, within a functional area, a subsystem, a separate logistics function. The principle of global optimization must also be fulfilled, that is, local optimization criteria and decisions that are made on their basis should not contradict the global optimum of the logistics system as a whole. As can be seen from the above, the main factors and indicators for assessing the effectiveness of the functioning of logical systems were considered, and the main problems of optimizing the logistics activities of an enterprise were identified.

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