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The role of logistics in agricultural development in Ukraine

Rola logistyki w rozwoju rolnictwa na Ukrainie

Abstract. The article considers the problem of an efficient system of agricultural logistics formation that is currently in Ukraine in the process of development. Demand for logistics integration in modern conditions becomes a necessity while further agricultural sector development without implementation of logistic functions becomes ineffective. In the logistics system formation in the agricultural sector purely market institutions for the coordination of relationships are of crucial significance. Government policies can act as a catalyst for the creation of logistic chains. Macrolevel requires state regulation mechanisms for the sustainable use of limited resources and socio-economic development of territories. The negative factors of logistics development in Ukraine are the lack of licensing, available IT-solutions, outdated stocks, poor training of specialists. Thus, in today's agricultural environment, logistics is a new concept that is undergoing significant changes in short period of time.

Key words: agriculture, regional economics, logistics, agricultural logistics

Synopsis. Artykuł jest poświęcony problemowi tworzenia efektywnego i konkurencyjnego systemu logistyki w rolnictwie na Ukrainie, która obecnie znajduje się tam w procesie rozwoju. Popyt na logistykę w nowoczesnych warunkach jest koniecznością ze względu na fakt, że dalszy rozwój sektora rolnego robi się nieskuteczny bez realizacji funkcji logistycznych. Polityka rządu może występować jako katalizator dla tworzenia łańcuszków logicznych. Makropoziom wymaga mechanizmów państwowego regulowania zrównoważonego wykorzystania ograniczonych zasobów naturalnych i społeczno-ekonomicznego rozwoju obszarów. Negatywnymi czynnikami rozwoju logistyki na Ukrainie jest brak licencjonowania, przestarzałe wyposażenie, brak dostępnych rozwiązań IT, słabe szkolenie specjalistów w dziedzinie logistyki. W związku z powyższym w nowoczesnym środowisku rolniczym logistyka jest nową koncepcją, która ulega znacznym zmianom w krótkich okresach czasu. Proces zarządzania systemami logicznymi jest złożonym i zależy od zachowania pozycji rynkowej i przewagi konkurencyjnej.

Słowa kluczowe: rolnictwo, regionalna ekonomia, logistyka, logistyka rolna

Introduction

Logistics is a tool for the rational use of resources, reduction of time expenditures and financial resources on the way of bringing products to consumers. Capabilities of logistics to improve the efficiency of procurement processes, transportation, storage and

distribution of material flows are recognized worldwide and used in all areas of activity, including agriculture.

Ukraine currently reached the leading position in the export of agricultural products and has become one of the leading grain exporters in the world. In addition to grains country exports sunflower seeds, wheat, barley and corn. Over the past 10 years, growth in the export of grain and grain processing products increased by 2.5 times and by various estimates Ukraine has the necessary potential for increasing agricultural production and exports.

But realization of the potential to the full extent depends on the support by way of an efficient and competitive logistics system, which is currently in the country in the process of development. This confirms the fact that logistics costs associated with the transportation of grain from Ukrainian farmers to Ukrainian ports exceed by nearly 40% the cost of similar services in France and Germany and by 30% cost of related services in the United States.

Analysis of the logistics markets conducted by specialists of Lisat.ru (portal of logistic market) note that Kazakhstan has become the leader in the group of post-Soviet states as for the speed of track and quality of clearance, which is ranked 62nd, followed by Uzbekistan ranked 68th, and Azerbaijan rounds out the top three¹. Its position in the overall ranking is 89th. However, experts note that despite the fact that Georgia has carried out global changes in customs clearance, it holds only the 93rd position. Russia holds the 94th position in the rating, Ukraine – 102nd, Moldova – 104th. Yemen is one position above Ukraine and Iran is one position below. At the same time western neighbors of our country take the top fifty positions in the rating, Poland is ranked 30th, Slovakia 38th, and Lithuania 45th.

According to the International Bank for Reconstruction and Development (IBRD) in 2014 Ukraine was ranked 61 among 160 countries in terms of logistics system development of LPI (logistics performance index). In the dynamics the effectiveness of the implementation of logistics activities is gradually increasing, as evidenced by the positive dynamics of the national logistics performance index, which increased by 0.13 points and reached the mark of 2.98². In the estimation of the IBRD the best value among the indicators of Ukraine International LPI has the index of on-time cargo delivery (3.51 out of 5) and the worst values are the quality of trade and transport infrastructure (2.65 out of 5).

Material and methods

The aim of our research is the study of the current state of logistics in Ukraine and mark paths of its development. In our research we used different methods: method of analysis, comparison method, correlation analysis, empirical method of scientific research and method of logical summarizing.

¹ The level of logistics: Ukraine ranked 102nd out of 155, 2014 [electronic resource] <http://www.ucca.org.ua/ua/information/news/224>.

² J.-F. Arvis, 2014, Networking to improve competitiveness: Trade Logistics in the Global Economy, [in] J.-F. Arvis, M.A. Mustra, L. Ojala, Ben Shepherd, Daniel Saslavski (Eds.) The Logistic Performance Index and Its Indicators. – The World Bank, Washington.

By means of these methods we defined main informational resources, which are necessary in the process of decision making about improvement of logistics in agricultural sector in Ukraine, developed the model of decision making as for the role of logistics in the development of agriculture in Ukraine, addressed the shortcomings of logistics service performance which are meaningful for the development of advanced efficient logistics system, determined the quality attributes of logistics service. Using empirical data of the case study we showed some of the problems of the logistics service in Ukraine. These methods facilitated the analysis of the logistics markets requirements, structural and institutional changes, helped identify success model that is essential to make logistics work well, plan and establish optimization of a supply chain, enhance competitiveness of each of the participant in logistics chain, minimize supply costs and environmental load, reduce unprofitable inventory.

Research results

According to many scientists agrologistics is a new application area of logistics associated with its provisions and practices in the field of agricultural production. Agricultural logistics as a science develops scientific principles, methods, mathematical models which allow planning, monitoring and managing the transportation, warehousing and other tangible and intangible transactions occurring in the process of bringing raw materials and supplies to agricultural enterprises, organization of production, and bringing agricultural products to consumers in accordance with their requirements³.

Branches of agriculture functionally include various activities, technologically have little in common, which impedes the intermechanism and supply chain, explains many unresolved problems of agricultural logistics.

The market economy brings additional complexity to the spontaneous formation of relations in agricultural production. Therefore, many scholars have pointed out the need for the use of modern economic tools.

Demand for logistics integration, which has existed since the social division of labor in modern conditions becomes a necessity due to the fact that the further development of the agricultural sector without implementation of logistic functions becomes ineffective.

The first attempts to use the logistics functions and construct logistics infrastructure in the agricultural sector were still in the planned economy of the USSR. Thus, the Food Program, which was adopted in 1982 was a series of administrative, political, economic,

³ B. Klepacki 2011a: Agrologistyka – nowe wyzwanie dla nauki i praktyki, *Logistyka* 3; T.V. Bozhydarnik, 2011: The main ways to use logistics in agroindustrial complex of Ukraine, T.V. Bozhydarnik, N.V. Bozhydarnik, 2011 [electronic resource] http://www.nbu.gov.ua/Portal/soc._gum/ekfor/2011_1/5.pdf; T.V. Borovik, Logistical support of agricultural products market [electronic resource]. <http://pdaa.edu.ua/sites/default/files/nppdaa/6.1/34.pdf>; T.P. Horobets, 2010: Logistics activities in agricultural enterprises [electronic resource]. http://www.rusnauka.com/8_NND_2010/Economics/60337.doc.htm; A.G. Kravtsov, The analysis of the prospects for implementing logistics approaches in AIC, *The Bulletin of Kharkiv Petro Vasilenko National Technical University of Agriculture “Systems Engineering and forestry complex technology”*. Transportation technology 136, Kharkiv, Petro Vasilenko KNTUA, 272–278.

logistical and social activities aimed at systemic solution of the food problem, the sustainable provision of consumers with basic foodstuffs, improvement of the food patterns structure and social transformation of the village on the basis of intensive development and integration of agricultural production, the food industry, transportation, warehousing facilities, trade and other branches⁴.

By analyzing the Food Program it can be said that although at the time there was no concept of the logistics system, but in its very essence there were laid the basic logistics functions on the movement of material and labor resources at the domestic level and questions about the country's export capacity were raised.

In the formation of the logistics system in the agricultural sector of modern Ukraine purely market institutions for the coordination of relationships such as contracts, agreements, arrangements, schedules of deliveries of products between enterprises, coordinated transportation routes, etc. are of crucial significance. At this level, logistics by using economic leverage has the ability to self-development.

Market institutions and economic interests unite participants of the agroindustrial integration into a single logistic chain. However, the creation of such logistics chain is a long-term process and we are of the opinion that government policies can act as a catalyst for the creation of such logistic chains. Macro level requires state regulation mechanisms for the sustainable use of limited natural resources and socio-economic development of territories.

As a part of the agroindustrial complex there are the following subsystems:

- natural resources;
- agricultural production;
- production of capital goods for agriculture;
- processing, laying-in, storage of agricultural products;
- production infrastructure (road facilities, transport organizations, communications, etc.);
- market infrastructure (food markets, stock exchanges, banks, leasing companies);
- social infrastructure (housing and public utilities infrastructure, organization of education, public health service, culture, sports, trade);
- scientific support;
- staff training, retraining and professional development.

And the logistics system must link all the subsystems in a single chain for the effective functioning and interaction.

Figure 1 shows the general scheme of the logistics system of agriculture. The institutional environment creates the necessary arrangements for the operation of the logistics system.

The financial environment generates cash flows that encourage land use and other branches of agroindustrial complex, together with the institutional ones they generate material and labor input flows into the agri-food complex.

In the system of logistics one of the functions most important for modern agricultural enterprises is the function of the formation of agricultural relations with suppliers, which should be based on the integration ties.

⁴ A.P. Nosov, Logistics features in the agricultural sector of the state, *Audit and Financial Analysis*, 1012, 2, 1–4.

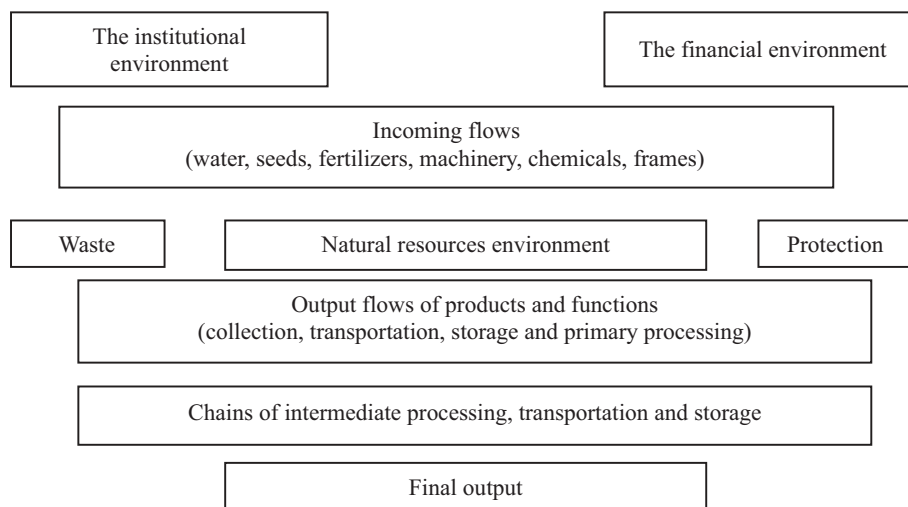


Figure. 1. Logistic system of agroindustrial complex

Rysunek 1. System logistyczny w przedsiębiorstwach branży rolniczej

Source: own elaboration based on Magomedov and Buchaev [2013].

For Ukraine, the agricultural sector is of particular importance. Approximately 31.2% of the population lives in rural areas; and agroindustrial complex development to a large extent determines the state of the entire economy and well-being of one third of the population. The share of agricultural sector accounts for about 11.8% of gross value added by type of economic activity, financial results before taxation 20,529.53 million hryvnya, employment in agricultural sector 17.1 and 8.6% capital investment concentrated in agriculture (Table).

Table. Agricultural production in selected years in Ukraine (in prices of 2010 in millions hryvnya)
Tabela. Produkcja rolna na Ukrainie w wybranych latach (w cenach z 2010 roku, w mln hrywien)

Year	Gross agricultural production	Of which	
		crop production	livestock products
1990	282 774,2	145 502,0	137 272,2
1995	183 890,3	106 329,6	77 560,7
2000	151 022,2	92 838,9	58 183,3
2005	179 605,8	114 479,9	65 125,9
2010	194 886,5	124 554,1	70 332,4
2014	251 438,6	177 707,9	73 730,7

Source: Agriculture of Ukraine 2014. Statistical Yearbook.

We could mention as an example one of the largest companies in Ukraine, which is engaged in the production of agricultural products and is a model of the development of agricultural logistics.

Kernel is a leading diversified agribusiness company in the Black Sea region listed on the Warsaw Stock Exchange. Their integrated value chain encompasses an extensive grain and oilseed origination network, 389 thousand leasehold ha under farming, 3 million

t of sunflower seed crushing capacity, 2.8 million t of silo storage capacity and 6 million t of capacity at their deep-water export terminals at the Black Sea basin, and a centralized logistics and sales team⁵.

Key performance indicators of the company:

Sunflower seed crush was 611.9 thousand t in Q4 FY2015, down 8% YoY due to an overall decrease in Ukraine's harvest of 12% YoY. However, crushing volumes were above management's expectations, with the full year crush volume at 2,522.8 thousand t, up 8% YoY and above initial guidance of 2,400–2,500 thousand t.

Sunflower oil sales in bulk outpaced production levels and amounted to 300.3 thousand t (up 1% YoY) in Q4 FY2015, as global demand was healthy and resulted in strong volumes and price growth toward the end of the quarter. Combined with strong production during the year, this resulted in strong full year sales of 1,030.2 thousand t, up 12% YoY.

Bottled sunflower oil sales were seasonally weak in Q4 FY2015 (18.1 million l, down 5% YoY), but full year sales were strong at 98.9 million l (up 5% YoY), with a decline in domestic sales due to lower purchasing power, which was more than compensated by growth in export deliveries.

Grain sales increased by 11% YoY to 788.3 thousand t in Q4 FY2015, reflecting the combination of a larger amount of in-house grain contracted for the last quarter of the season and higher volumes of grain origination in Ukraine. Exports from Russia remained weak during the last quarter as farmers delayed export sales in expectation of a review of the high wheat export duty. As a result, FY2015 grain sales amounted to a record 4.7 million t, up 12% YoY.

Export terminals' throughput amounted to 949.6 thousand t in Q4 FY2015 (up 13% YoY), with growth in line with grain export sales dynamics. Export terminals' throughput growth in FY2015 of 23% YoY to 4.8 million t reflected the company's execution of grain sales, as well as a higher share of grain delivered through their own export terminals.

Grain and oilseed volumes received in inland silos amounted to 2,521.8 thousand t in FY2015, a decrease of 2% YoY, which is explained by drier weather conditions during the autumn harvesting campaign that reduced farmers' demand for off-farm storage; this was largely compensated by higher capacity.

The company independently carries out logistics activities without the involvement of other market operators. Kernel is the largest private provider of inland silo services in Ukraine with 2.8 million t of grain storage capacity concentrated in key farming regions⁶.

Kernel's silo network is instrumental in the Company's building long-term relationships with farmers and supports the Company's leading positions in the grain and sunflower oil businesses. Company's 40+ silos operate essentially as providers of services to the Group and to third parties (farmers) who need to clean, dry and store their crops. Grain and oilseeds are brought from the fields directly to the silo and are kept for anywhere from a few weeks to several months. Typically, a portion of a farmer's crop is sold immediately after harvest while the balance is stored and sold over the season. Kernel provides silo services for a monthly fee and the farmer is free to sell his produce to Ker-

⁵ Kernel. Who we are [electronic resource] <http://www.kernel.ua/en>.

⁶ Kernel. Who we are [electronic resource] <http://www.kernel.ua/en>.

nel or to a third party. The Company is, however, in an advantageous position to buy the grain, having good visibility on volumes available for sale and easy access to farmers.

Kernel has been actively adding new modern facilities and focusing on increasing its presence in the storage-deficit regions. Through the construction of greenfield storage capacity, Kernel aims to expand its origination zone for both grains for export and sunflower seed for crush, as well as earn on high-quality services provided to farmers and secure storage for own crop production. Over the last three years, the company has commissioned 650 thousand t of greenfield silo capacity.

Kernel's terminals are key infrastructure assets ensuring the efficiency of export logistics of grain, bulk oil and meal exported by the Company⁷. In Ukraine, they operate Transbulkterminal, one of the largest grain export terminal in the country with installed throughput capacity of 4 million t per annum. In September 2012, Kernel acquired through a 50–50 joint venture a 100% interest in a deep water grain export terminal in Taman port, Russia. The third largest deep water grain export terminal on Russia's Black Sea coast, it is strategically located in close proximity to southern Russia's predominant grain producing region and has installed throughput capacity of 4 million t per annum.

Deep water terminals, both Transbulkterminal and Taman, handle Panamax size vessels, loading over 50 thousand t of grain per vessel providing a material freight cost advantage versus approximately 5 thousand t per ship handled in the shallow water terminals of Azov Sea.

Oil transterminal in Nikolayev, Ukraine, handles the Company's transshipment of sunflower oil and meal, exclusively serving in-house needs.

It should be noted that one of the main tasks of logistics is cost management in bringing the material flow from the primary source of raw materials to the final consumer. It includes not only the cost accounting of production and distribution, but also administration of consumption expenses.

In recent years, the average circulation costs of capital goods with respect to their value increased (excluding delivery from supply bases to agricultural companies) to 20–25%, in remote regions to 60–80% or more. It causes the growth of the share of the costs of resources shipment in the total costs of agricultural products production. In the EU countries the use of logistics methods allows to reduce the level of distribution costs by 20%, commodity supplies by 30–70%, reduce inventory turnover time by 20–50%⁸.

Before the agro-industrial complex in the direction of the development of logistics systems there is much tension around the issue of technological equipment upgrading, production modernization and introduction of modern packaging and packing material, construction of the necessary storage facilities and distribution centers, as well as the use of the effective means of products transporting through the logistics chain. Material flows of agricultural production must comply with the material and technical supply flows of agriculture. Therefore, the state support of agriculture and the development of agricultural market infrastructure are important.

⁷ Kernel. Who we are [electronic resource] <http://www.kernel.ua/en>.

⁸ P.P. Goncharov et al., 2012: Logistic approach to solving the problems of agricultural products marketing, *Economic Sciences*, 163–166.

The extent of state support of agricultural producers in Ukraine is quite significant. According to OECD estimates⁹, over the 2010-2012 biennium state support of agriculture of Ukraine amounted to 1.62% of GDP, while the farmers of OECD countries received only 0.34% on average.

Budget support through production subsidies (premiums per head, per ton, concessional interest rates and compensation of the agricultural machinery and equipment expenses, etc.) and general services subsidies (infrastructure, education, sanitary and phytosanitary control, etc.) account for an insignificant share of the total state support of agriculture of Ukraine; farmers receive substantive support in the form of tax benefits (see Fig. 1).

The main problem is financing of various support programs for agricultural sector and rural areas in Ukraine. The traditional 40–50% “kickbacks” when obtaining budget subsidies, the complexity and obscurity of application requirements, non-transparent and questionable activities of the government agencies that are governed by the Ministry of Agrarian Policy and Food (Agrarian Fund, Hlibinvestbud, PJSC “SFGCU”)¹⁰, all of which made budget subsidies and programs unavailable for the vast majority of agricultural producers while the activities of the state-owned enterprises became extremely lossmaking for the state¹¹.

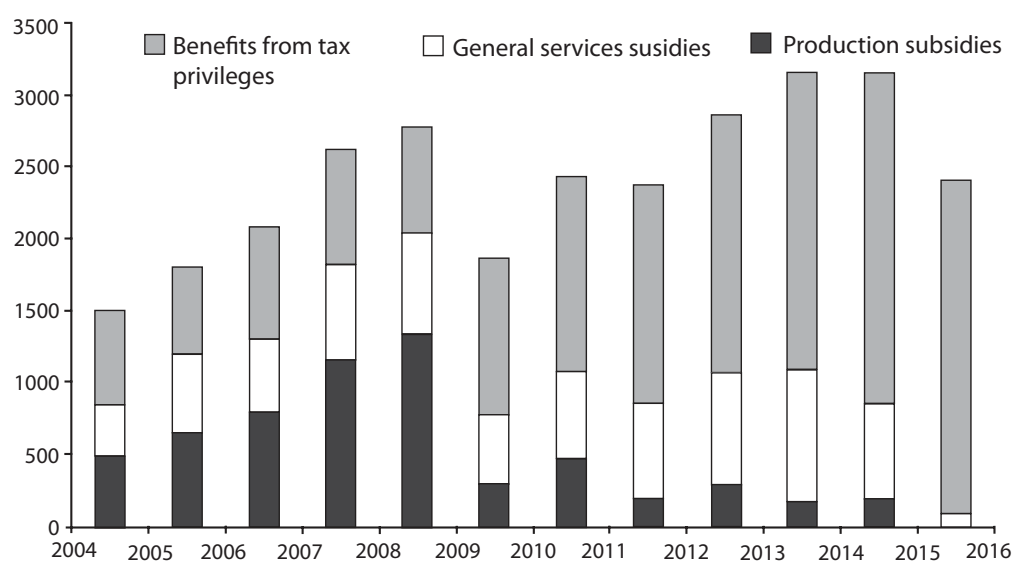


Figure 2. Agricultural sector state support in Ukraine in 2004–2015 (in million US dollars)

Rysunek 2. Dofinansowanie państwowe sektora rolnictwa na Ukrainie w latach 2004–2015 (w mln dolarów amerykańskich)

Source: OECD PSE tables [electronic resource] <http://www.oecd.org/tad/agricultural-policies/producerandconsumersupportestimatesdatabase.htm>.

⁹ OECD, 2014.

¹⁰ Chinese grain claim [electronic resource] <http://goo.gl/8xTt0r>.

¹¹ World Bank, 2014.

Thus, it can be argued that in general budget subsidy support could not significantly affect the development of agriculture as the considerable part of subsidies simply did not reach the producers. All producers (who are eligible to such benefits), however, obtain tax privileges without exception; the interference of government officials in this case is minimal.

The state budget for 2015 virtually envisages almost no funding for production subsidies, other than financing of the Agrarian Fund. In view of the above said, it will not have any significant impact on Ukrainian agriculture but will enable Ukraine to root out corruption through radical reform of the state support system for agribusiness. Farmers will continue to receive the same tax benefits till January 1, 2018 (according to the text of the Coalition Agreement).

The negative factors of logistics development in Ukraine is the lack of licensing, outdated stocks, lack of available IT-solutions, poor training of specialists in the field of logistics.

International logistics companies are afraid to work with the Ukrainian logistics operators, because Ukraine has not yet developed a system of logistic activities licensing jeopardizing the execution of contracts and further work with partners.

For example in Germany logistics revenues are ranked third, its implementation must be licensed to carry out logistics activities¹².

Conclusions

In today's agricultural environment, logistics is a new concept that is largely unstudied and undergoing significant changes in short periods of time. Control process of logistics systems is complex and depends on the market behavior and positions of competitive advantage.

Implementation of logistics systems in agricultural production allows:

- optimizing the structure of flows between sectors and individual enterprises;
- optimizing resource management in the production and consumption of each part of infrastructure;
- coordinating the management of the processes of supply and transportation;
- creating systems of rational use of warehouse of various fields of property on the principles of cooperation;
- optimizing the total cost of products moving;
- optimal distributing the functions of flow processes management between management subjects.

The main focus of logistization is coordination and optimization of operational management of the supply and transportation between producers of agricultural products, processing plants, suppliers and trade agents; cooperative use of infrastructure and resource potential of the economic sector; integration and economic interest of all participants of the logistic system of each link.

¹² V. Shevchenko, 2012: Logistics operations in Ukraine should be licensed [electronic resource] <http://zammler.com.ua/ukr/news/12>.

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